RAILWAY MASTER MECHANIC

VOL. XXIX | CHICAGO | JANUARY, 1905 | NEW YORK | No. 1

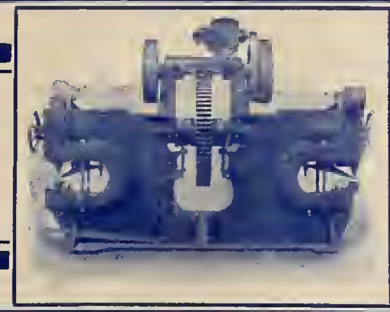
368

Northern Motors for Heavy Tools

THEY do the work economically, quickly — and stand the racket. Then, too, if required, any speed variation necessary with one voltage, two wires, many speeds.

SEE BULLETIN No. 3837

WE SHOW A NORTHERN SPHERICAL MOTOR DRIVING SCULLY DOUBLE PUNCH



NORTHERN ELECTRICAL MFG. CO., Engineers Manufacturers Madison, Wis., U. S. A.

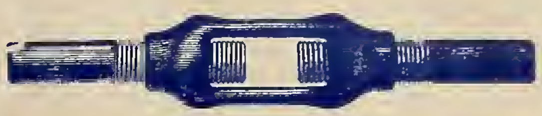
TAYLOR Best Yorkshire Staybolt Iron
Axles and Piston Rods

B. M. JONES & CO., Sole Representatives in the United States, Canada and Mexico. | BOSTON, 159 Devonshire St. NEW YORK, 143 Liberty St.

STRONG TRADE MARK

See Page 10

Turnbuckles



Cleveland City Forge & Iron Co.
CLEVELAND, OHIO

IF YOU WANT THE BEST, YOU WILL CERTAINLY BUY THE FAMOUS STANDARD STEEL PLATFORMS AND THE SESSIONS STANDARD FRICTION DRAFT GEAR BOTH MADE BY STANDARD COUPLER CO 160 BROADWAY NEW YORK

ALLFREE-HUBBELL LOCOMOTIVES ARE
SIMPLE — POWERFUL — ECONOMICAL — DURABLE
Locomotive Appliance Company, Chemical Bldg., St. Louis, Mo.
Sole Manufacturers SMYTH DERAILERS

THE RAILWAY MATERIALS CO.
114 LIBERTY ST.
NEW YORK

STEEL BACK OR MALLEABLE BACK
BRAKE SHOES

W. M. SIMPSON
OLD COLONY BLDG.
CHICAGO

FILES **NICHOLSON FILE COMPANY** RASPS

Our Booklet, File Filosophy, Sent Free upon Application.
GENERAL OFFICES: PROVIDENCE, R. I.

MURPHY CAR-ROOF

IMPORTANT

Our Outside Roof Reduces the Height of your Cars 2 Inches and the Width 6 Inches Less than Any Inside Roof. Ask for Blueprint.

STANDARD RAILWAY EQUIPMENT CO., St. Louis

Perfect Brake Wheel

DAYTON MALLEABLE IRON CO. DAYTON, O.

Dayton Brake Lever

Alphabetical Index of Advertisers, Page 41. Advertisers' Classified Index, Page 28.

RAILWAY MASTER MECHANIC

Security Building
CHICAGO

BRUCE V. CRANDALL, President — **CHARLES S. MYERS**, Vice President — **WARREN EDWARDS**, Manager
O. H. REYNOLDS, Editor — **O. W. BODLER**, Secretary

Index to Volume XXIX.

January to December, 1905,

Issue.	Pages.	Issue.	Pages.	Issue.	Pages.	Issue.	Pages.
January	1 to 44	April	111 to 142	July	223 to 266	October	331 to 394
February	45 to 78	May	143 to 174	August	267 to 298	November	395 to 426
March	79 to 110	June	175 to 222	September	299 to 330	December	427 to 474

Illustrated Articles Indicated by Asterisk

Established 1878.

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO

BRUCE V. CRANDALL, President. CHARLES S. MYERS, Vice-President
O. W. BODLER, Editor. WARREN EDWARDS, Manager

Office of Publication, Rooms 501 and 502 The Plymouth Building, 305 Dearborn Street, Chicago

TELEPHONES - - { HARRISON 3357 / AUTOMATIC 7357

Eastern Office: Room 716, 132 Nassau St., New York City.

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Vol. XXIX. CHICAGO, JANUARY, 1905. No. 1.

Contents.

WITH this issue we begin the publication of an index of all important articles appearing in the leading railway and mechanical journals which are of interest to those connected with railway motive power and rolling stock department. This index will be found this month on page twenty of the advertising pages, and it contains references to articles found in the current issues of nearly fifty publications. There has been no attempt made to make a digest of various articles published during the past month, but simply a descriptive index giving the title of the article, the name of the author, an abstract in a few words, when and where published and the number of words contained. There is now being published every month such a mass of material relating to general railroading and mechanical engineering that it is almost impossible for the average reader to find the time to keep posted on all that is being published, and we shall attempt in this index to do the reading for our subscribers, and present to them in condensed form everything that is published relative to the field of the "Railway Master Mechanic."

ONE of the problems of great interest to railway officials is the reduction of operating expenses for passenger traffic on branch lines. Several attempts have been made to put in cars gasoline engines direct connected to a generator, and the power transmitted to the wheels by means of motors. This system seems very simple but thus far the attempts have been unsuccessful. Other experiments under consideration are to couple the gasoline engine directly to the axle, requiring special means of regulating the speed. The chief difficulty encountered seems to be that the gasoline engine does not respond to great variations in power or speed. For this reason experiments have been made with storage batteries in connection with the engine and generator to take the peak of the load in starting or ascending grades.

Foreign roads have taken the initiative in this class of traffic by introducing a small car propelled by steam. Included in this issue is a description of such a car; having a tubular boiler which is fired by coke or charcoal.

It appears that a better arrangement would consist of an automobile flash boiler in connection with the steam engine. The speed of the steam engine can be controlled easily and variations of power do not effect it to such an extent as the gasoline engine.

THE fifth annual convention of the Chief Joint Car Inspectors and Car Foremen's Association was held last fall in the Transportation building at the St. Louis Exposition. This meeting was very largely attended, and the discussions were exceedingly interesting. The field for an association of this kind is of course unquestioned and its opportunity for useful and practical work is almost unlimited, so that now, with a change of name to include the car foremen, its scope is still further widened. This association should be of valuable assistance to the Master Car Builders' Association in many ways, as it will bring together the men who come directly in constant contact with the different kinds of construction and conditions that prevail in car work, giving them a chance to express their views and ideas, and from this many valuable points may be gathered by the heads of the different car departments throughout the country. Many valuable suggestions are often made by foremen in charge of construction and repairs, and where they can come together to express their opinions freely it is possible for them to be of real service not only to their superior officers, but the discussions will be instructive to the members themselves. As being of interest to readers and as a means of making this association better known to the railway world in general, we are publishing in full elsewhere in this issue the report of the fifth annual convention of the Chief Joint Car Inspectors and Car Foremen's Association.

THE surreptitious removal of engine parts to be applied to another locomotive of the same class standing in the shop, should be discountenanced by the master mechanic, and his position in this regard should be made known down the line to the gang foremen. It is not uncommon for a machinist to ask another where such and such a part is, say for the 950. The reply will be, "I don't know. But you know where to get one. Steal it off the 953 in the next gang." Sometimes the parts are "stolen" from another engine in the same gang. And so it is that a number of minor parts are misplaced, such for instance as braces, hand rail columns, flag brackets, cylinder heads, casings, new bolts from the blacksmith shop, etc. The mere removal of the parts does not constitute a loss to the company in so far as the material is concerned, for lost or broken parts must be replaced. The loss and inconvenience is felt when the "robbed" engine is being assembled and it is learned at the last minute that some of the pieces are missing.

When making repairs, those parts which are to be renewed are provided for and those which may be used again are put aside until the engine reaches that stage in its rebuilding at which they should be applied. Thus the work proceeds systematically. If it is supposed, however, that certain parts are ready to be replaced, and when they are about to be applied it is learned that they have been surreptitiously removed, confusion follows. One or more machinists will waste time looking for that which has been lost, and when it is realized that it cannot be found an order is issued for another. It is probable that the new piece will require more or less machining and a further loss of time ensues, possibly delaying other work depending upon the piece in question.

Mr. Edgar E. Calvin,

General Manager, Oregon Railroad & Navigation Company.

Mr. Calvin was born October 16, 1858, at Indianpolis, Ind. He entered railway service in 1873, since which he has been consecutively, to 1875, telegraph operator, Indianapolis, Cincinnati & LaFayette Rd; at school during 1876; April, 1877 to March 1882, telegraph operator and station agent, Union Pacific Ry.; April, 1882 to June 1, 1887, train dispatcher, conductor and trainmaster, same road; June 1, 1887 to Feb. 22, 1891 division superintendent Missouri Pacific Ry.; Feb. 22, 1891 to June 1, 1895 superintendent Idaho division Union Pacific System; June 1, 1895 to March 16, 1897, general superintendent International & Great Northern Rd.; March 16, 1897 he was appointed general superintendent of the Oregon Short Line and assitant general manager of the same road on May 15, 1903. In March, 1904 Mr. Calvin was appointed general manager of the Oregon Railroad and Navigation Company.

If, instead of depending on other engines for covering spoiled work or providing lost and broken parts, the pieces were ordered as known to be required, they could be machined and provided in the usual order of things. By so doing the system of repair need not be disturbed, and engines will not be delayed while waiting for a missing part whose absence is not discovered until the locomotive is nearly ready to leave the shop.

Of course "robbing" engines in the back shop to provide parts for a locomotive in the roundhouse is not inconsistent. It is important that an engine should be hurried out of the roundhouse as soon as possible to make thorough repairs, for it is on the road that an engine earns interest on the capital invested. However, when an engine in the shop is "robbed" for a roundhouse job, care should be taken to replace the piece or pieces immediately from the storehouse, so that whatever drilling or other machining necessary may be done without delay to the engine in the shop. For instance, if the 950 blows out a cylinder head and the 953 is undergoing general repairs, when the former is brought into the roundhouse, it is perfectly consistent to take a cylinder head from the 953, but another casting should be ordered immediately in order to drill it and turn it to size to obviate delay in the shop on account of the removal.

The Ganz & Co. Motor Co.

IT is generally known to the management, who are in a position to know, that the local and small railroads are maintained only at a great sacrifice. One of the chief factors is that it is unfavorable to run trains consisting of locomotive, tender, mail and baggage cars and at least two coaches, bringing the weight per passenger to three and often five or six tons. In order to make the branch a paying investment, relief must be sought in some way. This is accomplished partly through the reformation of operation, and the introduction of proper vehicles.

From experience the following means are recommended principally in reference to the enlargement and stability in the transportation of passengers:

1. The adoption of a good time table in which the chief importance is not the increase in the size of trains, but to suit the local conditions.
2. To increase the number of trains.
3. To reduce the fare as much as possible.

The present system of handling as large trains as possible is encountered in the first claim. It will necessitate such means of traffic in which the total weight is as small as possible, the machinery is simple and economical, the attendance does not require special trained men, and finally that the whole outfit is suitable and sufficiently reliable to be able to reel off the necessary speed in the transaction of passenger, baggage and mail traffic.

These fundamental principles were borne in mind in the construction of the Ganz & Co.'s motor car system, which consists of the following: On a light coach, that is sometimes provided with mail and baggage room, they put a steam motor with boiler of greatest strength and reliability and least weight. This makes the source of power a part of the car and its weight is hardly noticeable.

This motor car system embodies all the technical advantages, that are suitable for the attainment of the fixed goal. Its principal points are quoted in the following:

1. The motor is a reversible 35-horsepower two-cylinder compound and provided with simple control.
2. The compound construction makes it possible for the most economical distribution of steam. The motor can, however, be started as two simple engines by means of a simple valve, which is of great advantage in starting, ascending grades or in cases where extra power is required.
3. The motor is enclosed in a closed, dust proof, cast iron box, which serves as an oil reservoir at the same time. This makes it possible for all parts of the engine subject to friction to run in an oil bath. From this the following advantages are obtained:

a. The wear and tear is very small.

b. The amount of oil used is small, so that it is sufficient to replace the supply monthly. The first filling takes about 44 pounds and the amount replaced averages from 10 to 12 pounds per month. We note here that the oiling of the cylinders is by menas of a separate pressure pump and the consumption is also small, namely, an average of .00725 to .0169 pound per mile.

c. The motor is protected from all incompetent manipulation. After regular handling in transit it needs no

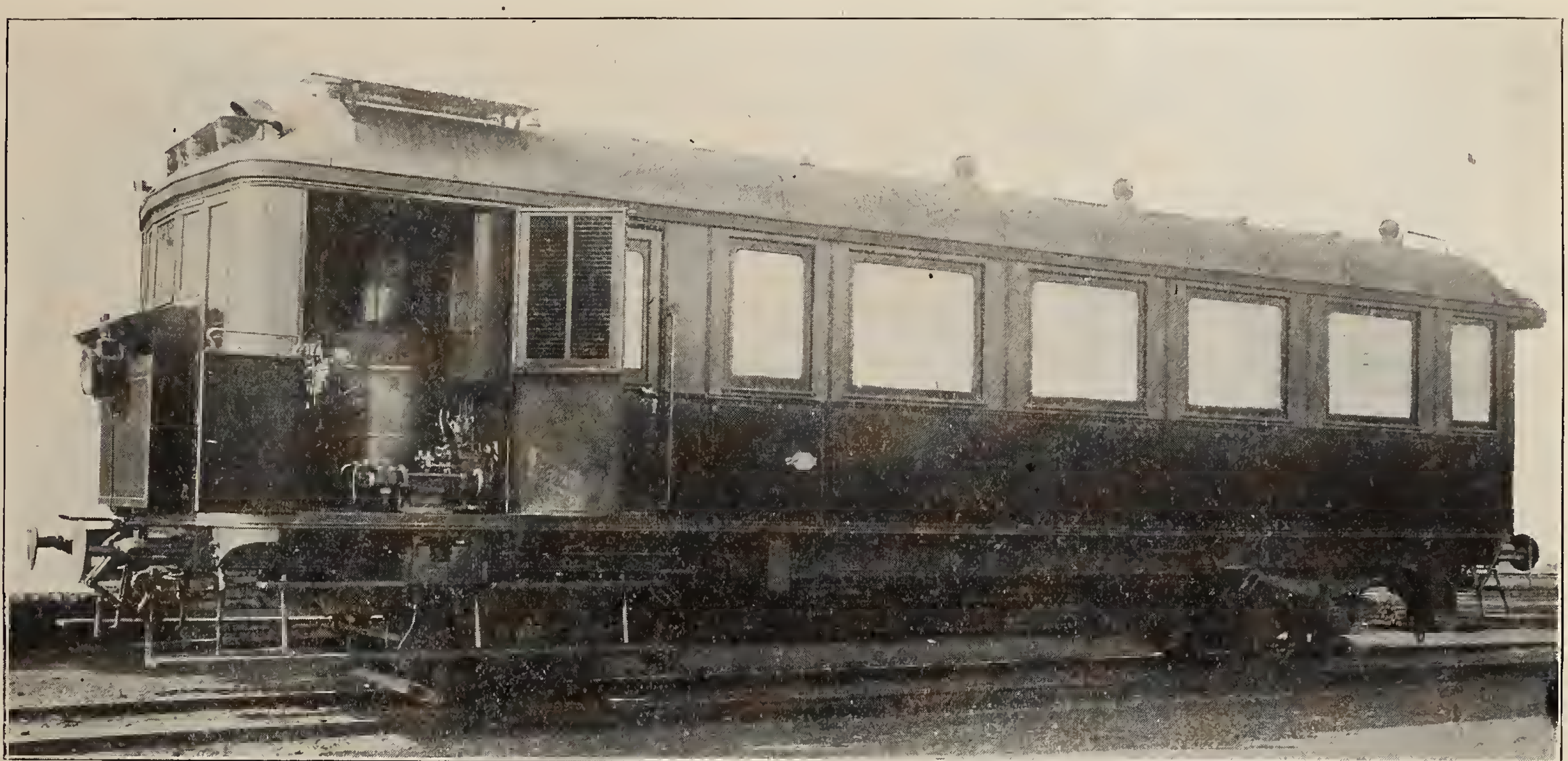


Fig. 1.—Ganz & Co., Motor Car.

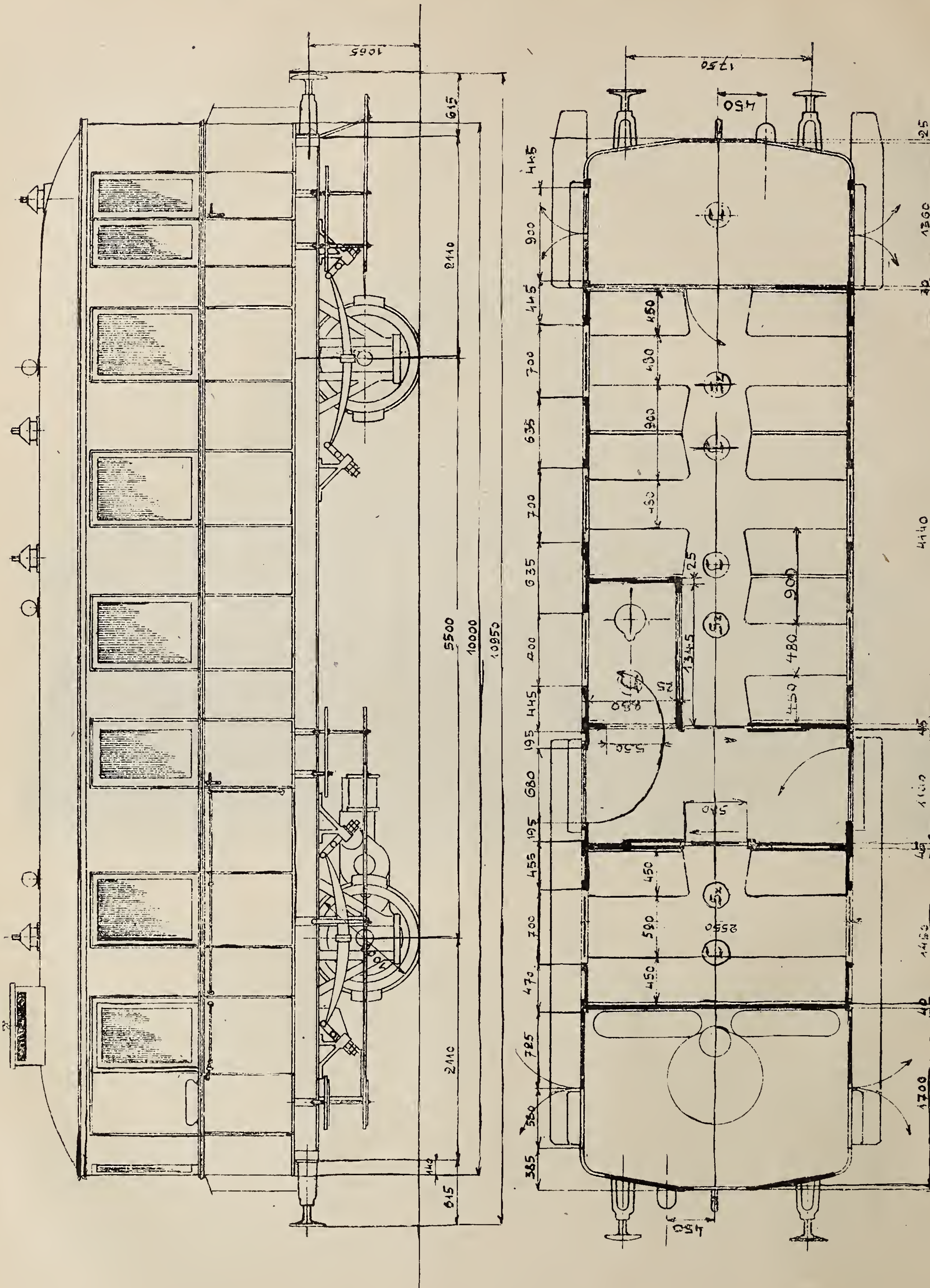


Fig. 2.—Elevation and Plan of Ganz & Co's Motor Car.

inspection or other operations. It has been fully demonstrated that the motor needs not more than one thorough inspection per month.

4. The motor housing is fastened to the axle so that it forms with it a solid construction. It is hung to the truck on the side of the vibrating parts of the cylinder. After loosening the latter, except for the piping, the motor together with the axle can be put in or out like an ordinary axle.

5. On cars with single trucks the above connection of motor, namely, their patented system, makes it possible to arrange the latter to curve just as easy as with the ordiary direct connected axle. This is due to the fact that in such equipment the customary simple spring rigging can be retained.

6. Every part of the motor is manufactured exactly to caliber so that parts which have become worn or broken can be replaced quickly without extra labor. By this means the greatest damage can be repaired in a short time.

7. The power is transmitted to the connected axle through two pair of separate maintained gear wheels; through which:

a. The even running of the equipment is insured, in that with this arrangement the wheels on the connected axle receive an even rotation, not like machines with the locomotive system, whose transmission of power works with fits and starts on the wheels of the connected axle. and brings forth the damaging pounding motion. Those which receive motion by fits and starts raise the amount of power consumed and are therefore of the kind that entail loss through the absence of the even speed insured by the geer teeth transmission.

b. Through the even speed of the equipment, the demand on the track is noticeably reduced—in comparison to the locomotive system—which reduces the cost of maintaining the track to a great extent.

c. It is also noted that according to the last advantage, the weight previously allowed on axles for local trains can confidently be incresaed.

d. A large fluctuation in the limit of tractive effort and speed is insured. With small load, as for instance only passengers, it can pull the car with greater speed, while with heavier loads and slower speed it develops a greater tractive effort.

e. It is possible to make the car smaller and make more trips. By this means the weight is reduced considerably in proportion to the regular machines. The regularity of motion of the parts overhanging the trucks is also afforded through the smaller car and the above emphasized even speed is advantageously influenced by these means.

f. The small weight of the motor, about 1,650 pounds, makes it possible for favorable distribution of weight on the axle, so that the allowable limits are never exceeded.

The boiler of the car corresponds not only in respect to the production of steam; but the same has proven itself the most advantageous and suitable among the available motor car boilers. The main fetaures of the same for the operation of motor cars are summed up as follows:

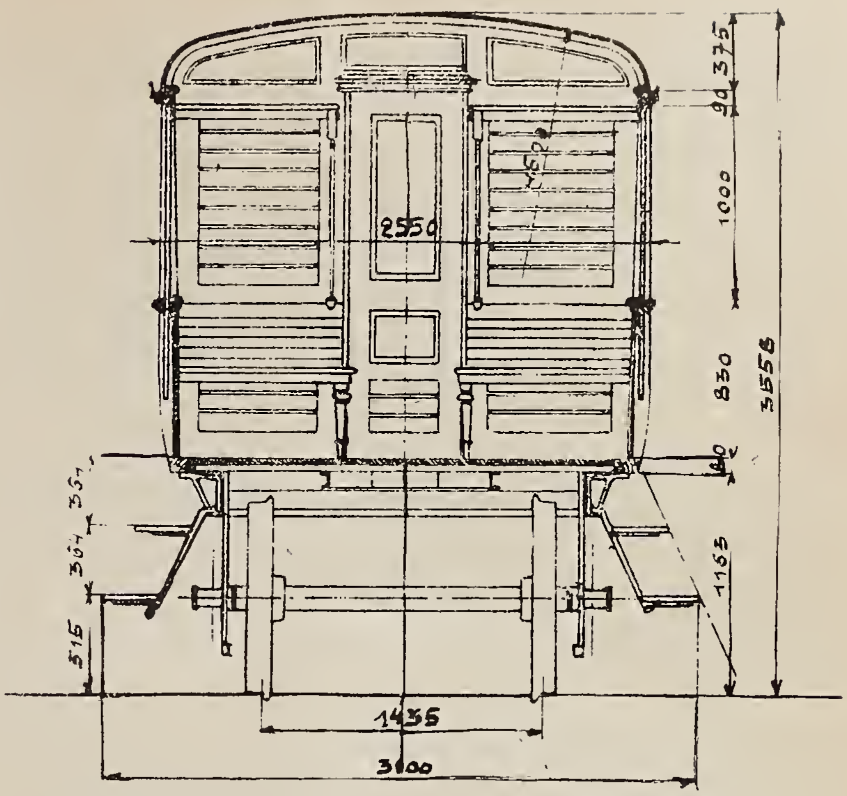


Fig. 2.—End Elevation Ganz & Co's Motor Car.

DESCRIPTION OF CAR ILLUSTRATED.

Seating capacity II class	9
Seating capacity III class	20
Total	29
Total weight, without water and coal	29,500 pounds.
Horsepower	35
Feed water for 43.5 miles, about	264 gallons.
Fuel—coke or charcoal—about	220 pounds.
Fuel used per mile, about	5.3 to 6.8 pounds.
Maximum speed on level	34 miles.
Maximum speed with 30-ton load on level	15.5 miles.
Maximum grade with single car	30 per cent.

1. On account of its small dimensions, 32¼ inches diameter and 43½ inches high, it takes up little room, and can therefore be placed on the motorman's platform, taking up very little of the space. The boiler has a great capacity for steam production, so that it furnishes steam in sufficient quantity even in the greatest emergencies.

2. The attendance while working is very simple on account of its small size and suitable construction; as is also the firing which is done from the top. With suitable fuel, coke or charcoal, the grates are easily cleaned by means of shakers. The grate is lowerable and adjustable, so that it can be cleaned quickly even when fuel with larger residue than the above mentioned is used.

3. The boiler is removed as easily as the motor. After loosening the screws in the floor and opening the hinged side wall, it can be put on the floor or exchanged in a short time. The boiler has every detail made exactly to caliber like the engine, so that parts which become damaged can be replaced quickly and without much labor.

4. On account of its small size a high working pressure can be maintained with safety, which makes it possible to make the most economical use of the fuel and water.

5. The cleaning and washing of the boiler is easily and quickly performed. First, on account of the short flues, quick circulation prevents the collection of mud and scale. Then the boiler is provided with a construction at the mouth of the feed pipe by means of which the water jet of the feed pump, can be made to blow out the remote mud.

6. It is a noticeable feature in the construction as well as safety, that the boiler is not constructed with rivets, but is put together with anchor screws. By loosening the screws any part can be removed or made accessible.

floor is covered with linoleum. The side walls are provided with parcel racks. The third class compartments have latticed seats, walls and ceiling of two different natural colored, varnished wood. The floors are painted and the parcel racks are made of wooden slats. Further the car has steam heat, acetylene or gas light, superstructure windows or torpedo ventilation, conductor and signal bells, signal lamp and steam whistle.

This motor car system, with the technical advantages brought out is, according to all trials, perfectly reliable and corresponds with the above formulated claims as follows:

a. The motor car can, on account of its capacity, with a light coupled trailer outside of its own weight, readily carry 100 to 150 passengers, their baggage and the first class mail.

TABLE I.

Year.	Average number of passengers per day.	Remarks.
1899	35	Beginning July 27.
1900	113	One train each way per day.
1901	127	One train each way per day and two market trains per week.
1902	170	Since May 1, motor trains; one train each way per day and two market trains weekly; since October 1, cheaper fare and two trains each way per day.
1903	288	Two trains each way per day and two market trains per week.

7. The boiler is fed by means of steam pumps, one of which is held in reserve. The advantage of this feed is that it can be regulated on a continuous run according to the amount of water used. It, therefore, is superfluous to start the pumps before starting, in order to regulate the height of the water.

For the average material consumed in the operation of this system we give the following data:

Fuel on single motor car 5.3 to 10.6 pounds per mile.

Fuel on double motor car, 8.8 to 14.1 pounds per mile.

Water on single motor car, 3.1 gallons per mile.

Water on double motor car, 6.2 gallons per mile.

The water storage is generally sufficient for 37.5 to 43.5 miles.

The maximum speed varies from 34 to 52¾ miles per hour on the single car type according to the gross weight. The maximum grade it can overcome is 40 per cent.

The interior arrangement and furnishings of the car are followed out with the idea of simplicity, beauty, and solidity. The principal equipment consists of Griffin or Tyres wheels, raisable windows provided with counter weights, hand brakes with eight brake shoes; eventually both cars will be equipped with automatic or non-automatic air brakes. The motor regulation apparatus can be operated from both ends.

In the I and II class compartments cane seats are upholstered with horse hair and covered with moquette, or are provided with removable cushions on cane seats. The walls and ceiling are covered with varnished veneer. The

b. The cost of trainmen and maintenance of rolling stock are reduced to a small amount. The cost of operation on the mileage basis is about one-fourth that of the locomotive.

c. The weight of the car together with the trailer is about 20 tons.

d. The weight of the motor equipment is very small but nevertheless the trains can easily travel 25 to 30 miles per hour and 75 to 100 miles per day.

e. In order to reduce the cost of maintenance and to avoid any increase in weight on the interior finishings of the car, everything is made simple, but pretty and substantial. This motor car system was adopted by many foreign local railroad managements on account of these projected claims, and since this system, owing to its superiority, has proven itself worthy of this trust by experiments carried out, other roads have introduced the steam motor car system partly for passenger and partly for express traffic.

Owing to the complaisance of these roads we are able to present data from experience of the practical results of the system as well as on the improvement in traffic; also on the decrease of operating expenses which we quote below:

Table I contains comparative data on the number of passengers carried on the Kovacshaza-Bekescsaba branch of the Alfoldreko line of the locomotive train and the motor car system which was introduced later:

TABLE II.

Period.	From Arad.	From Pescka.	From Battonys.	Total.
	Number of Passengers.			
April to August, 1902	18,960	12,230	6,730	37,920
April to August, 1903	39,112	25,105	14,009	78,226
Increase in 1903, 40,306.				

TABLE III.

Branch.	Csaba Kovacshaza.	Csaba Veszto.	Arad Brao.	Brasso Hosszufaln.
Number of trains per day..	Two trains each way per day and twice a week three trains.	24 trains each way day.	Two trains each way per day.	Week days 16 Holidays 22.
Amount of traffic with motor car................	2	3	1 steam motor car, 1 benzine motor car in reserve.	2
Weight of motor car......	12 tons.	12 tons.	13 tons.	13 tons.
Max.. attached weight and the number of cars......	4 cars at 5 tons or 20 tons.	3 cars at 5 tons or 15 tons.	1 car 7 tons.	1 car 4.5 tons.
Total weight of train......	32 tons.	27 tons.	20 tons.	17.5 tons.
Total seating capacity.....	94	76	73	67
Operating cost without crews, per mile..........	3¾ cents.	3¼ cents.	2½ cents.	3¼ cents.
Cost of crew, per mile......	1¾ cents.	1¾ cents.	2¼ cents.	2.9 cents.
Fare per mile, I, II and III class	Up to 6¼ miles 4 cents, 6¼ miles or more 2 cents.	Up to 6¼ miles 4 cents, 6¼ miles or more 2 cents.		1 class 1.2 cent. 2d class .5 cent.
No. of passengers per day	288	800	200	225
Maximum grade...........	6 per cent.	10 per cent.	3 per cent.	25 per cent.
Distance operated..........	30½ miles.	9.3 miles.	93 miles.	10½ miles.

Table II shows the improvement of passenger service on the Arad-Battonya branch of the Arad-Csanader Railroad:

These figures deal only with passengers traveling between the three stations mentioned, the through passengers not being counted. In the first five months of the year 1903 the passenger traffic increased 106 per cent in comparison to the same time of the previous year, while the fare with the motor car was reduced 50 per cent. The management of the above road consider the expenditures as a business proposition, and the amortization of the capital invested in the motor car was considered a splendid point, so that the equipment on the line was immediately increased.

TABLE IV.

	Daimler Benzine Motor.	Serpolet Steam Motor.	Accumulator.	Ganz Steam Motor.
Weight of car......................	14.28	20.14	32.22	13
Seating capacity	24	32	56	33
Distance covered per day, miles.....	58.5	56	56	124
Cost in cents of maintenance per mile	2.7	2.35		2.1
Cost in cents of oil per mile.........	.193	.18		.085
Total cost in cents of material......	2.893	2.53	8.	2.185
Depreciation per mile in cents.......	.121	.079	.142	.066

The fact that the operating expenses of the motor car system are small, will be seen from the data in table III which was collected from actual practice:

In table IV we give figures published in the "Zeitung des Vereins deutscher Eisenbahnverwaltungen," of the Wurtembergishen state roads for comparison with the Ganz system:

These figures show the advantage of this system over others in regard to the work accomplished, and material used, especially the latter in comparison to the passengers per mile.

The data produced here shows without a doubt that the motor car system increases the local traffic. There are numerous small roads and branches that can transact all their passenger and express traffic with one car. Under such conditions the car could possibly take a freight car daily by which means considerable can be saved.

With the operation of this class of equipment the local trains can be increased, which is impossible with the locomotive on account of the greater expense.

The motor car can also be used instead of the present accommodation freight. The present trains of that class go very slow, are used very little and cause considerable expense. There are amongst them some trains that connect with trains on the main line, which seldom carry more than 8 to 10 passengers. With half the cost, two motor trains could handle the same traffic and maintain a greater local interest.

The motor cars can also be used in connection with the fast trains on the main line to good advantage. They could collect passengers between the regular stops of the fast train and deposit them at the regular stopping places. By this means the number of station stops of the fast train could be reduced, which is of great importance. The inconvenience of changing cars from the motor car would be done cheerfully if time could be gained by having less stops on the fast train.

Welding Cast Steel Locomotive Driving Wheels

CAST steel locomotive driving wheels having broken spokes can be welded in the following manner: Clamp the broken section in position and cut a "V" shaped piece out of each side of the spoke where it is broken. Then set in a piece wrought iron and weld it on one side of the spoke. When this part of the weld is complete, turn over the wheel and place another "V" shaped piece of wrought iron in the spoke and weld it again.

This simple scheme has been worked very successfully and saved scrapping a large number of wheels.

Northern Pacific 2-8-2 Type of Freight Locomotive

THE Northern Pacific recently received a lot of fourteen 2-8-2 or Mikado type of freight locomotives from the Brooks works of the American Locomotive Company. These engines are in accordance with the design of Mr. D. Van Alstyne, superintendent of motive power, to suit the special conditions of service and fuel. The record of performance thus far has been more than satisfactory in the high speed freight work for which they were designed.

The sparking characteristics of the bituminous coal to be used accounts for the diamond stack and petticoat pipe which are used with horizontal netting. As would be expected, there are some original ideas worked out in the boiler by Mr. Van Alystine who made some investigations as chairman of the boiler design committee of the Master Mechanics' Association. The boilers are 75¾ inches diameter and have 374 2-inch tubes spaced 3 inches centers, leaving a bridge 1 inch wide. The water spaces at the mud ring are 4 inches wide at the sides and back and 4½ inches at the front and widen rapidly

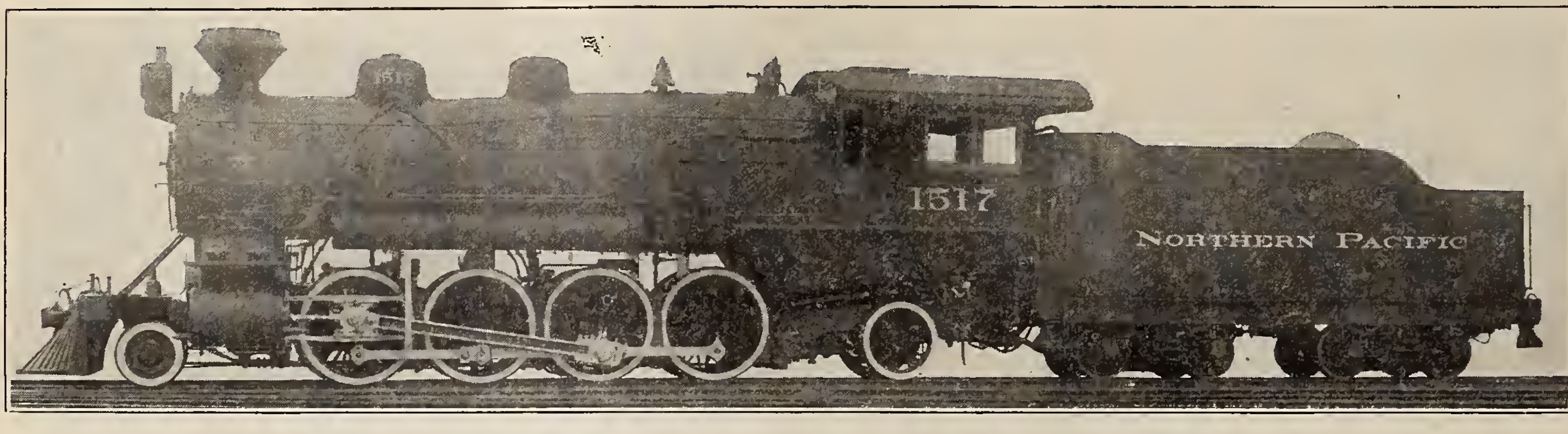


FIG. 1.—NORTHERN PACIFIC 2-8-2 TYPE OF FREIGHT LOCOMOTIVE.

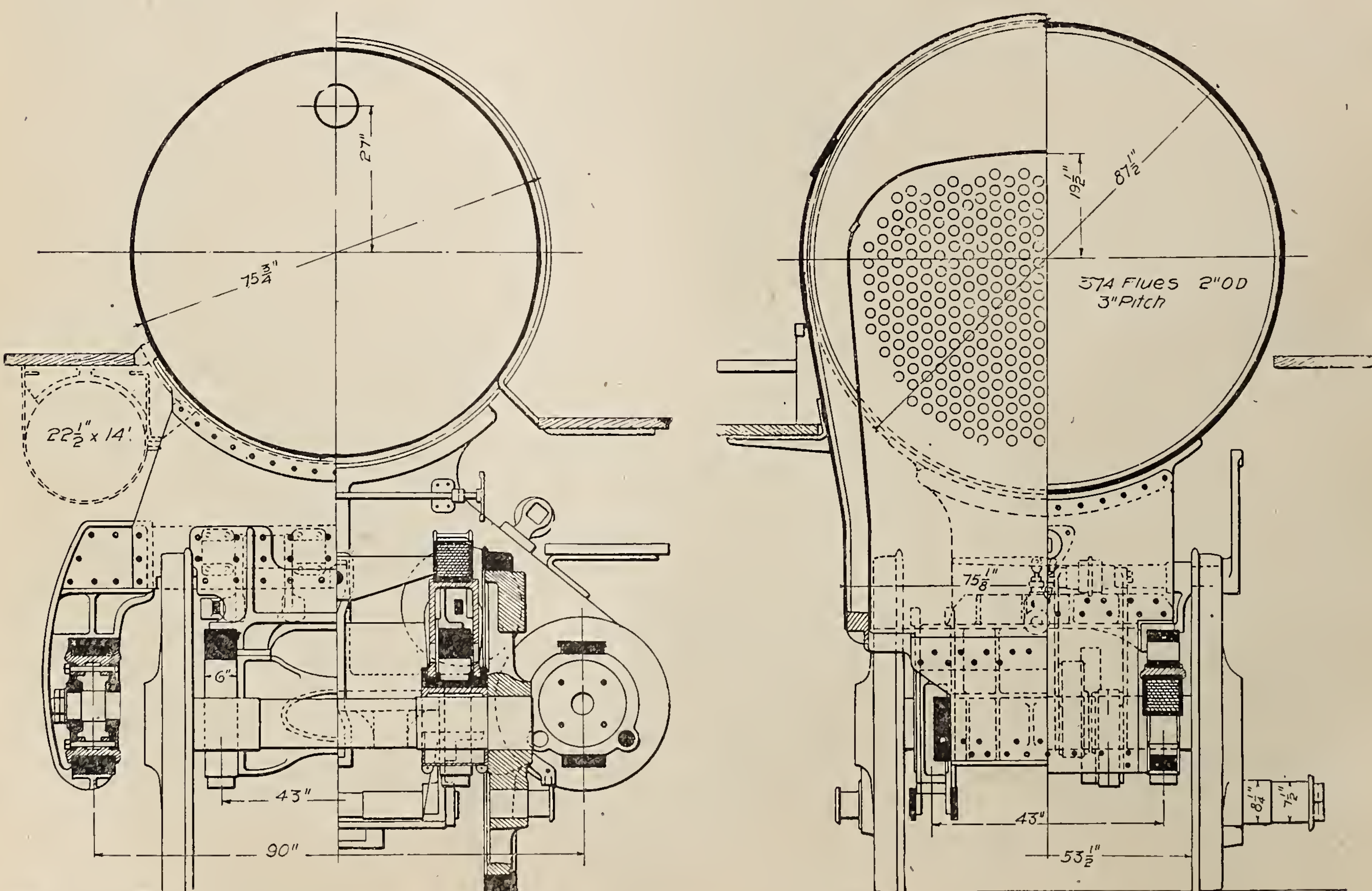


FIG. 2.—SECTIONS OF NORTHERN PACIFIC 2-8-2 TYPE OF FREIGHT LOCOMOTIVE.

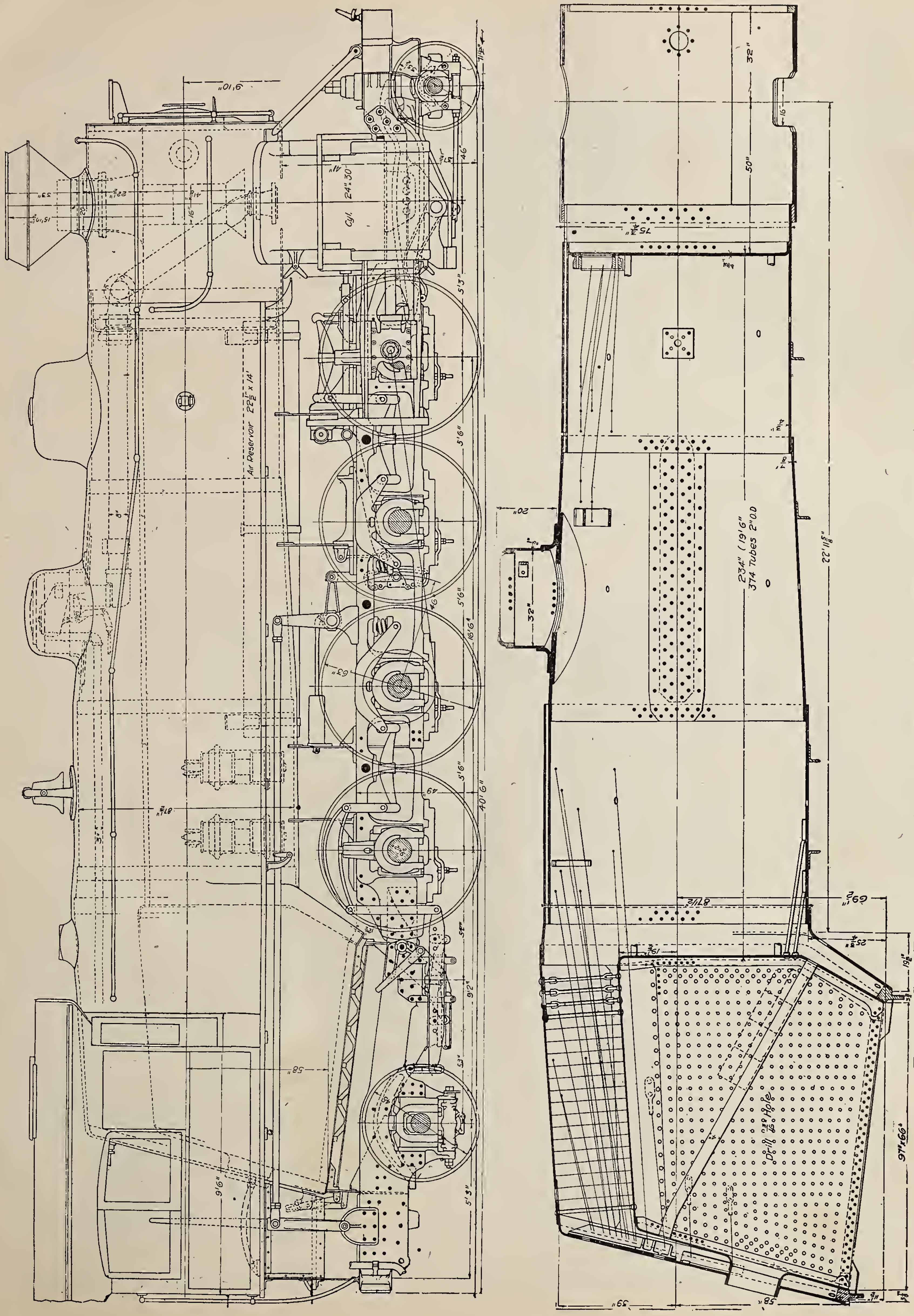


FIG. 3.—SIDE ELEVATION AND BOILER OF NORTHERN PACIFIC 2-8-2 TYPE OF FREIGHT LOCOMOTIVE.

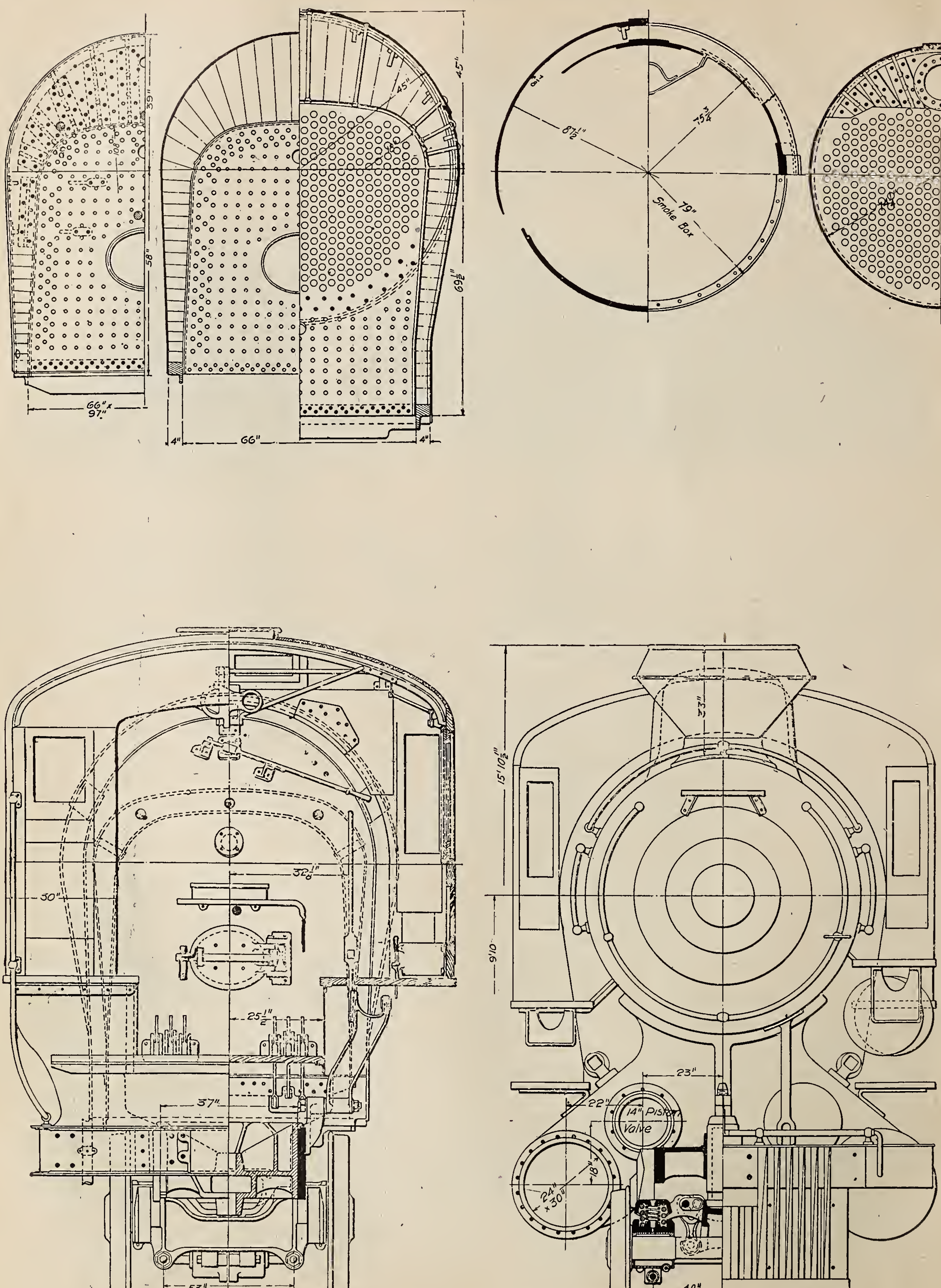


Fig. 4.—Sections of Boiler and Locomotive of Northern Pacific 2-8-2 Type of Freight Locomotive.

toward the crown sheet. These are factors that are believed to be very influential in their influence on the steaming capacity of a boiler, as well as the life of the same, since they have an intimate connection with circulation on which the success of the boiler depends.

There are two 9½-inch air pumps, both located on the left hand side. Cast steel is used in the driving wheel centers, driving boxes, equalizers, frame braces and many other parts in accordance with a modern practice. Although they are not the heaviest engines in the world they weigh 259,000 lbs. of which 196,000 lbs. is on drivers.

The general dimensions are as follows:

Guage	4 ft. 8½ in.
Weight in working order	259,000 lbs.
Weight on drivers	196,000 lbs.
Weight engine and tender	405,500 lbs.
Tender capacity, water	8,000 gal.
Tender capacity, fuel	12 tons.
Fuel	Bituminous Coal.
Engine type	Simple.
Cylinders, diameter	24 in.
Stroke, length	30 in.
Wheel base, rigid	16 ft. 6 in.
Wheel base, total	34 ft. 9 in.
Wheel base, engine and tender	63 ft. 1 in.
Heating surface, tubes	3,798 sq. ft.
Heating surface, fire box	200 sq. ft.
Heating surface, arch tubes	9 sq. ft.
Heating surface, total	4,007 sq. ft.
Grate area	43.5 sq. ft.
Journals, driving, main	10 x 12 in.
Journals, driving, others	9½ x 12 in.
Journals, engine truck	6½ x 12 in.
Journals, trailing truck	8 x 14 in.
Journals, tender truck	5½ x 10 in.
Boiler, type	Extension Wagon Top.
Boiler, pressure	200 lbs.
Boiler, outside diameter, first ring	75¾ in.
Fire box, length	97 in.
Fire box, width	66 in.
Fire box sheets, crown	½ in.
Fire box sheets, tube	⅝ in.
Fire box sheets, sides and back	⅜ in.
Fire box, water space front, 4½ in.; sides and back, 4 in.	
Crown stays	Radial, 1 in.
Tubes	374 2-in. No. 11
Tubes, length	19 ft. 6 in.
Valves, type	Piston.
Valve travel	5⅝ in.
Boxes, driving	Cast steel.
Brake, driver	American and water.
Brake, tender	Westinghouse.
Air pumps	Two 9½-in.
Air reservoirs	Two 60,000 cu. in. capacity.
Engine truck	Radial.
Trailing truck	Player radial.
Exhaust pipe	Single.
Grate, style	Rocking.
Piston rod, diameter	4¼ in.
Piston packing	Snap ring
Wheels, driving, diameter	63 in.
Wheels, driving, material	Cast steel.
Wheels, engine truck	Boise plate.
Wheels, trailing truck, diameter	45 in.
Tractive effort	46,600 lbs.
Ratio weight on drivers to tractive effort	4.2.
Ratio tractive effort to total heating surface	11.7.
Ratio total heating surface to fire box heating surface	20.
Ratio total heating surface to grate area	92.1
Ratio fire box heating surface to grate area	4.6.
Ratio of total heating surface to volume of both cylinders	255.
Ratio of grate area to volume of both cylinders	2.77.
Ratio of total heating surface to weight of one cylinder full of steam at boiler pressure	1,085.9.

Railway Mechanical Training as Viewed by a Technical Graduate.

On page 489 of our December issue we published a letter signed by "Q" on the above subject. In accordance with his suggestion several railway officials have sent in communications which we give below:

Editor Railway Master Mechanic:

Dear Sir—Referring to "Railway Mechanical Training as Viewed by a Technical Graduate," in the December issue of the Railway Master Mechanic, I believe that your correspondent has the right idea regarding special apprentices.

It is unfortunate but nevertheless true that too many of the above class regard themselves in need of the hothouse care.

So much has been written on this subject that I do not care to express myself at length, but briefly I am not in sympathy with too much special attention.

The technical graduate may be presumed to be better equipped for the railway service than many others, and no matter where he is placed, if of the right material, he will make a way for himself. Experience handed out with precision is usually not of the right kind, and I think it better for the apprentice to learn to pick up experience by his own efforts. The opportunity may be given him but he should learn to see it himself and take advantage of it.

The technical graduate of fifteen years ago had no such opportunities as are given today, but he looked for chances and took them.

We have several graduates working now but have no special course of instruction for them. They are naturally drifting into the work most suited to them, and as their ability to assume increased responsibilities becomes apparent such duties are assigned to them.

It does not seem advisable to spoil a good office man in order to make a poor shop foreman or vice versa.

Naturally I believe in the technical graduate. Some are good, probably the majority, and some are not suited to railway work, but we must learn that by experience. Give the good ones an opportunity to show what they can do and advance them as rapidly as consistent. It is for them to make the showing, for I do not know of any prescribed rules for making mechanical superintendents.

Yours truly,

T. A. Foque.

Mechanical Superintendent M., St. P. & S. S. M. Ry.

Editor Railway Master Mechanic:

Dear Sir—The writer's experience in this line consists of a three years' apprenticeship to the machine trade in the locomotive shops, two years at a technical school, graduating, and ten years as Engineer of Tests and Superintendent of Motive Power.

I am inclined to think that in the mind of many that the value of a technical graduate is over-estimated, certainly in the minds of the majority of technical graduates. The essential differences are these: that the non-technical man has usually an untrained mind; has no knowledge, or at least but slight knowledge, of the laws of nature and hence the laws governing the apparatus which he handles and the conditions of the problems which he is called upon to solve. On the points of energy, capacity for intellectual development, and that peculiar characteristic denominated or called horse-sense, the one seldom has much advantage over the other. We have here five points, on the first two of which a technical graduate excels. This should make him over 66 per cent better than the non-technical man. However, these two points seldom show to their full value at the beginning of a career, but it is after years of training, where the technical man has had ample opportunity to familiarize himself with the problems which he has to handle, that his trained mind and thorough knowledge of nature's laws becomes more valuable. The failure to realize this has been the cause of a large number of technical men becoming discouraged, throwing up the sponge, and going into those lines of work which were more lucrative and where the men had an easier means of earning a livelihood. A non-technical man, however, is not subject to such discouragement, as he realizes that he does not know it all and accepts thankfully what little may come to him, whereas the technical man too frequently thinks that he is omniscient and becomes too readily discouraged and disgusted when he finds others have not the same exalted opinion.

Very truly yours,

L. S. Randolph,

Consulting Engineer, Blacksburg, Va.

Editor of the Master Mechanic—The letter which was signed "Q" in your December issue expressed views which should start all motive power men thinking once more. So much has been said and so little done about the special apprentice that it is enough to disgust and discourage those who are deeply interested in this all-important subject.

Being a technical graduate, the writer feels free to say that many of our technical schools are responsible for a certain set of fools, "soreheads" and combinations of the two who disgust railroad men of all degrees, and prejudice them against college men as a whole. I think this is due to the fact that these schools do not employ engineers but mere theorists—"paper" men.

Every man who enters college should be taught from the time he registers as a freshman until he is presented with his diploma that when he shall have graduated he has only just begun, that he has merely learned how to learn. The courses should combine as much practical work, practical application of theory as possible. Summer work in railroad shops should be interpolated where possible.

When the man enters the special apprentice course of some railroad, he should study well his fellow workmen, and while treating all courteously and cheerfully, giving them the benefit of his training when requested by them to work out some little problem and the like, he should ever bear in mind that he is working for advancement and never do or say that which might some day be thrown up to him to his detriment. He should become as proficient a mechanic as possible, and furthermore bear in mind that there is not one man in any shop organization from whom he cannot learn something. During his spare time he should keep apace with events in his profession by reading technical literature. He will soon find himself in a position where he can offer valuable suggestions.

Railroads can always find test laboratory men, and I will agree with "Q" that the test department (while an essential and indispensable adjunct to the organization of every railroad) is a sidetrack for an ambitious man. A few weeks or months in the laboratory is sufficient, and if the railroad has enough special apprentices it will not be necessary for any one man to stay very long there.

Railroads want men with executive ability and initiative, and the places to develop these attributes are in the machine and car shops first and the roundhouse afterwards. Good roundhouse and general foremen are scarce and their lives are never beds of roses; but if a man wants variety, excitement, hard work and one continual test of his patience, let him take a roundhouse. If he pulls out creditably, his chances are good; if not, he had better enter other business.

Occasional consultations with one's superior officers are fruitful in that the foremen or master mechanic can ascertain what the apprentice most needs. A railroad needs technical men with practical experience, and these men are the more valuable to their company if they have received their training at least in part with that company. Almost all of the railroads do not give enough attention to the training of their men. They should offer sufficient inducements to keep their men and special inducements to their highly efficient ones. It is wrong for a mechanical superintendent who has lost a good foreman or master mechanic to say: "Oh well, he was not much good anyway!" My observation has convinced me that many grave errors have been committed by officials letting first class and well trained material slip away from them for want of taking proper care of their bright and efficient men.

If a road decides to adopt the system, why not let the assistant mechanical superintendent or the mechanical engineer (preferably a man who has gone through it himself) be responsible for special and regularly indentured apprentices? While his position in the matter would be advisory for the most part, he could arrange courses, receive periodical progress reports, and be in constantly close touch with the situation. Foremen and master mechanics would then know that some one particular man was watching the matter closely and they would necessarily hold up their ends or be made to answer for it.

Why is all this trouble necessary, you ask, and what good will ensue? The answer lies in the answers to several questions. Have all railroads enough supervision so that they are as economically operated as it is possible for them to be? Is not a railroad a commercial proposition? Should not operation be based upon the principles of economics? Should not the very best talent occupy the positions of responsibility? Is it not economy to provide for the future? Can men be well trained without a *system of training?*

Yours truly, "R. R."

Dining Car for the C. B. & Q. Ry.

THE Chicago, Burlington & Quincy Railway have recently added four new dining cars to its commissary department. Two of these cars were built by the Pullman Company and are illustrated herewith.

The general appearance of the outside is shown in Figure 1. The most noticeable feature about this is the low broad windows set high above the floor line and the design of small art glass windows.

FIG. 1.—DINING CAR FOR THE C., B. & Q. RY.

The cars are 70 feet long over sills, and are of standard Pullman construction with cantilever truss and continuous blocking, wide vestibules and standard six-wheeled trucks. They are painted a standard Pullman color with a single broad gold stripe around the bottom and small gold lettering. There is no fancy gold scroll work of any description on the outside.

Figure 2 gives the floor plan. The tables are arranged to seat four persons at the tables on one side of the aisle and two on the other, giving a total seating capacity for 30 persons. The general arrangement of the kitchen pantry, dining room and aisles is not materially different from that usually used in dining rooms.

Figure 3 gives a view of the interior of the dining

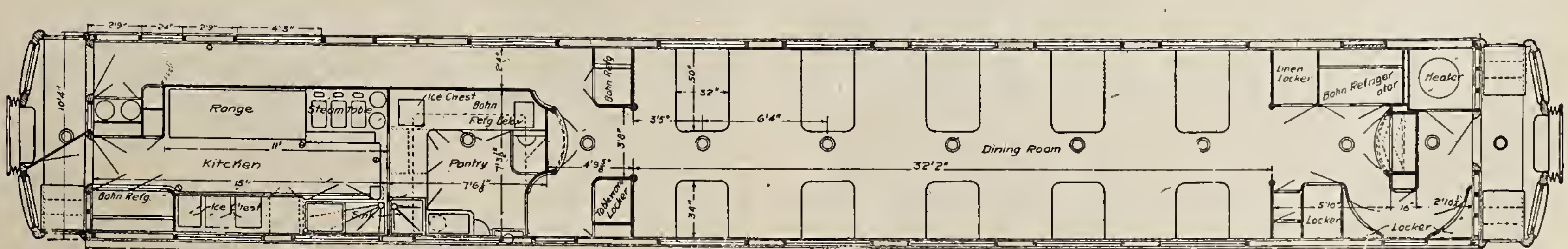


FIG. 2.—FLOOR PLAN OF DINING CAR FOR THE C., B. & Q. RY.

FIG. 3.—INTERIOR VIEW OF DINING CAR FOR THE C., B. & Q. RY.

room looking towards the kitchen. The rich appearance of this room is clearly shown in this illustration. It is almost identical in general features with the interior of the cafe-smoking car exhibited by the Pullman Company at the World's Fair, which received much favorable comment. The principal differences in the two designs is in the plain walls and elimination of the small lights over the table in the Burlington car.

The upper deck, as can be seen, is of the square flat beamed design in natural wood with a dead rubbed finish. The lower deck and side walls to the top of the wainscoting are in solid burnt orange color and are only relieved by the two natural wood ornamental braces coming down between the windows. The wainscoting rises high between the windows and is in a very plain panel effect. Between each of the windows above the wainscoting is located a lamp of art glass and verde antique metal work. The lamps in the upper deck are also of the same design in a square effect. The bottoms of the windows are set some six or eight inches higher than has been customary and niches are provided below each window, which add materially to the area of the table. This arrangement of windows is perfectly satisfactory, allowing a clear view to the outside, and prevents the whole table and its array being visible from the outside.

All the woodwork is of English oak, dead rubbed and having very few mouldings or carvings. The chairs are upholstered. seat and backs, in leather and are of a very plain square design. The floor is covered with a figured Wilton carpet and rubber tiling on the platforms and vestibules.

The car is lighted by the A. & W. acetylene system and carries an 8-cell storage battery to supply current for the kitchen and refrigerator lights and for electric fans.

Next Meeting Place of the American Railway Master Mechanics' Association and Master Car Builders' Association

THE annual conventions of the American Railway Master Mechanics' Association and the Master Car Builders' Association for the year 1905 will be held at Manhattan Beach, Long Island, New York.

The Master Mechanics will meet on Wednesday, Thursday and Friday, June 14, 15 and 16, and the Master Car Builders on Monday, Tuesday and Wednesday, June 19, 20 and 21, 1905.

Headquarters will be at the Oriental Hotel. The management of the Oriental and Manhattan Beach Hotels has made the following rates for members of the Associations, their families and guests:

Single room, one person, without bath, $3.50 per day; double room, one person, without bath, $4.50 per day; double room, two persons, without bath, $3.75 per day, each; extra large double room, two persons, without bath, $4.75 per day, each; single room, one person, with bath, $5.00 per day; double room, one person, with bath, $6.00 per day; double room, two persons, with bath, $5.00 per day, each; extra large double room, two persons, with bath, $6.00 per day, each.

The Brighton Beach Hotel, located a short distance to the west of the Manhattan and Oriental Hotels, and operated under a separate management, will also co-operate in every way to take care of the members, and has named the same rates for rooms as the other two hotels.

The Marine Railway runs from the Manhattan Hotel direct to the Brighton Beach Hotel, and during the conventions the members and friends will be carried free between these hotels.

During the period the two conventions are in session the Oriental Hotel will be reserved for the exclusive use of the members of the two conventions and their guests, including the members of the Railway Supplymen's Association. While the Manhattan Hotel cannot be given exclusively to the convention, practically all of the rooms will be reserved, and one of the large dining rooms will also be set aside for their use. The distance between the Oriental and Manhattan Hotels is about fourteen hundred feet. An electric car runs between them from early in the morning until 12 o'clock at night for the accommodation of their guests, free of charge.

Applications for rooms should be made to The Manhattan Beach Hotel & Land Co., 192 Broadway, New York City. The committee on arrangements would specially request the members to apply at once for their rooms.

The joint committee of arrangements consists of Messrs. Charles W. Martin, Jr., Wm. McIntosh and A. E. Mitchell.

Threads for Grease Cup Plungers.

PRESENTED herewith are the line drawings of two main rods grease cups, which are shown together to direct attention to the number of threads used per inch on the circumference of the plungers. The cup shown by Fig. 1 has been designed by the Mexican Central Railway in order to supplant the use of brass in this connection, as removable parts when made of such material are stolen from locomotives at a rate which makes the use of brass unprofitable. This cup has been designed so that the change could be readily made on old locomotives, and with new locomotives, where the cup is forgel on the rod, the same plunger is to be used. It will be observed that there are twelve threads per inch on the plunger and the inner wall of the cup. Fig. 2 presents a design of grease cup arranged as standard by the C., B. & Q. Railway, after a careful consideration by the several master mechanics of this road and the systems under its management, as to the number of threads which are the most practical in this connection. It will be noticed that the cup is forged to the rod, and the bushing with a hexagonal head is screwed into the cup, the thread in this case being a 11½ per inch, as the removal of the bushing is infrequent as compared with the number of times which it is necessary to turn the plunger. On the plunger there are eight threads per inch, which is a much coarser thread than has heretofore been generally used in such instances. A locomotive using this cup is supplied with such a wrench as that shown in Fig. 3. At one end is a socket for removing the bushing when necessary, and at the other end is a ¾-inch square lug which fits the opening in the top of the plunger for turning the same, when it is desired to force the grease.

A comparison of these two suggests the opinion that the design of the C. B. & Q. is the more practical, and is worthy of attention, inasmuch as the coarse thread has the advantage over the finer thread. With the coarse thread the wear is not so great, the thread is not so liable to cross, when replacing the plunger hurriedly, and when the engineer's fingers may be cold. A further advantage is the fact that it is not necessary to give the plunger as

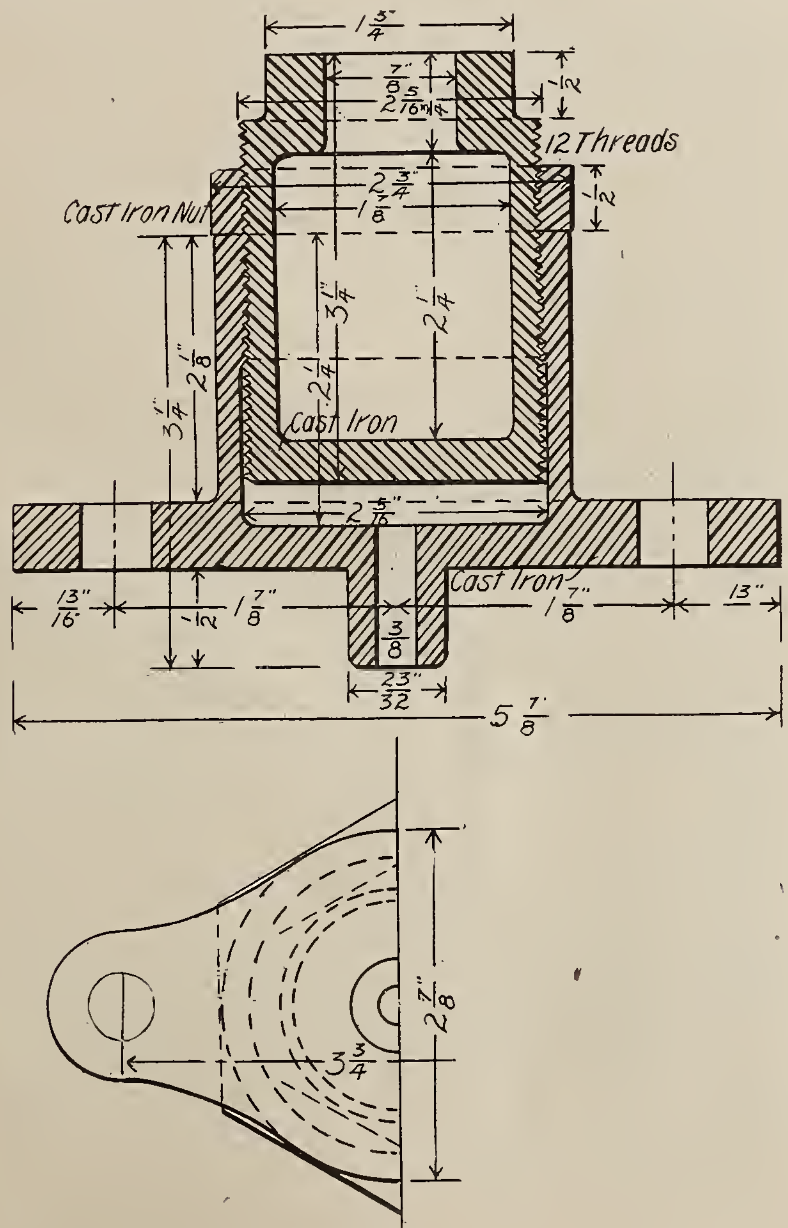


Fig. 1.—Threads for Grease Cup Plungers.

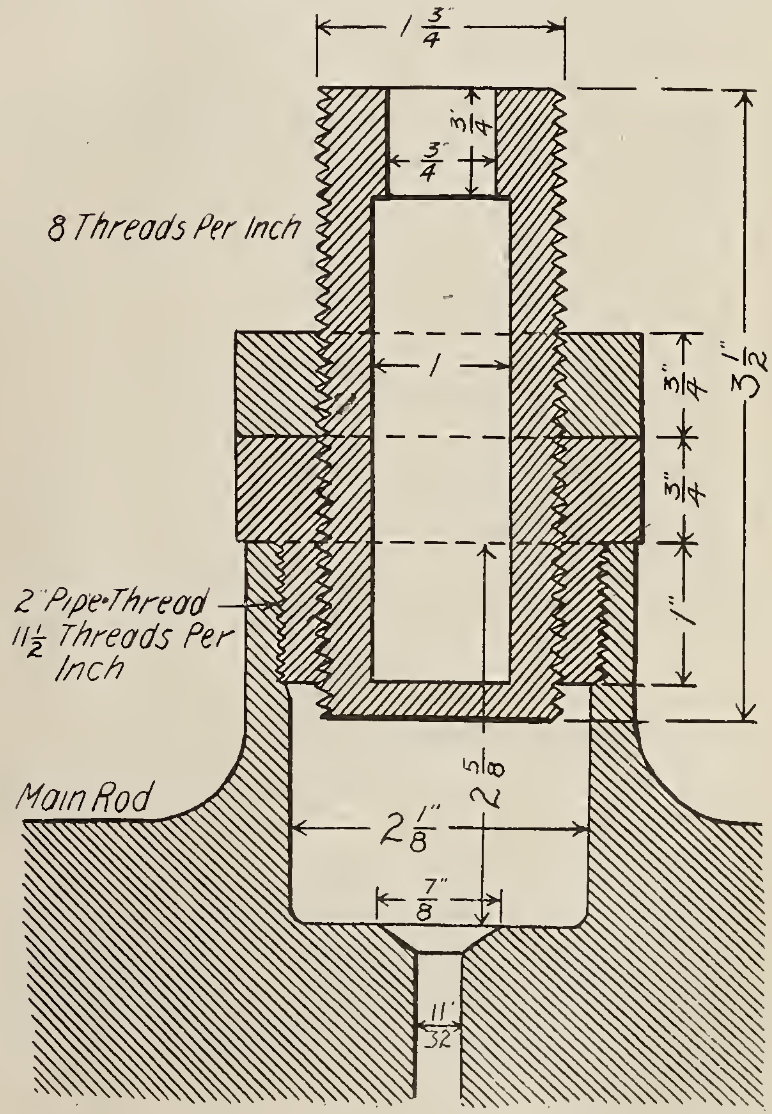


Fig. 2.—Threads for Grease Cup Plungers.

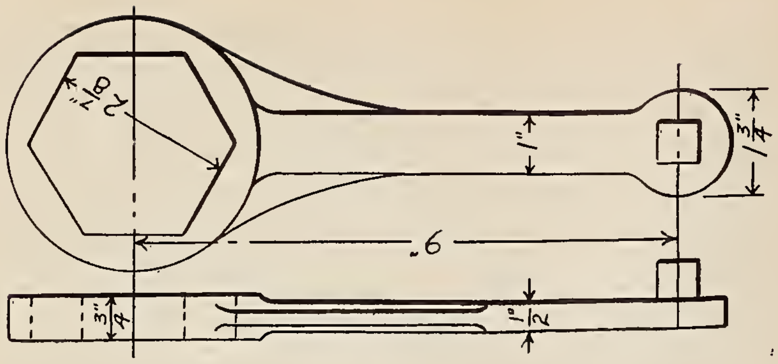


FIG. 3.—THREADS FOR GREASE CUP PLUNGERS.

great a number of turns when lowering the same; and when but a few turns are necessary to lower the plunger a given distance, it is an easy matter for the engineer to remember that a fraction of a turn, or such and such a small number of turns will supply the proper amount of grease to run him to his next stopping place.

Subjects for the Next Annual Meeting of the Traveliug Engineers' Association.

The subjects selected by The Traveling Engineers' Association to be discussed at their next annual meeting are as follows:

Subjects:

1. Is the third man necessary on the large type of modern locomotives? If so, in what capacity? W. J. Crandall, N. Y. C. & H. R. R. R., chairman.
2. Grease as a lubricant for all bearings on a locomotive. J. A. Talty, D. L. & W. R. R., chairman.
3. What Devices for and Arrangement of Engines and Tenders will Lighten the Work of the Engineer and Fireman? D. D. Kessler, D. L. & W. R. R., chairman.
4. Bell Ringers, Air Sanders and Other Devices Operated by Compressed Air; Their Care and Arrangement to Get the Best Results. P. J. Langan, D. L. & W. R. R., chairman.

Papers:

1. Electric Motors, and Instructing the Men to Handle Them. E. F. Miller, C. & S. S. Elev.
2. Injectors; Modern Practice. S L. Kneass, William Sellers' Manufacturing Company.
3. The Latest Makes of Lubricators; Their Operation and Maintenance. C. G. Potter, L. E. & W.
4. The Mechanical Stoker. C. A. Kraft, C. & O.
5. The Piston Versus the Slide Valve. W. J. McCarroll, Baldwin Locomotive Works.

Topical Discussion:

What System will Enable the Road Foreman of Engines to Keep the Best Record of Tire Wear?

W. C. THOMPSON.

Staybolts, Braces and Flat Surfaces.

A Discussion of Various Rules and Formulæ. By R. S. Hale, Boston, Mass., presented before the A. S. M. E., Dec., 1904.

SUPPORT OF FLAT SURFACES OF BOILERS BY STAYBOLTS.

1. The problem of the support of flat surfaces arises in the design of the fireboxes of locomotive and upright boilers, in the design of the combustion chambers of Scotch marine boilers and in the design of the heads above the tubes in horizontal tubular boilers of all classes.

2. The stress on the staybolts is in general a direct pull. In the case of diagonal braces the actual stress may be reduced in figures to an equivalent direct pull by considering the angle between the brace and the plate. In the case of short stays there is a bending action due to differences in expansion of the inside and outside plate which causes special stresses which will be considered below.

3. The maximum working stress permitted in staybolts is as follows:

United States rule, 6,000 pounds per square inch.
British Board of Trade, 9,000 pounds per square inch.
British Lloyds, 8,000 pounds per square inch, if 1½ inch diameter or less.
British Lloyds, 9,000 pounds per square inch, if over 1½ inch diameter.
German Lloyds, 1-7 of tensile strength. For 60,000 pounds this is 8,560.
Bureau Veritas, $\frac{1}{5.75}$ of lower test limit, then add ⅛ inch for material of 60,000 pounds; this is 10,400 on net section and about 8,300 on the gross section of a 1-inch stay.
Hartford Boiler Insurance Company, no official rule, but in the Locomotive of September, 1893, recommends 7,500 on long stays, and in same paper, March, 1892. recommends 4,800 on short stays.

None of these rules, except the practice of the Hartford Co., take any account of the difference in stress between short and long braces. Some of them allow a greater stress on large braces, as, for instance, Lloyds and Bureau Veritas.

4. Now, in short braces, such as those in locomotive fireboxes, the difference in expansion between the inside and the outside sheet bends the stays and induces severe stresses in addition to the direct pull due to the steam pressure. As a result, such staybolts are frequently found broken close to the outside plate.

5. Further, as is well known, excessive stress and strain makes the metal more liable to corrosion, and these short bolts are frequently found corroded and wasted.

6. In boilers with long braces such as the ordinary horizontal tubular boilers we very seldom find any corrosion. However, an allowance for corrosion would appear excellent practice, even if corrosion appear but seldom, and the rule of the Bureau Veritas, by which the stress is computed on the net area that will remain after ⅛ inch (1-16 inch on each side) has been wasted, is an excellent one. For long braces where there is no bending action, say braces of 2 feet and over, there would appear to be no reason why the stress should not be as great as that allowed on similar metal in boiler plates. In boiler plates a stress of 12,000 or more is allowed between rivet holes, and from 7,000 to 11,000 in the body of the plate. It would, therefore, appear that we can safely take 12,000 for long steel braces, or 10,000 for iron. While this allows considerably more pessure than has been usual in some cases, the fact that these long braces give but little trouble would seem to warrant increasing the pressure.

The allowance of ⅛ inch for future corrosion makes this agree better with current practice than is apparent at first sight. Thus, with a 1-inch brace, 12,000 pounds on the net section, which is ⅞-inch diameter, is 9,200 on the gross section, or but little more than is now usual. For large braces the proposed rule will allow higher pressure than is now customary, but our experience with such cases as have come to our notice indicates that it will be amply safe.

7. On short braces the working stress due to tension alone should be less in order to leave a margin for the bending stress. These braces are usually iron, and if we make the permissible stress 9,000 on the net section after subtracting 1-16 inch on all sides, on iron braces less than 24 inches long, 8,000 if less than 12 inches long, 7,000 if less than 6 inches long, and 5,000 if less than 4 inches long, we shall get results that will be in better accord with present good practice and experience than any of the rules stated above in paragraph 3. The difference will, at least, take partial care of the stresses due to bending.

The variations above suggested according to length of braces are not based on any theory, but are chosen so that for very short braces the stress shall be about that which locomotive boilermakers have found good practice, with stresses on braces of intermediate lengths something in proportion.

In the case of the circular fireboxes of upright boilers it must be remembered that the strength of the furnace as a flue diminishes the stress on the staybolts.

8. We may now consider the strength of the plate itself, and this obviously depends on the distance between stays and the thickness of the plate.

9. It also depends somewhat on the diameter of the stay, since we can easily imagine an extreme case, in which the stays were so large as to diminish appreciably the area of plate to be supported. It is obvious, however, that for any given method of attaching the stay to the plate a change in the diameter of the stay will affect the stresses by but a very small amount; hence it will be correct to neglect this factor in determining the thickness of the plate for any stated method of attachment and distance between stays.

10. The method of attachment, of course, affects the safe working pressures.

11. The theoretical stress, independent of method of attachment, or rather for stays of infinite strength attached at points, has been found by Grashof (Unwin Machine design) to be as follows:

$$f = \text{maximum stress} = \frac{2p^2}{9t^2}P.$$

p=pitch, t=thickness of plate, P=steam pressure; all in pounds and inches.

Since the stress on the bolt itself is given by the formula:

$$f = P\frac{4p^2}{\pi d^2}, \ d \text{ being the diameter of the bolt,}$$

it is interesting to note that for equal stress in bolt and plate the bolt should be 2.4 times the thickness of the plate, whatever the pitch for the case covered by the formula.

12. The stress on the plate is stated by D. K. Clark to be determined as follows: Steam pressure at elastic limit of plate equals $5{,}700 \times \frac{t}{p}$, p in this case being distance between bolts, not between centers.

Although Clark states this to be the elastic strength, yet it appears to be more probable that it is some fraction of Clark's idea of the ultimate strength. It would probably be as wrong to depend on Clark in such a case as it would be to use his theories as to strength of beams in designing bridges, instead of using the formulæ based on the elastic theory, such as the formulæ used by all the best engineers in designing every large bridge or steel frame building.

13. The rules used by the various insurance and similar bureaus are as follows:

United States, $P = C\frac{t^2}{p^2}$; C = 112 for steel plates 7-16 or less.

British Lloyds, $P = C\frac{p^2}{t^2}$, C = 90 for screw stays 7-16 and less.

German Lloyds, $P = C\frac{t^2}{p^2}$;

Board of Trade, $P = C\frac{(t+1)^2}{p^2 - 6}$, C = 66;

Bureau Veritas, $P = \frac{(t-1)^2 T}{2p \quad C}$; T = tensile strength taken at 25.8 tons, or 60,000 pounds, in following computations.
C = .055 and less

Hartford Boiler Insurance Co., in Locomotive of March, 1892, page 38, advocates D. K. Clark's rule with a factor of safety of 3, based on the elastic strength. His rule is:

$P = \frac{5{,}700\ T}{p}$, T being thickness in inches, p is the net pitch—i. e., distance between staybolts and not between centers.

The figures given in the tables following take p as the distance between centers in all cases. If it was worth while to take account of the difference the figures could be corrected accordingly for Clark's formula.

The constants above given are considerably increased for other methods of attaching stays to plates than merely screwing in and riveting over.

14. In tables 1-4 are given the permissible pressures by these rules for various thicknesses of plates; for pitches, from 4 to 11 3-16 inches.

TABLE I.

STEEL PLATES. SCREW STAYBOLTS RIVETED. PITCH, 4 INCHES

WORKING PRESSURES.

Thickness of Plate.	British Board of Trade.	United States Rule.	Bureau Veritas.	British Lloyds.	D. K. Clark.
¼	123				
	165	112	90	90	107
	176				
5-16	237	175	160	141	149
⅜	323	252	250	203	178
7-16	422	343	360	276	208

TABLE II.

STEEL PLATES. SCREW STAYBOLTS RIVETED. PITCH, 6 INCHES.

Thickness of Plate.	British Board of Trade.	United States Rule.	Bureau Veritas.	British Lloyds.	D. K. Clark.
¼	55	50	40	40	79
5-16	79	78	71	62	99
⅜	108	112	111	90	120
½	178	214	218	177	158
⅝	266	334	360	278	198
¾	372	480	538	400	238

TABLE III.

STEEL PLATES. SCREW STAYS RIVETED. PITCH, 8 INCHES.

Thickness of Plate.	British Board of Trade.	United States Rule.	Bureau Veritas.	British Lloyds.	D. K. Clark.
¼	28	28	22	23	59
⅜	56	63	63	51	89
½	92	120	122	100	109
⅝	138	188	202	156	148
¾	193	270	302	225	178

TABLE IV.

STEEL PLATES. SCREW STAYS RIVETED. PITCH, 11 5-16 INCHES

Thickness of Plate.	British Board of Trade.	United States Rule.	Bureau Veritas.	British Lloyds.	D. K. Clark.
¼	13	14	11	11	12
⅜	26	31	31	25	63
½	44	60	61	50	84
⅝	65	94	102	78	105
¾	91	135	151	112	126
⅞	121	185	212	153	147

TABLE V.

RECENT CASES OF BULGES BETWEEN STAYBOLTS FOUND BY MUTUAL BOILER INSURANCE COMPANY INSPECTORS.

Working Pressure.	Pitch of Stays. Inches.	Thickness of Plates.	Pressure U. S. Rule.
65	5	5-16	112
80	7½	¼	32*
75	7	5-16	57*
85	4	5-16	173
75	8	¼	29
80	5½	⅜	132
100	4	⅜	250
75	4	5-16	173
70	4	5-16	173
80	8 x 7	¼	32*
75	4	5-6	173
60	7 x 7½	5-16	50*
100	4½ x 5	⅜	180
80	6 x 5½	⅜	120
115	6	⅜	112**
120	6	⅜	112**
100	4½	½	400
60	6½	⅜	98
60	4½ x 5	5-16	123

*Small circular firebox. **Large circular firebox.

For the cases marked * or ** the circular form of the firebox strengthens the plate against collapse, as was shown in my article in the Engineering Magazine.

The double figures given for the Board of Trade are the figures from their rule and the figures from Trail's Board of Trade tables for pitches under 6 inches, which tables, it is understood, supersede the rules for these small pitches.

It should, of course, be understood that probably none of the rules are intended for extreme cases. For pressure under 30 pounds various other considerations would, of course, enter and for pressures above 250 pounds temperature changes in the plate would very likely make the rules inapplicable. In other words, none of these rules are intended for extreme cases, and for ordinary working conditions it appears the give results that do not differ widely from each other.

Such being the case, the simplest formula is probably the best. Further, there should be a decided preference for formulæ that agree with the theoretic formulæ rather than for empirical formulæ. Of course, an empiric formula may represent the results of a few experiments better than a theoretic one, but unless the experiments are very accurate the chances are that the differences between the empiric and theoretic formulae are due to errors of experiment.

In this connection it may be noted that such experiments as have been made, notably those of Fairbairn, Clark, Wilson, Greig, Eyeth and the Board of Trade (see Stromeyer, page 140 for a list of these) are not complete enough and apparently are not accurate enough to furnish any rule. This is only what is to be expected since experiments on flat plates, if the plates are tested to breaking, or even only to bulging, deal with pressures and strains far in excess of working conditions and must deal with the metal in a more or less plastic state. Experiments to determine the actual working stress in flat plates under ordinary conditions would have to be very refined experiments in which the stresses were inferred from the measurement of infinitesimal deflections, and these experiments have not been made. As stated above, the case is very similar to that of iron beams, in which the working stresses have to be computed from the elastic theory, since experiments by testing beams to destruction give results which we know are not to be relied upon in designing.

16. Hence, it follows that the theoretic form used by the United States, German and British Lloyds, etc., is the best, and that working pressure $= \text{constant} \dfrac{t^2}{p^2}$ is the form to be adopted.

17. In regard to choice of constants it is interesting to note that on the whole United States rule gives results intermediate between the British Board of Trade and the Bureau Veritas, although considerably higher than the British Lloyds. In order to see if these results were borne out by experience I have made up a list of the most recent cases in which our inspectors have found plates bulged between staybolts, table 5.

18. It is clear that if weakness caused those bulges, all the rules give much too high pressures, but it is more probable that these bulges are most of them due to overheating, just as the bulges in the furnaces of internally fired boilers, or the bottom plates of horizontal return tubular boilers, and that they are not due to weakness of design. In other words, they are due to abnormal conditions, and are to be prevented by care in the operation of the boiler rather than by change in the design.

19. The proper constant, therefore, is somewhere between 90 and 120, and since failure will not cause serious accident it would seem wise to use 115 in determining the limiting safe pressure, while 100 will give good results when designing a new boiler for economically long life.

The United States and Lloyds permit a slightly higher constant for thick plates than for thin, and the Bureau Veritas rule has this effect. Lloyds rule and Clark's have just the reverse effect. I cannot see anything either in our experience or the experiments that warrants allowing proportionate greater pressure on thick plates than called for by Grashof's formulæ, except so far as may be desired for corrosion in special cases, where it is thought corrosion should be specially provided for.

21. For braces attached by nuts or crowfoot braces attached by rivet, it is obvious that a higher pressure can be allowed. Lloyd allows about 20 per cent more for nuts, United States about 20 per cent more, Board of Trade about 25 per cent more, and a constant of 140, which would agree with the margin in the other rules, is good practice.

22. For horizontal return tubular boilers the braces, when small diagonal braces are used, are attached to the heads by crow-feet and rivets. For this case a constant of 140 appears to give results in accordance with good practice.

23. For the cases where the stays or braces are in the steam space, with fire or hot gases on the other side so that the plate and ends of the braces are exposed to overheating, the British Board of Trade diminishes its constant and the allowable pressure by some 40 per cent. The other rules take no account of such cases, but apparently allow full pressure. Such a flat surface with steam on one side could not safely be exposed to the full heat of the furnace at any pressure and yet be safe. On the other hand, if exposed to comparatively cool gases it may be as safe as if it had water on one side, instead of steam, but was exposed to the full heat of the furnace.

It follows, therefore, that no general rule can be laid down, but the constant for stays in the steam space, when the plate is exposed to the products of the combustion on the other side, may have to be reduced according to the particular case.

24. The foreign rules allow quite an excess of pressure for various washers, etc. As Stromeyer has shown, however, thicker plates are cheaper than such washers, and the use of channels or angles as in United States practice seems also to be superior. For such construction a constant of something like 200 to 250 may probably be taken, but the exact amount would so depend on the washers, the two pitches, on the shape and dimensions of the channels, on the riveting, etc., so that no rule could be laid down.

25. In the above discussion it has been assumed that the stays are all pitched in squares. If they are not, the British Board of Trade uses the square root of the surface and the Bureau Veritas the square root of the sum of the squares, for the pitch. In general, it seems to be assumed that if the pitches differ only slightly an intermediate figure as in these rules may be taken, while if they differ largely the case must be specially considered. The rule of the British Board of Trade for using the square root of surface, i. e., of the product of the two pitches if they differ slightly, is simple and probably as correct as any, within the limit of say 20 per cent variation.

SUMMARY.

STRESS ON STAYS.

Comparison of the various rules for working stress on stays and braces shows a general neglect of the difference between long and short stays.

For long steel stays, subtracting 1/8 inch from the diameter, and then allowing 12,000 pounds per square inch on net section, remaining gives results which apparently will be better than any of the present rules. For iron stays probably 10,000 should be used.

For short stays, which are chiefly iron, where bending action comes in, empiric rules reducing stress as length of stay decreases may be used. Our knowledge of the bending stress is not sufficient to warrant the use of a more theoretic formula.

PITCH OF STAYS AND THICKNESS OF PLATES.

Comparison of the working pressures for pitch of stays and thickness of flat plates shows that the complicated formulæ of some of the rules do not give as good results as the simpler formula $P = C \frac{t^2}{p^2}$, C being taken as 100 to 115 for riveted stays, 140 for stays nutted or crowfoot stays riveted on, and a higher value up to 200 or 250 for the use of washers or channels or angle bars riveted on.

If the pitches differ by less than 20 per cent use the surface instead of p^2. If the pitches differ by more than 20 per cent it is a special case. Special cases and unusual construction must always receive special consideration.

The above constants give results indicating the probable safe pressure for a year or so, until the next examination. In designing a boiler for a long life the constants should be reduced by some 20 per cent or so, just as a factor of safety of 4 can sometimes be used temporarily for the shell of a new boiler, while 5 should be used in designing a boiler to be run for a number of years without reduction of pressure.

No 3 Hollow Hexagon Turret Lathe.

THIS machine is the largest of three sizes of the hollow hexagon turret lathe, and is specially designed and constructed for using the high-speed tool steel to their limit of efficiency. Great strength and rigidity, ample power, wide range of speeds and feeds instantly changeable, improved "high-speed" turning tools, rapidity and convenience of manipulation; are characteristic of the machine. The machine takes bar stock up to 3⅝ in. in diameter through the automatic chuck, and turns same any length up to 36 in. The swing over the bed is 24 in. The head and bed are cast in one piece. The bed is exceptionally deep and wide, and the V's unusually large. The cone is geared 3½ to 1 and back-geared 13 to 1; the back gears being engaged and disengaged by friction clutches. There are twelve spindle speeds, ranging from 18 to 190, in geometrical progression, giving about 100 ft. surface speed on diameters from 2 in. to 3⅝ in. The automatic chuck and the power roller feed handle bar stock of any shape. The chuck is held in the head of the spindle, which is forged solid, thus bringing the chuck jaws close up to the front spindle bearing, with a minimum of overhang. The chuck is operated by the long lever in front of the head, working through a system of compound levers, which give a powerful movement for closing the jaws. The jaws are quickly changed for different diameters of stock, and a single screw adjusts the roller feed and the guide fingers.

The turret saddle slides directly on the bed, eliminating all overhang. It is gibbed to the outer edge of the bed by the flat gibs throughout its entire length. There are four changes of feed in either direction, varying from 20 to 100 (revolutions of spindle to feed one inch), and screw-cutting feeds for leading-on dies are also provided. The feed rack is located on top of the bed midway between the V's and is as high up as possible, thus obviating all of the torsional strain in usual construction where the rack is placed at the side of the bed. Power quick traverse in either direction is provided for the rapid handling of the turret, and for indexing, the movements being controlled by the lever in front of the turnstile. The independent adjustable stops for each face of the turret are located in front of the saddle, where they are easy of access for changing and adjusting, and at the same time are well protected from chips and dirt.

The "Hollow Hexagon" turret is 18 in. across flats, and has a broad bearing on the carriage. It revolves on and is kept central by a large taper bearing with ample provision for taking up wear, and its trussed form provides an exceptionally rigid support for the tools, resisting end thrust as well as torsional strains. The index is nearly the full diameter of the turret, and the lock bolt is placed directly under the working tool.

The tool equipment regularly furnished is adapted for a great variety of work, including thread-cutting. The universal turners are especially adapted for using "high-speed" tool steels, one of the special features of the tool being the roller back rest, which eliminates the excessive friction due to the high speeds, and the improved construction and great rigidity of the tool insure the highest degree of accuracy. The holder which carries the cutting tool swings about a stud, and can be easily and accurately adjusted by means of a screw, while an eccentric lever provides means for quickly withdrawing the tool from the work.

The carriage has 30 in. traverse longitudinally and 10 in. cross motion, both with four changes of feed in either direction. The longitudinal feeds vary from 24 to 120 and the cross feeds from 62 to 312 (revolutions of the spindle to feed one inch). Both feeds have adjustable automatic trips. There are two stops, with automatic trips, for the longitudinal travel; and the cross feed screw is fitted with a graduated dial. The front of the cross slide is equipped with a suitable tool post for holding, forming and turning tools, while the rear end carries a holder for cutting-off blades.

All of the feeds are gear driven, and are quickly and easily changed by simply shifting a lever in the feed box, which is conveniently located in front of the head.

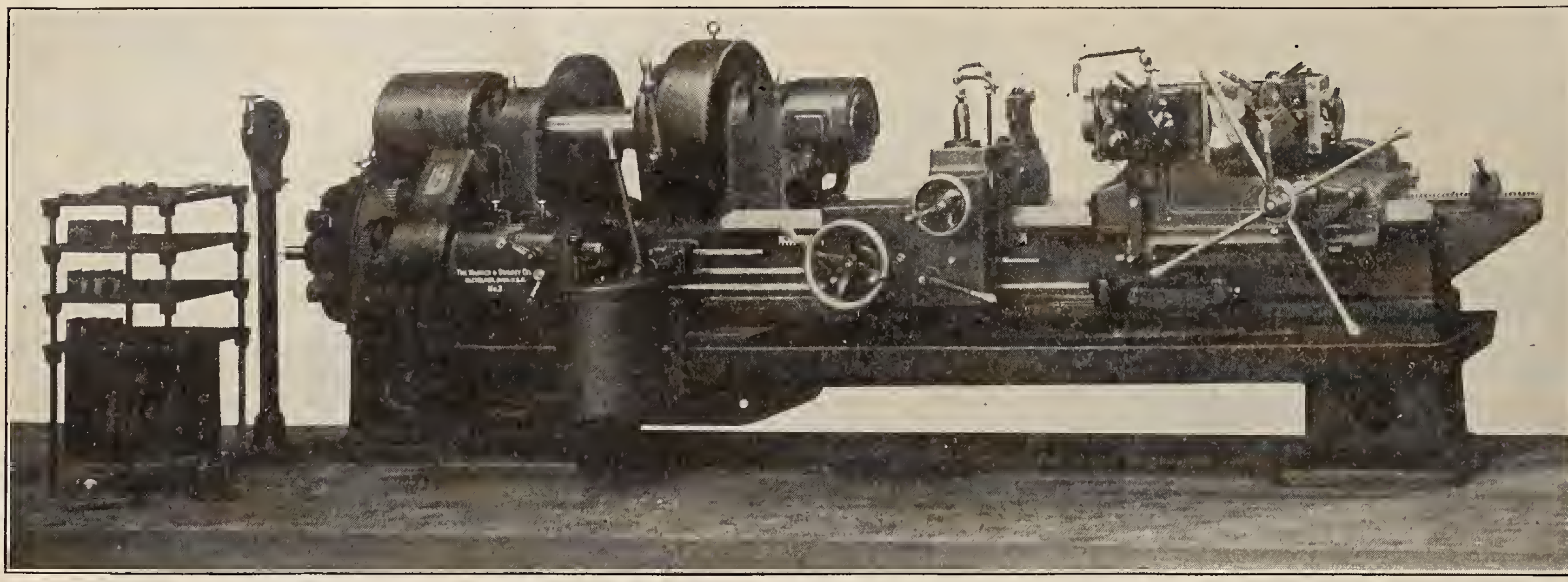


Fig. 1.—No. 2, Hollow Hexagon Turret Lathe.

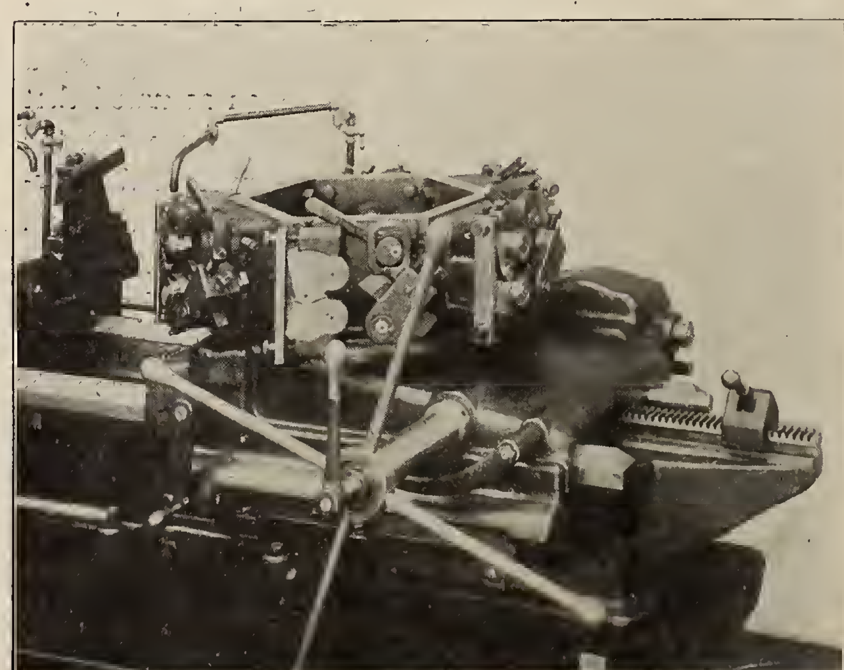


Fig. 2.—No. 3, Hollow Hexagon Turret Lathe.

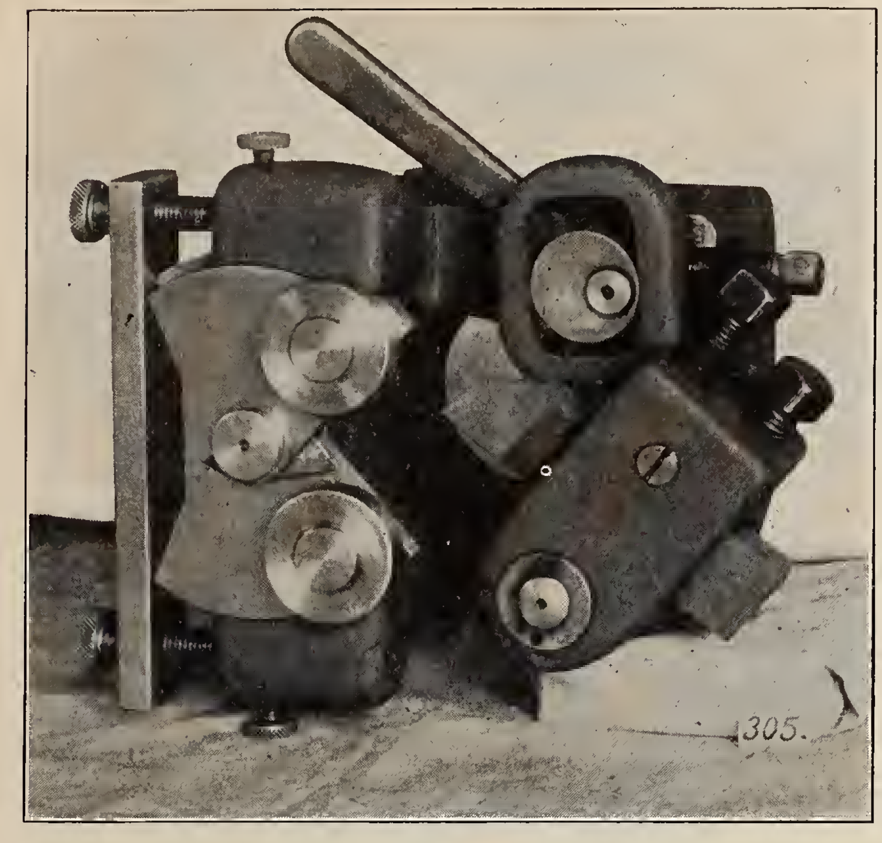


Fig. 3.—No. 3 Hollow Hexagon Turret Lathe.

The turret and carriage feeds are independent of each other. The pan and oil reservoir are of large dimensions. A geared oil pump, which operates in either direction, delivers a copious flow of oil to the cutting tools for both the turret and carriage, through two systems of piping. All gears and other revolving parts are covered by suitable metal guards.

The machine shown in the photograph is electrically driven by variable speed motor, direct connected to the back gear shaft. For belt drive the spindle is equipped with a three-grade cone, and a triple friction countershaft accompanies the machine.

The net weight of the machine is about 12,000 lbs.

This machine as illustrated and described is manufactured by the Warner & Swasey Co., of Cleveland, O.

Personals

Mr. E. W. Fitt, formerly chief draughtsman of the Chicago, Burlington & Quincy lines West, has been appointed assistant superintendent of motive power.

The following changes have been made in the machinery department of the Illinois Central Railroad: M. J. McGraw, master mechanic at East St. Louis, has been transferred to Clinton, Ill., as master mechanic, vice Mr. P. J. Colligan, resigned; Mr. Joseph H. Nash, formerly general foreman at Waterloo, Iowa, succeeds Mr. McGraw as master mechanic at East St. Louis.

Mr. Gustavo Navarro has been appointed superintendent of motive power and machinery of the Vera Cruz & Pacific, with headquarters at Tierra Blanca, Mex.

Mr. C. H. Quereau, formerly superintendent of shops of the New York Central and Hudson River Railroad, has been appointed engineer of test with headquarters at Albany, N. Y.

Mr. A. W. Horsey, formerly chief draughtsman of the Canadian Pacific, has been appointed mechanical engineer of the lines east with headquarters at Montreal, Can.

Mr. J. J. Mailor, Jr., has been appointed foreman of machine shop of the Ft. Smith & Western at Fort Smith, Ark.

Mr. E. W. Fitt, chief draughtsman of the Chicago, Burlington & Quincy lines West, has been appointed assistant superintendent of motive power, with headquarters at Lincoln, Neb.

Mr. E. E. Davis, formerly assistant superintendent of motive power of the N. Y. C. & H. R., has been appointed superintendent of motive power of the Buffalo, Rochester & Pittsburg, with headquarters at Dubois, Pa.

Mr. W. H. Kelson has resigned as general storekeeper of the Canadian Pacific.

Mr. J. L. Wigton has resigned as master car builder of the Missouri, Kansas & Texas at Sedalia, Mo., and has been succeeded by Mr. H. O. Bowen.

Mr. J. H. Ohlenbocks has been appointed assistant master mechanic of the Wabash at Decatur, Ill., succeeding Mr. Charles B. Hathaway, resigned.

Mr. J. Markey has been appointed master mechanic of the Northern division of the Grand Trunk with headquarters at Allendale, Ont., to succeed Mr. N. B. Whitsel.

Mr. W. R. Maurer, formerly with the B., R. & P., has been appointed mechanical engineer of the New York, New Haven & Hartford, with headquarters at New Haven, Conn.

Mr. J. McManamy, formerly traveling engineer of the Pere Marquette at Grand Rapids, Mich., has been appointed master mechanic of the Buffalo division, with headquarters at Saint Thomas, Ont.

Mr. J. R. Groves, superintendent of machinery of the Colorado Midland, has been appointed superintendent of motive power and car departments of the Denver & Rio Grande and Rio Grande Western, with headquarters at Burham, Colo., to succeed Mr. F. Mertshermer, resigned.

Mr. W. J. Schlacks, formerly general foreman of the Colorado Midland, has been appointed superintendent of machinery of that road, with headquarters at Colorado City, Colo., to succeed Mr. J. R. Groves, resigned.

Mr. T. A. Lawes, formerly superintendent of motive power of the Chicago & Eastern Illinois, has been appointed mechanical engineer of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, vice Mr. J. T. Carrol, who resigned to become chief draughtsman of the Lake Shore & Michigan Southern.

Mr. Thomas Jackson has been appointed shop superintendent of the Northern Pacific, with headquarters at Livingston, Mont., succeeding Mr. W. S. Clarkson, who has been appointed general master mechanic. Mr. J. E. O'Brien, division master mechanic at Jamestown, N. D., has been appointed assistant shop superintendent at South Tacoma, Wash. Mr. R. P. Blake has been appointed assistant shop superintendent at Brainerd, Minn. Mr. C. S. Larrison has been appointed master mechanic of the Dakota division, with headquarters at Jamestown, N. D., in place of Mr. O'Brien. Mr. A. H. Draper has been appointed general airbrake instructor at Saint Paul, Minn., succeeding Mr. Larrison. Mr. Mark Purcell has been appointed air brake instructor at Saint Paul.

Felspar Roofing

Felspar roofing, as manufactured by the Stowell Mfg. Co., of Jersey City, N. J., is a ready-to-use roofing intended for roofs of business houses, factories, dwellings, farm buildings, sheds, etc., either on flat or steep roofs. It is manufactured from the genuine imported Fitch Lake, Trinidad asphalt and the best fibrous wool felt, saturated with the same asphalt, with a top coating of granulated felspar, which renders it fireproof against flying embers.

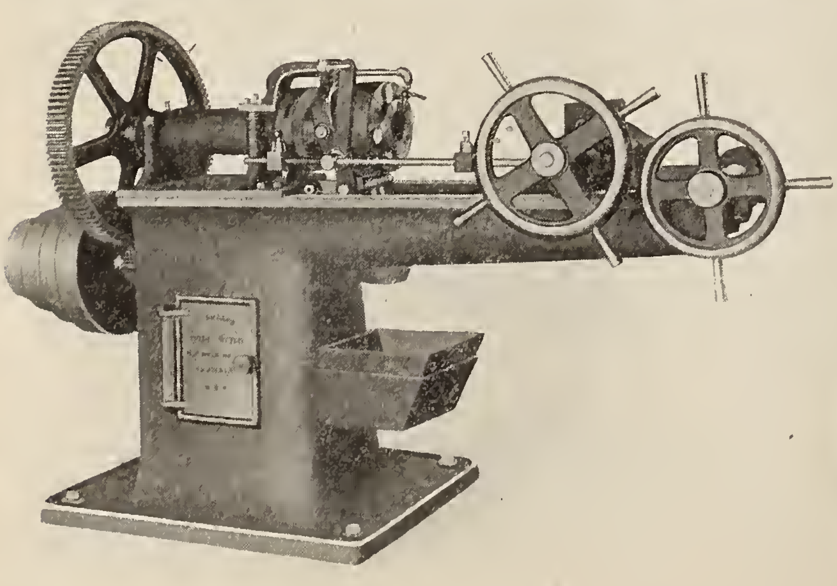
It will not dry out and become brittle, as coal tar and other so-called asphalt roofings do, and is not affected by hail, heat, cold, acid, gases, etc., and is insured under same rates as metal or gravel roofs. The cost is very moderate, and as it does not require coating or painting as do metal or felt roofs, the entire original cost is saved within five years.

It is put up in rolls of one hundred and eight square feet, and the price includes cement and broad-headed nails for laps.

Standard Bolt Cutter

The Norwalk Manufacturing Company of Norwalk, Ohio, are manufacturing bolt cutters of the style shown in the accompanying cut in sizes 1-inch, 1¼-inch, 1½-inch, 2-inch, 2½-inch and 3-inch single head and 1½-inch double head. Their ¾-inch bolt and pipe cutter is of lighter construction, a reasonable priced machine for light work.

Simplicity of construction combined with best material gives the Standard bolt cutter long life and easy, rapid operation. The locking device is very simple and positive. The machine is equipped with an automatic device to release the dies when the desired length of thread is cut. All wearing parts are constructed of hardened steel.

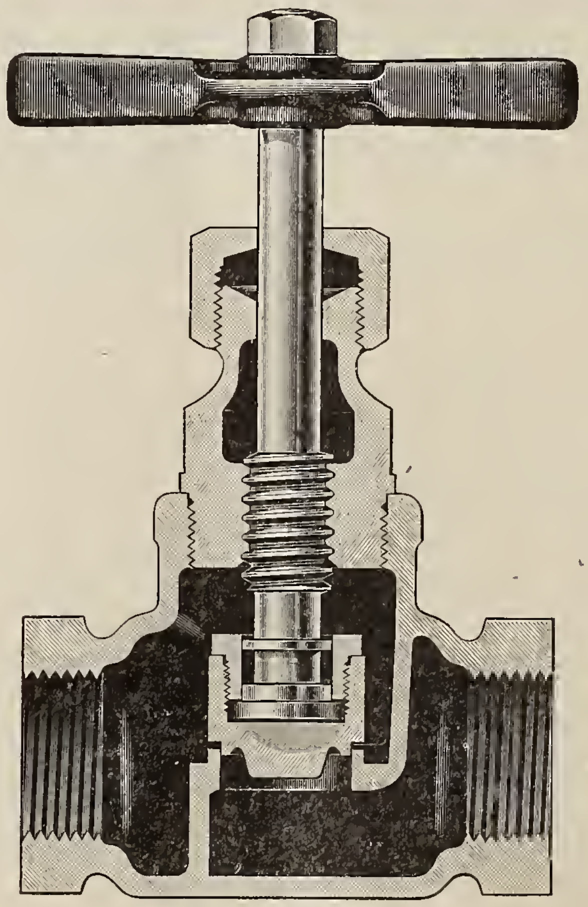


Standard Bolt Cutter.

The Standard has perfect die mechanism. There are four dies to a set, constructed of the best quality of tool steel. The head of the die is round, and is proven by experience to be unexcelled for the production of perfect work. They have a greater area of wearing surface than any other cap die manufactured, and are so constructed and perfectly fitted that it is impossible for chips or other foreign substance to come in contact with the wearing surface. The old dies may be re-cut several times, and new ones will be furnished at less cost than any other well known die.

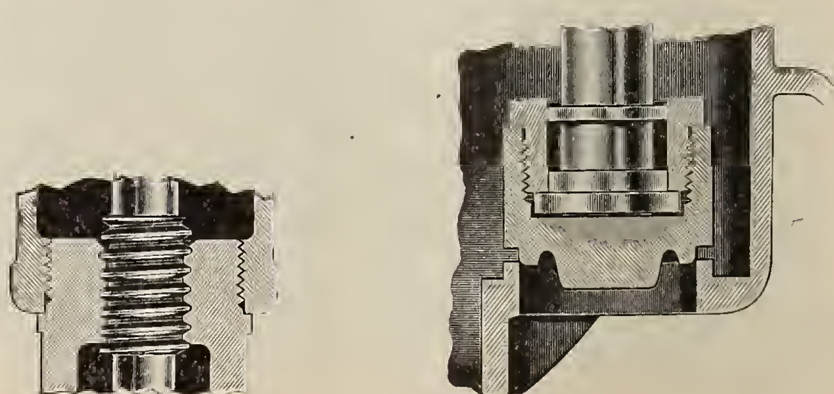
The Hancock Valves

The Hancock globe, angle 60° and cross valves are made screwed and flanged in sizes up to 3 inches. These valves are made of special composition giving great strength and resistance to wear, and of one standard only, for all pressures. Under actual test the bodies will stand a pressure of 4,000 pounds per square inch without breaking, and are

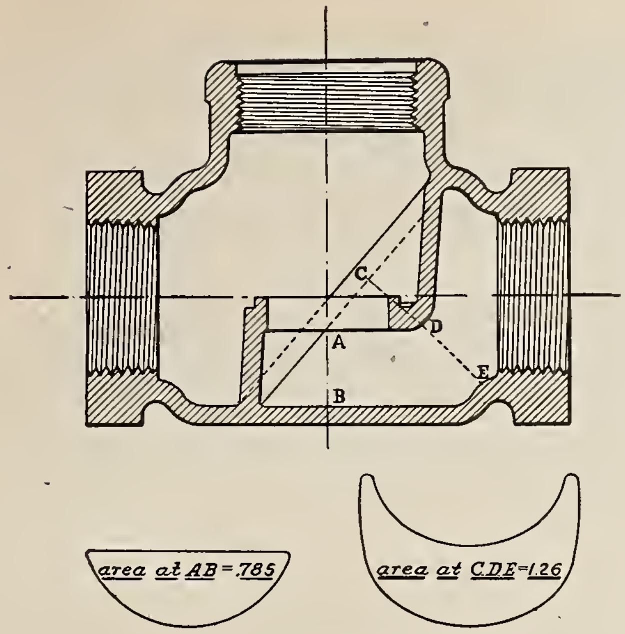


Hancock Valves.

tight with a water pressure of more than 1,000 pounds per square inch. They are tested with 1,000 pounds water pressure before leaving the works and guaranteed for 500 pounds steam pressure. In order that the valve seat may be hard and durable, the body is made of specially hard and tough mixture. The discs are made of a special mixture which does not contain any zinc and the spindles of Tobin bronze. Ex-



Hancock Valves.



Hancock Valves.

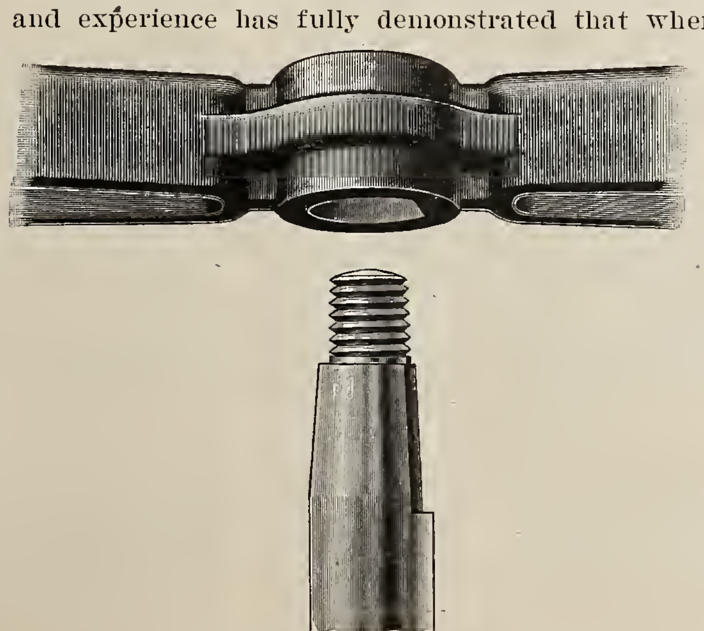
perience has demonstrated that a Tobin bronze spidle working in a special composition bonnet will not cut under the highest steam pressures.

These valves are made after the same general design as the Hancock main steam valves used on locomotives for a number of years and found to give perfect satisfaction with the high steam pressures carried. From the sketch shown herewith of a 1-inch globe valve, it will be seen that the area of the most contracted part is ample and of full size. The valves have been designed so that the metal is distributed to give uniform strength throughout, and the areas have not been reduced or contracted for the purpose of reducing the weight.

Attention is called to the way the valve is guided on the stem. An inspection of the section will show two collars or guides upon the stem which guide the disc nut, thereby compelling the disc to always seat squarely and preventing absolutely the disc from cocking.

The valve seat is flat. This form of seat has many advantages over any other form used in valves of this character. The valve disc has a projection on it which serves two purposes. In the first place, it acts as a guide when the seat is ground, and in the second place, this lip or projection on the disc prevents the cutting of the seat by the wire drawing of the steam when the valve is cracked or slightly open.

Again, when the valve is slightly raised from its seat, as shown in the illustration, with the lip entering slightly, it allows the escaping steam to clean the seat, so that when it is seated all dirt and foreign matter has been washed or blown completely off the seat. This is a most important feature, and experience has fully demonstrated that when the valve begins to leak it requires a very little regrinding to make it tight. This is accomplished so easily that a tight valve can be maintained with little labor and expense.



Hancock Valves.

The bonnet of these valves are made with a long thread engaging the body of the valve, and the shoulder on the bonnet is made narrow. By means of this narrow seat on the shoulder it is possible to keep the bonnet tight, and when it is desired to unscrew the bonnet it can be easily done. This is a decided improvement over the form of bonnets having a wide shoulder bearing upon a wide surface on the top of the body of the valve.

When it is necessary to regrind the valve to its seat, the bonnet is removed, the disc nut unscrewed from the disc and a piece of wood can be inserted in the disc, enabling it to be ground perfectly, as the projection on the disc guides it, it not being necessary to have any special regrinding tools for this purpose.

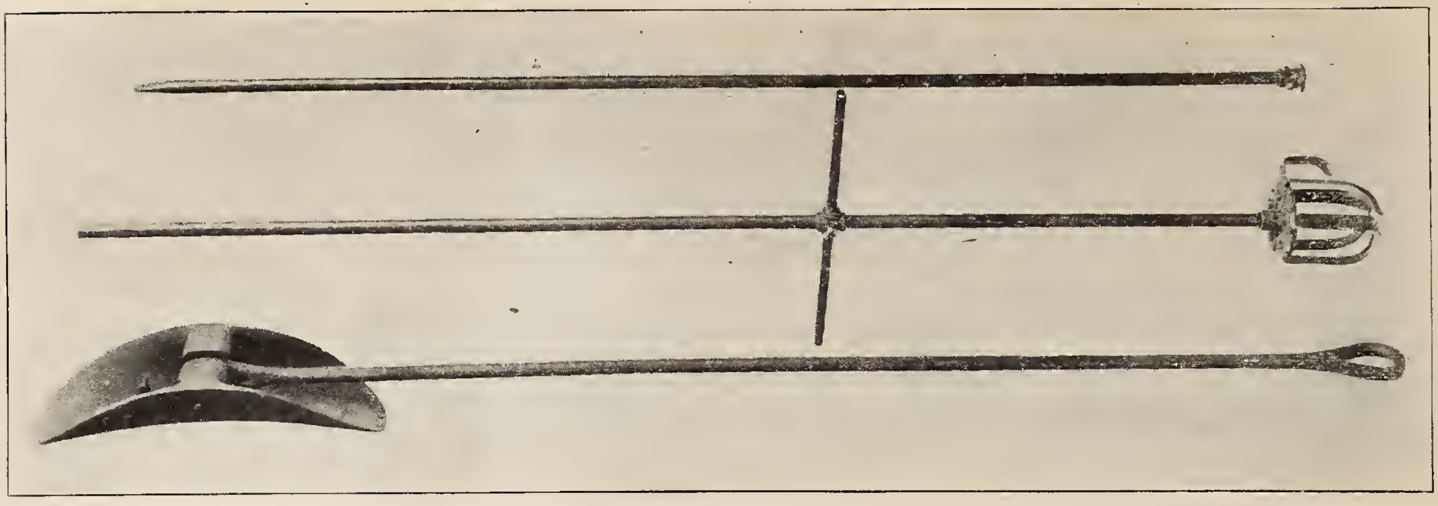
The tee handle shown has proved to be so much more efficient in opening and closing that it has become popular among the users of these valves, and the demand is so universal that all valves sent out are equipped with it. Its advantages are especially apparent on steamships, where there are a multiplicity of valves and economy of space is necessary. The illustration shows the peculiar method of attaching the handle. The hole is made tapering, with one side flat, and the spindle of the valve is also made tapering with one side flattened to receive the handle, which is held on the spindle by means of a nut. The flattened side holds the handle rigidly in its place, and the taper enables it to be drawn tightly to the spindle, avoiding absolutely the great annoyance of the handle or wheels working loose, which must exist when attached by the old means of a square only. This method of attaching handles has been most efficient and makes a decided improvement in the valve.

The Hancock valves are made by the Hancock Inspirator Co., whose general office and salesroom is at 85-87-89 Liberty street, New York, with a western branch office and salesroom at 22-24-26 South Canal street, Chicago, Ill. The factory is at Boston, Mass.

The Miller Anchor for Railway Wrecking Purposes

The Miller Anchor Company of Norwalk, Ohio, are manufacturing wrecking anchors that can be set in from thirty to forty minutes, eight feet deep, and will stand a strain of 40 to 50 tons. Two men will set one of these anchors by the time chains and lines are ready for the pull. They have been

Miller Anchor.



Miller Anchor.

thoroughly tested by the W. & L. E. Ry. and it was found impossible to pull them up.

The auger for setting the anchor has a nine-foot stem, one inch in diameter, with adjustable handle. It bores a 12-inch hole which is the right size for all of their anchors.

The accompanying illustration shows an engine attempting to pull out one of the anchors.

The prices are as follows

No. 6, 10x25 inches, 1¼-inch rod 9 feet long	$6 00
No. 7, 10x30 inches, 1⅜-inch rod 9 feet long	8 00
No. 7, 10x30 inches, 1½-inch rod 9 feet long	10 00
Auger	5 00

Notes of the Month

We are in receipt of a handsome calendar of the Cleveland Pneumatic Tool Co., of Cleveland, O. It is a work of art and a worthy emblem of the company who take such pains to please their patrons.

The Detroit Graphite Mfg. Co. of Detroit, Mich., have issued a pamphlet on "Superior Graphite Paint." This contains specifications for painting steel structures, together with a list of structures using this paint.

The Philip Carey Mfg. Co., of Cincinnati, Ohio, were awarded the gold, silver and bronze medals for superiority and general excellency of its magnesia steam pipe and boiler coverings. They were also awarded a gold medal on account of its magnesia flexible cement roofing.

Mr. John G. Sanborn, formerly with the Chicago Pneumatic Tool Company, and more recently with the Chicago Storage Battery Company, has accepted a position with S. F. Bowser & Co., Fort Wayne, Ind., as railway representative for their oil house equipment and oil storage systems. Mr. Sanborn will make his headquarters in Chicago.

The Miller Anchor Co., of Norwalk, O., are meeting with great success with their wrecking anchors, having sold them to the following railway companies: W. & L. E., Wabash, L. S. & M. S., Union Pacific, C. & N. W., Georgia Ry. Co. and the C. & A. of Canada. Other companies are giving them a trial. It is impossible to pull one of these anchors out of the ground with a large engine.

J. A. Fay & Egan Co., of Cincinnati, Ohio, manufacturers of wood working machinery, announce the opening of their new offices in Chicago, in the Railway Exchange Building, Suite No. 751. The offices will be in charge of Mr. Everett S. Kiger. J. A. Fay & Egan Co., will do all business in this territory direct, discontinuing Manning, Maxwell & Moore, of Chicago, as their agents. Any who contemplate visiting that city are cordially invited to make these offices their headquarters.

The Hancock Inspirator Co., of New York, Chicago and Boston, have just issued a very interesting catalogue of the Hancock valves. It illustrates and describes the globe, angle 60° and cross valves. These valves have been made for a number of years, but this book is the first catalogue in which full descriptions and price lists of all the styles and sizes are given. These valves are designed and made to meet the demand of steam and mechanical engineers for high steam pressures.

John F. Allen, 370-372 Gerard Ave., New York City, manufacturers of the well-known Allen Portable Pneumatic Riveting Machines reports the following recent sales: Fenwick Freres & Co., Paris, France; John Turbull, Jr., & Sons, Glasgow, Scotland; Cambria Steel Co., Johnstown, Pa.; Middletown Car Works, Middletown, Pa.; B. & O. R. R. Co., Baltimore, Md. Mr. John F. Allen was the pioneer in the manufacture of machinery of this class, and the Allen riveters combine in their construction all the latest time and labor-saving improvements.

The Duff Manufacturing Company of Allegheny, Pa., were awarded a gold medal (the highest award in its class) by the superior jury at the Louisiana Purchase Exposition at St. Louis, Mo., for their Barrett track and car jacks and the full line of Barrett lifting jacks for all purposes. The full line Barrett lifting and car jacks and about forty sizes of Barrett jacks for all lifting purposes were exhibited in both transportation and machinery buildings and the award received embraces many sizes adapted to all classes of work, including the Barrett motor armature lift, Barrett pipe forcing jack, Barrett automobile jack and the differential screw jacks.

The Northern Electrical Mfg. Co., Madison, Wis., recently received an order for three 150 K. W., slow speed generators from the Tennessee Coal, Iron & Railroad Co., of Birmingham, Ala. The order was received through J. B. McClary & Co., representing the Northern Electrical Mfg. Co. at Birmingham. The Tennessee Coal, Iron & Railroad Co. is the largest of its kind in the south, and the order was secured in competition with all the first-class manufacturing companies, even though the prices on Northern machinery were met by competing manufacturers. The order was awarded after thorough examination and careful consideration of Northern machinery and given on the basis of superiority.

The State Department at Washington has been informed of the following appointments of official delegates to the International Railway Congress by the governments named:

Argentine Republic.—Carlos Maschwitz, Engineer; Luis Rapelli, Engineer.

Belgium.—E. Hubert. Administrator of the State Railways, member of the International Committee of the Railway Congress; Gerard, Inspector General, having in charge the general inspection of the electric service of the State Railways; L. Weissenbruch, Chief Engineer, Director in the Department of Railways, Secretary of the International Committee of the Railway Congress.

Bulgaria.—(1) St. Sarafoff, Manager, represented by his assistant for the Traffic Department; (3) the Heads of Departments, each according to his specialty; the Head of the Maintenance Department; the Head of the Transportation Department; the Head of the Motive Power Department.

China.—Chan T'ien-yu, District Magistrate; Kuang Ching-yang, District Magistrate; The Taot'ai, K'o Hung-nien; M. Jadot.

Denmark.—G. C. C. Ambt, General Director Danish State Railways. One or two other delegates to be appointed later.

France.—Perouse, Councillor of State, Inspector General of Roads and Bridges, Director of Railways at the Ministry of Public Works; Colson, Councillor of State, Engineer in Chief of Roads and Bridges, former Director of Railways at the Ministry of Public Works; Lax, Inspector General of Roads and Bridges, former Director of Railways at the Ministry of Public Works; Nivoit, Inspector General of Mines, Vice-President of the Committee for the Technical Working of Railways; Beaume, Inspector General of Roads and Bridges. General Director of the Northern Lines; Pontzen, Member of the Committee for the Technical Operation of Railways; Fontaneilles, Chief Engineer of Roads and Bridges, Aid to the Director of Railways at the Ministry of Public Works; Bernheim, Mining Engineer. One additional delegate to be named later.

Greece.—P. Homere, Department Engineer; Aristide Balanos, Civil Engineer; N. Sideridis, Engineer.

Guatemala.—Joaquin Yela, Guatemalan Charge d'Affaires in the United States.

Italy.—Commendatore Engineer Cesare Rota, General Inspector of Railways; Cavaliere Prof. Engineer Grismayer Egisto, Railway Inspector.

Mexico.—Santiago Mendez, Engineer.

New South Wales.—Charles Nicholson Jewel Oliver, J. P., Chief Commissioner of Railways.

Paraguay.—Diplomatic representative at Washington.

Peru.—Henry G. Davis, of West Virginia.

Roumania.—Inspector-General E. Miclescou, Director General of the Government Railways; Inspector-General M. M. Romniceanou, Sub-Director; Inspector-General A. L. Cottescou, "Chef de Service;" Inspector-General Th. Dragou, "Chef de Service;"Inspector-General J. Baiulescou, "Chef de Service;" Ingenieur H. O. Schlawe, "Chief de Division."

Siam.—H. Gehrts, Director General State Railways.

South African States.—Cape Government Railways, by Mr. McEwen, General Manager; Central South African Railways, by Mr. Hoy, Chief Traffic Manager, and another official whose name will be furnished later; Natal Government Railways, by Mr. Downie, Traffic Manager.

Technical Publications

"Irish Literature," Justin McCarthy as Editor-in-chief. John D. Morris & Co., 1201 Chestnut St., Philadelphia, publishers.

To most readers this splendid collection will come as a revelation, for few realize the full extent and merit of the Irish national literature. The poems of Goldsmith and Moore, the novels of Sterne and Miss Edgeworth, the dramas of Sheridan and Boucicault, the oratory of Burke and Grattan, the historical works of Lecky and Bryce, are indeed immortal, but, in the glory they have added to English literature, their Irish origin is at times forgotten. These ten large volumes contain the choicest selections from the works of 350 Irish authors, covering the whole field of Irish literature, ancient and modern, in poetry and prose.

Spangenberg's Steam and Electrical Engineering. By E. Spangenberg, Albert Uhl and E. W. Pratt. 672 pages, 648 illustrations. Published by Geo. A. Zeller, St. Louis. Price, $3.50.

This is a treatise of stationary and locomotive engineering, electricity, compressed air, mechanical refrigeration, gas and gasoline engines, hydraulic elevators, repair work, etc. Owing to the wide experience of the authors, and that it covers the theoretical as well as the practical work, the book must be a great service to those for whom it is written. This makes it a reference book in the true sense of the word. The portion of the book devoted to locomotive engineering covers eighty-two pages, starting with an educational chart of a locomotive, giving all the names of the parts. Then there are 467 questions and answers on all the practical points in connection with locomotive engineering. Following this is a description of a locomotive stoker and also two systems for classifying locomotives.

"Letters From an Old Railway Official to His Son, a Division Superintendent." By Charles De Lano Hine. Chicago. The Railway Age; 5x7½ inches; 179 pages. Price, $1.50.

All branches of the operative department, with its manifold labors, responsibilities and perplexities, are touched upon, with the serious purpose of improvement brightened by pleasantry and fastened in the mind now and then by a drop into the professional slang of the road. The old man approves of the course of the son in having left his father's road and started in for himself, "so as to make people believe that you can go up the official hill without having a pusher behind you," and cautions him that "many a superintendent has had to double the hill of a swelled knob and run as a last section into the next promotion terminal." Then with a fine touch of domesticity, the genuineness of which we will not stop to question, the fatherly adviser strikes his boy's heart-strings by adding "You have too much of your mother's good sense ever to cause anybody else to put up signals for you on this account."

Handbook of Builders' Hardware—by Henry R. Towne, President Yale & Towne Mfg. Co., Past President Am. Soc. M. E.—bound in morocco, 1117 pages with many illustrations. Published by John Wiley & Sons, New York. Price $3. This is a combined handbook of technical information and ready-reference catalogue of locks and hardware for architects. In order to discuss the subject intelligently in all of its phases of characteristics, production and uses, the author has not hesitated to avail himself of one with which he is most familiar, which has unavoidably involved frequent reference to the Yale & Towne Mfg. Co., and its products; but the volume is in no sense a trade catalogue. The book includes an historical review of its subject, technical descriptions of the leading facts of locks and their component parts, a detailed enumeration of the many articles included under the comprehensive term "Builders' Hardware" in their many forms and designs, and a very full discussion of the subject of architects' specifications relating to the selection and furnishing of builders' hardware. A feature of special interest and value is a series of articles by Mr. W. W. Kent, architect, on the "School of Ornament," elaborately illustrated with pictures culled from many sources, setting forth briefly, but clearly, the origin and characteristic of nearly all the recognized schools into which architectural design and ornament have been classified.

Proceedings of

FIFTH ANNUAL SESSION

of the

Chief Joint Car Inspectors' and Car Foremen's Association of America

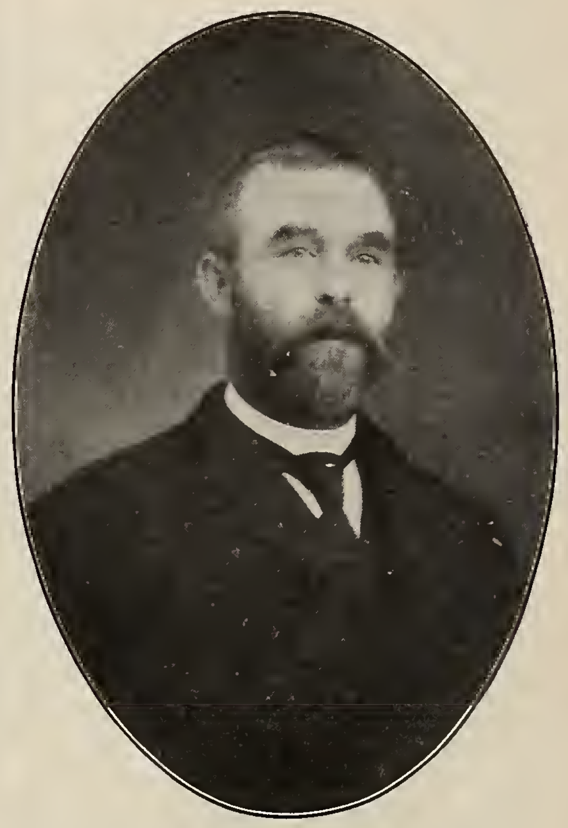
THURSDAY, SEPTEMBER 22, 1904

St. Louis Railway Club Rooms, Transportation Building

World's Fair, St. Louis, Mo.

H. Boutel, Pres.

Chas. W. Waughop, Past Prest.



John McCabe, Secy. and Treas.

Meeting called to order by the president, Chas. W. Waughop, at 10:30 a. m.

Mr. Waughop: Gentlemen, there are two announcements I wish to make to start with: Mr. Willard Smith, the manager of the Transportation Building, has permitted smoking in this room; the vice-president and secretary will pass among you, with the courtesy of the St. Louis Railway Club, an attendance card. I will thank each of you to kindly sign your name and address and return to the party who will collect it in a few minutes, we will thus do away with the roll call.

It is unfortunate, gentlemen, that we are about thirty minutes late in our opening, but it is owing to the fact that the Cincinnati delegation, with myself, were unable to catch a car, and had to walk to the grounds. There was, I believe, one or two Columbus people in the crowd. We will dispense with the roll call, as cards of attendance have been distributed among you.

The following were in attendance:

Bailey J. I., C. Foreman, C. & O. Ry., Russell, Ky.
Bates Geo. M., C. C. I., C. B. & Q. Ry., Chicago, Ill.
Bates Geo. M., C. C. L., C. B. & Q. Ry., Chicago, Ill.
Bawden Wm., G. F., L. & C. Dept., Burlington R. H., North St. Louis.
Benson A. E., Foreman, C. B & Q., East St. Louis, Ill.
Bergman Henry, Asst. Supt., A. B. B. A., St. Louis.
Berry L., Inspector, P. Co., Columbus, O.
Bockwitz A. J., G. F., B. & O. S. W., East St. Louis, Ill.
Boutet H., C. J. I., Big Four, Cincinnati, O.
Bunting G. M., Foreman, Pa. Co., Cleveland, O.

Burns L. J., F. C. D., C. & O., Covington, Ky.
Butler E., F. C. D., T. R. R. A., St. Louis.
Bardy John L., F. C. D., L. & N. Ry., Covington, Ky.
Baxter E. C., Sec., Conventional Dep., Cleveland, O.
Cable Owen, C. I., Kankakee, Ill.
Charlton Chas., Foreman, P. C. C. & St. L., Cincinnati, O.
Clare Jas., F. C. D., C. H. & D. Ry., Cincinnati, O.
Cressey Wm. H., G. F., C. H. D. Ry., S. Omaha, Neb.
Cushman E. N., G. F., T. St. L. & W., East Madison, Ill.
Devanney J. J., F. C. D., T. R. R. A., East St. Louis, Ill.
Dobson C. R., F. C. D., I. M. & S. Ry., St. Louis, Mo.
Donegan T. J., G. F. C. D., Kansas City.
Dunn P. T., G. F., Cincinnati, O.
Dyer Jos., C. J. I., Youngstown, O.
Eicher Albert, Car Rep., Cincinnati, O.
Eicher Frank, Foreman Coach Yard, Big Four, Cincinnati, O.
Ferguson G. M., Supt., L. T. R. R., Lorain, O.
Fields Jas., Foreman, C. & A. Ry., Venice, Ill.
Foley E. J., F. C. R., St. Louis Car Co., St. Louis, Mo.
Felps G. H., T. R. R. Assn., East St. Louis, Ill.
Gainey J. J., G. F. C. D., C. N. O. & T. P. Ry., Ludlow, Ky.
Givan P. S., Foreman, L. & N. Ry., Cincinnati, O.
Hackett John, G. Y. M., C. C. C. & St. L., Cincinnati, O.
Hamilton Bert, C. J. I., Texarkana, Ark.
Handmore Rich., C. F., T. St. L. & W., Madison, Ill.
Hickey Thos., F. C. R., Wabash R. R., St. Louis, Mo.
Hitch Leas. A., Foreman Pass. Cars, C. & O. Ry., Covington, Ky.
Hitch Leas, A., Foreman Pass. Cars, C. H. & O. Ry., Covington, Ky.
Hogan Ed., F. C. D., I. M. & S., St. Louis, Mo.
Holloway A., C. I., Southern Ry., East St. Louis, Ill.
Irwin W. H., C. I., Columbus, O.
Julien B., G. C. F., Omaha, Neb.
Koerner Albert, C. F., Penna. Co., Columbus, O.
Kohehepp A., C. F., C. A. & C., Columbus, O.
Lawson W. C., Representative, Pressed Steel Car Co., Chicago, Ill.
London W. T., Chief Clerk, Loco. & Car Dept., Hannibal, Mo.
Langdon M., Foreman, B. & O. S. W., Cincinnati, O.
Lowe J. F., Foreman, Wabash Ry., Brooklyn, Ill.
McCabe John, C. J. C. I., Cleveland, O.
McFadden C. J., Foreman, Big Four, East St. Louis, Ill.
McPherson J. G. Foreman, Mo. Pacific, St. Louis, Mo.
Malone J. B., F. C. D., C. P. & St. L., East St. Louis.
Meeder Otto, F. C. E., St. L. R. C. Co., St. Louis.
Mendenhall C. M., Pressed Steel Car Co., Pittsburg, Pa.
Merrill Arthur, Foreman, Union Sand Co., East St. Louis.
Meyer Fred L., Foreman, Vandalia Line, East St. Louis, Ill.
Miller Wm., M. M., T. R. R. A., St. Louis, Mo.
O'Brien J. J., G. F., T. R. R. A., St. Louis, Mo.
Parks O. J., C. F., Vandalia Line, Terre Haute, Ind.
Pearce H. C., G. F., I. C. R. R., East St. Louis, Ill.
Rau Gus, F. C. D., St. L. & S. F., St. Louis, Mo.
Rieger C. A., C. I. F., N. C. L., St. Louis, Mo.
Sebring H. K., C. C. I., L. & N., East St. Louis, Ill.
Setzekorn C., Foreman, A. R. T. Co., St. Louis, Mo.
Skidmore Stephen, G. F., Cincinnati, O.
Stack John, Foreman, B. & O. S. W., East St. Louis, Ill.
Smith E. S., G. F. C. R., Southern Ry., Princeton, Ind.
Stark Chas., G. F., C. C. & L. Ry., Cincinnati, O.
Stearns F. H., Foreman, M. & O. Ry., East St. Louis, Ill.
Taylor D. T., Foreman Reps., Burlington, N. St. Louis, Mo.
Treat C. M., Sec., Bureau of Publicity, Niagara Falls, N. Y.
Ustick F. H. Supt., C. B. & Q., St. Louis, Mo.
Waughop Chas., C. L. I., St. Louis, Mo.
Wohorle John, C. J. I., Columbus, O.
Wright W. S., C. Foreman, E. St. L. & B. Elec. Ry., East St. Louis, Ill.

Members Absent.

Atkinson J., C. J. I., Windsor, Ont.
Bailey F. W., F. C. D., S. W. S. C. Co., Fort Worth, Tex.
Boltz V., C. J. I., Wheeling, W. Va.
Berg A., F. C. D., L. S. & M. S., Ashtabula, O.
Boggs Jas., F. C. D., D. S. C. Co., Fort Worth, Tex.
Brainard W., F. C. D., L. S. & M. S., Youngstown, O.
Chisman C., F. C. D., P. C. C. & St. L., Cincinnati, O.
Compton R. T., C. J. I., Cairo, Ill.
Curran J. W., F. D. D., B. & O. S. W., Cincinnati, O.
Dennerle J., Clerk Supt. M. P. Office, L. S. & M. S., Cleveland, O.
Fenwick Wm., G. F. C. D., W. & L. E., Canton, O.
Hill C. C., F. C. D., C. H. & D., Cincinnati, O.
Hoggsett J. W., C. J. I., Fort Worth, Tex.
Merrian E., C. J. I., Lexington, Ky.
Palmer E. C., C. J. I., Toledo, O.
Phipps W. F., C. J. I., Evansville, Ind.
Scrimpton J. J., C. J. I., Atlanta, Ga.

The reading of the minutes of the last meeting is the second order of business. Owing to the lateness of the proofs in arriving at our last meeting, they were not printed, and it was deemed advisable by the executive committee not to print them for last year.

The next order of business is the address of the president. I will make that as brief as possible at this time.

I am, of course, pleased to know that there are so many representatives of both the chief inspectors and the car foreman present from both foreign places and St. Louis, and it being our fifth anniversary under permanent organization—and our wooden anniversary, you might say—it is very fitting that the World's Fair should celebrate this occasion with such a magnificent display in honor of our fifth anniversary.

Your president and vice-president were present, with one or two members, at the Master Car Builders' Association meeting at Saratoga in June. There were some changes in the rules, and those we will consider later on.

I wish to say to the visitors at this time—that is, particularly to the visitors—that we have for you a show in the World's Fair of the Louisiana Purchase, something that you will not again see the like of for possibly the next one or two generations; you will not again see such a magnificent lot of buildings and displays. I feel that each one of you should spend as much time here, particularly the visitors, as possible, at this fair.

Last December, the first, the rules of the Joint Association in St. Louis were changed to conform to the rules adopted at Cincinnati. We found from practical experience, after ten months use, that the rules of that town (By Mr. Boutet: "City, if you please") are not what we think is the proper thing here. It may be good for an inland city of the dimensions of Cincinnati or Columbus or Cleveland (Voices in the audience: "Yes, Cleveland is an inland city) to put rules of that nature into effect, where the interchange is directly between railroads. But where you try to work rules that are up against a city that has more interchange than possibly any other six large cities in the country, and particularly so when you come against the switching line companies, it is an entirely different proposition. I think that the Cincinati rules, so far as St. Louis is concerned, are not a success. There is a committee out at the present time from the Central Association of Railroad Officers who are endeavoring to get up a new set of rules for the government of the peculiar conditions existing in this city, with the hope that they will not punish the chief joint inspector, whoever he may be, and adopt rules that will be fitting to the peculiar conditions existing here.

This being our wooden anniversary, I feel that after having been your president for five years, or from its start, that the burden of that office should be placed on someone else. It is entirely too much honor for any one man, and I hope that the association will see fit to place in nomination, with my second, some one of the association who will be more capable than I have been in carrying the association forward and upward.

I wish to pay my compliments to the chief inspectors. There are a great many of them (and I am quoting from a letter) that know so much that it is not necessary that they attend this meeting. There are others who don't know enough and are afraid to attend this meeting. I will close with the same expression on the foremen.

Through the courtesy of the car foremen of St. Louis and East St. Louis, we have been enabled to perfect a program to-day which I hope you will all avail yourselves of, particularly so to-night. And an expression of thanks is due from this association to the car foremen of St. Louis and East St. Louis. I particularly hope that all gentlemen present who have their ladies with them will not neglect to-night's program.

The convention this year was called for the railroad reading-rooms of the St. Louis Railway Club, who have kindly proffered their us the use of their room. Unfortunately some of these—well, we will call them saw-butchers; they are doctors—are meeting in the Railway Club rooms, and they have entirely occupied them.

It is with pleasure that I announce to the association that there have been no deaths among the chief inspectors in the past year, and fortunately no resignations and no removals, and we trust that they will all continue for another year at least.

I shall ask Mr. Willard Smith, the general manager of the Transportation Building, to address us for a short time, and I will close my short address by thanking all of you gentlemen for being present, and I trust that our meeting to-day, in going over the rules, which will be the principal order of the day, will meet with your approval and be of benefit to each of you. Gentlemen, I thank you. (Hearty applause.)

While we are waiting on Mr. Willard Smith, we have a few cigars here, and I am told by the Galena Oil Company people that they can be lighted in the room with safety. Help yourselves.

The President: Gentlemen, I take pleasure in introducing to you Mr. Willard Smith, manager of the Transportation Building, who will address you.

Mr. Smith, in a very interesting address, welcomed the association on behalf of President Francis, and complimented the inspectors on the thoroughness of their work. A point particularly complimentary was that of the numerous disastrous wrecks occurring this year, not one could be charged to faulty inspection or neglect of the inspector.

The President: The next order, gentlemen, is the admission of new members. On this score I wish to say that I heartily concur in a recommendation of one of the members, that we take down the bars to a certain extent and admit to membership of this association foremen of the car department, and I will be glad to put a motion to that effect.

Mr. Boutet: Mr. President, before that motion is put I would like the other side to be heard on that.

The President: They cannot be heard until the motion is made. If there is no motion, I will consider the motion of Mr. Boutet, of Cincinnati, as a motion.

Mr. Boutet: The proposed changes that I thought would be advisable for the association to make, not so much, possibly, in the view that you may take of it as others. We have about twenty-five chief joint car inspectors throughout the United States, Canada and Mexico. They would make a very nice meeting if we could get them all together. But for some reason, as stated by the president, it is impossible to get them all together. As one of them told me about three weeks ago at the meeting at Cincinnati, "You won't have but about five," and wanted to know if we were all satisfied to be governed by that small proportion of the membership. The same invitation was extended to one as was extended to others. We cannot get them to attend. Now, I think by changing our constitution we can get enough live men to attend our annual meetings to make an association that would be felt by the whole railroad fraternity. There are not enough of us in the case of chief joint inspectors. But if we should expand the Chief Joint Inspectors' Association into a national association, I believe we could get up an association here by that means so that the weight of the association will be felt by every car and mechanical man throughout the country. It is true we may have a meeting in one locality, where we might get some car foremen to attend and join that would not be any help to the association, but they would not attend more than one meeting, and I think with these changes we will get better results than any other way. What we want is to get information, and we will have, I think, the best class of foremen of the country. So far they do not come, with very few exceptions. What I think we want is to get all car foremen of the United States interested in one general association, and I think in this manner we can get up an association, purely of car men, that would be known and respected by every person in the railroad world.

The proposed changes are to change the second line of Article No. 1 to read: "The Chief Joint Car Inspectors and Car Foremen."

Add to Rule No. 2, "and to make such recommendations as will be advantageous in the construction and maintenance of cars."

Change Article No. 3 to read as follows: "The membership shall be composed of all Chief Joint Car Inspectors and Car Foremen of any steam railroad in the United States, Canada and Mexico."

When the above amendments are made, the constitution will read as follows:

Article 1.—The name of this association shall be the Chief Joint Car Inspectors' and Car Foremen's Association of America.

Article 2.—Objects.—The object of this association shall be to provide an organization through which the members and the companies they represent may agree upon such action as may be required to bring out, if possible, an absolute uniformity in the interchange of cars at all interchange points in the United States, and make such recommendations as in their opinion will be advantageous in the construction and maintenance of cars.

Article 3.—The membership shall be composed of the Chief Joint Car Inspectors and Car Foremen of any steam railroad of the United States.

(By Mr. Boutet: The rest of the rules are just as they are printed, just as they have been.)

Article 4.—The officers of this association shall be a president, vice-president, secretary-treasurer and two elective members who shall form the executive committee.

Article 5.—Duties of Officers.—The duties of officers shall be such as usually pertain to such offices, or may be delegated to them by members of this association.

Article 6.—Election when held.

Section 1.—Officers shall be elected at the annual meeting of the association to be held in September of each year.

Section 2.—Election and Tenure of Office.—Officers of this association shall be elected by a written ballot by a majority of votes cast, and shall hold office for one year, or until their successors are chosen.

Article 7.—Annual Contribution.—Every member will be subject to payment of annual dues, to be assessed at each annual meeting for the purpose of defraying necessary expenses of the association.

Amendments.—This constitution may be amended at any annual meeting by a two-thirds vote of the members present.

By-Laws.

Article 1.—Annual Meeting.—This association shall hold meetings annually in the month of September, time and place to be set by the executive committee.

Article 2.—Hours of Session.—The regular hours of session shall be from 9:30 a. m. until 12:30 p. m., and from 2:00 p. m. to 5:00 p. m.

Article 3.—Place of Meeting.—Place of each meeting shall be fixed at least three months before time of meeting.

Article 4.—At any regular meeting of the association seven or more members shall constitute a quorum.

Article 5.—Order of Business.—The business of the association shall, unless otherwise ordered by a vote, proceed in the following order:

1.—Roll call.
2.—Reading of minutes of last meeting.
3.—Address by president.
4.—Admission of new members.
5.—Report of secretary-treasurer.
6.—Assessment and collection of annual dues.
7.—Unfinished business.
8.—New business.
9.—Report of committees.
10.—Election of officers.
11.—Adjournment.

Article 6.—A majority vote of the active members present shall be required to decide any question, motion or resolution which shall come before the association, unless otherwise provided.

Article 7.—No member shall speak more than twice in the discussion of any question until all members who desire to do so have had an opportunity to speak.

Article 8.—If a motion to close any discussion is submitted to a vote, the chairman shall ask the question, whether all have spoken that desire to do so. If all have spoken, a motion shall then be subjected to a vote, and the proceedings govern in accordance with the rules of the association.

The President: Before putting the motion, I would like to ask the proposer of the motion to change the heading of the association to read, "The Chief Inspectors' and Car Foremen's Association of America." It is quite an expensive habit to get into—to use so much type that is not needed.

Mr. Boutet: Mr. President, it might call out some other changes. I will erase the words "Canada and Mexico," and accept the amendment to the motion.

The President: Gentlemen, it is moved and seconded that the proposed change in the heading of the association and certain other recommendations shall be changed as per Mr. Boutet, of Cincinnati. Are you ready for the question? Any comments? (Question called for.)

The president then duly put the motion and declared "it is a vote."

Mr. Boutet: Now, Mr. President, I would ask the secretary to prepare the roll and let all car foremen here come up and register who want to be members of the association, their titles, roads and locality.

Mr. C. A. Reager (of the St. Louis Dressed Beef Co.): If I understand it right, the way it is worded is just to include steam railroads.

Mr. Boutet: Why it was so worded and what we particularly aimed at was to cut out the electric; we wanted to maintain this as a steam railroad car association. Had we better change that to private car lines? It would not exclude those.

Mr. Reager: The impression is, that that would not exclude them.

Mr. Boutet: No, sir.

The Président: Would each gentleman please call his name when he addresses this meeting? I know a great many people by their faces, but I do not know their names.

Mr. Cressey: We have got two or three of the M. D.'s in here.

J. T. THOMPSON.

The President: Mr. Taylor, would you kindly change seats with that next gentleman to the rear and inform those gentlemen who came in that this is the Chief Joint Inspectors' meeting and not the people who look wise and charge all kinds of prices for it?

The next order of business, gentlemen, is the report of the secretary-treasurer. Unless there be objection, I will ask the executive committee to examine the books and report to the executive committee. It is so ordered.

The next order of business is the assessment and collection of annual dues.

Mr. Boutet: I move that that matter lay over until this afternoon.

The President: Unless there be objection, we will take that course. Have we any unfinished business, Mr. Secretary?

The Secretary (Mr. McCabe): No unfinished business.

The President: Any new business?

The Secretary: Nothing particular.

Mr. Boutet: I believe I have something that would come up under new business, if you have no objection.

The President: Under the head of new business, gentlemen, I have some letters here I would like to read.

Under date of September 20, 1904, I have a letter from Mr. W. E. Sharp, the superintendent of the Armour Car Lines of Chicago, showing favors.

The President: I have a letter under date of to-day addressed to myself, and signed by Mr. John J. Baulch, president of the St. Louis Railway Club. It is as follows:

Dear Sir:—I beg to tender to your association the rooms of the St. Louis Railway Club and everything that goes with it, for the use of your association while in St. Louis in September, 1904. Meeting room will be in good shape for you and we would be glad to have your association make itself entirely at home.

The President: We have an invitation under date of

September 13, from Mr. W. C. Radcliffe, secretary of the Detroit Board of Commerce, inviting this association to hold their next meeting in Detroit.

We also have a letter from Mr. E. C. Baxter, secretary of the Chamber of Commerce of Cleveland, O., inviting the association to hold the next convention at Cleveland.

We have another letter under date of September 7, from the same people, insisting on our holding our next meeting in Cleveland.

We have invitations here from the Bettendorf Company, the More-Jones Company, the National Malleable Casting Company and the Galena Oil Company to visit their display while at the fair.

I have a letter of regret from Mr. E. Merriss, the chief inspector at Lexington, Ky.; his son got married and he could not help it.

I have a letter from the general foreman of the W. & L. E. regretting he could not attend.

Letter from Mr. R. S. Miller, general foreman of the car department of the N. Y. C. & St. L. Ry.

From Mr. Gilmore, superintendent of motive power, N. Y. C. & St. L. Ry.

Mr. Zerbee, master mechanic of the Big Four at Bellefountain, O., sends regrets.

Mr. J. M. McBeth, the master car builder of the New York Central at East Buffalo, sends his regrets.

Mr. Ed. D. Bronner of the Michigan Central and Mr. Frank Howard of the Wabash at Cleveland send their regrets.

I have a letter from the Chamber of Commerce of Buffalo inviting this association to hold their next meeting in Buffalo.

Mr. Boutet: I move that the invitations be received with the understanding that the invitations be referred to the executive committee.

Which motion was duly seconded, and being put to the members the president declared "It is a vote."

The President: A vote of thanks is due to the Armour Car Company, the St. Louis Refrigerator Company, the A. R. T. Company, the American Brake Company, the Westinghouse Company, the St. Louis Car Company the Swift Car Lines and the Adreon Company for courtesies extended. I will consider motions.

Mr. Boutet: I move that to the names just read and the chief car inspector of St. Louis and East St. Louis be included in the list and a rising vote of thanks be extended to all of them.

Motion duly seconded and carried by unanimous rising vote.

The President: The next order of business is new business.

Mr. Boutet: Under that head I wish to read the following:

St. Louis, Mo., Sept. 22, 1904.

President and Members of the Chief Joint Car Inspectors' and Car Foremen's Association:

Gentlemen—We have met here, this the sixth annual meeting of this association, for the purpose of discussing the M. C. B. Rules of Interchange and to agree on some uniformity in the matter of interchange of cars.

We should also make such recommendations and agree on some plan to better the education of the car inspectors.

In my opinion, we should try and face the conditions as they exist to-day and not follow in the same old rut in which we have been going for years.

You are, no doubt, aware that the managers of the different roads throughout the country are figuring on getting cars from points of shipment to destination as soon as possible, and every delay that is made in setting a car out on a shipment from Boston to San Francisco adds to the time consumed on that particular carload of freight.

We, therefore, should look closely to the cause of delays and extra switching of cars in transit and try to remedy them by advice and instructions to the different car inspectors, in such a way that the car inspectors will not be held up by all railroad officials, as a barrier over which they cannot pass a car, but as a person to whom we can look with confidence and know that (using the car parlance) when they cut out a car, that car is not fit to go forward, but is unsafe for either train men or the lading of the car when it is marked out.

Are we not responsible, to a certain extent, for the conditions as they are now, instead of the car inspectors being responsible for it all?

For example: we find an inspector who has let several cars get by him; we jump on him with both feet, using the slang expression, about letting the cars get by him, and tell him that he must stop this manner of inspecting and he must catch defects and set the cars out; consequently, he is afraid of losing his position and gets very rigid and sets out everything that is the least bit wrong. This is not only done in this part of the country, but is almost universal.

These are the conditions: they are either very loose or very rigid. Should we not take up cases of this kind and talk with the inspectors in a different manner?

Should we not get with the inspectors, look at the cars with them, show them the kind of cars they should set out and what should be allowed to run? This can be done, but it will require quite a time, as it cannot be accomplished in a short time.

If, having done this for a reasonable time, talked with the inspectors and given them our reasons for acting in this manner, and we find that the inspectors show no judgment, we should send them back to the repair track or let them out and try some other men.

I have no doubt but that the majority of you will state that this is the rule that you are practicing, but I have no doubt, if you stop to consider, you will find the conditions are such as described by me.

You are also aware that cars that would have been set out ten years ago for some trifling defect are now regarded perfectly safe to go forward.

I trust we will all agree on some uniform manner of instructing inspectors that will bring about the best results.

Yours respectfully,

H. Boutet,

Chief Joint Inspector, Cincinnati, O.

The President: Who signs that?

Mr. Boutet: I do.

The President: Gentlemen, you have heard the letter read from the chief joint inspector at Cincinnati; what is your pleasure?

Mr. McCabe (Cleveland): I move that it be received and considered under the proper heading. Same duly seconded.

Declared duly carried by the president.

The President: Any other new business?

It is proper at this time, if you like, gentlemen, to discuss Mr. Boutet's recommendation, and I wish all to understand, both the car foremen and the others who are present, that you have the freedom of the floor just the same as the others. What is your pleasure?

Mr. McCabe: I move that it be taken up under the present heading, under new business.

The President: Not necessary for the motion; it is new business. Does any one wish to discuss it?

Mr. Boutet: Mr. President, I would like to hear an expression from all of the members. It is a matter of vital importance and I trust that each one of you will get up and give your views, and we can probably then arrive at some decision as to what would be the best mode of instructing men. Mr. McCabe, let us hear from you.

Mr. McCabe (Cleveland): Mr. Chairman and Gentlemen, I think our vice-president has made a mistake in requesting me to speak on the subject first. I am a very poor speaker and not much of a thinker, consequently not very much of anything. Now, Mr. Boutet and I are personally good friends, but as a rule we always cross swords in matters of this kind.

Now, I am here for a purpose, and I assure you it is to promote the best interests of the association. From this business I have had my bread and butter for the last twenty-five years, and naturally I should be interested in it, and anything that promotes our interest and brings credit to our labor is worthy of sincere thought from this organization. Mr. Boutet, in keeping with the majority of all our railroad men, very nicely and gently strikes at the poor car inspector. That is the custom which we all have. But my object here is to see the car foremen and the chief joint car inspectors of America get together, to come together, exchange views and understand one another. The object which Mr. Boutet refers to would be a very easy matter when we all think alike and act alike and act in harmony. Yet I must say, while not desiring to put Cleveland to the front, I think Cleveland stands second to none on joint inspection system. And why? No credit at all to the chief joint inspector or his assistants, or to the car inspectors. Not at all. That we have the best—I shall not say the best—but we have foremen in Cleveland and officers that work hand in hand. Everybody is working together to promote the best interests of that class of labor. When all the foremen and us get together, we inform each other, we talk together, everything runs nice. Now that plan ought to be encouraged, and to accomplish that all over the United States will be a step in the right direction.

Now, Mr. Boutet speaks of the car inspector. Let me tell you a little of my experience while I was foreman in the shops. The chief joint inspector and the car inspectors were always considered as not attending to their duty, or did not understand their business. Well, I looked into the matter then and I found that the chief joint inspector was doing everything he could, and I found that the car inspectors were doing their duty, and I looked a little further and I found that we were not doing our duty in the car shops. We had cars that were reported there that were turned out and switched back to the car shop, and the superintendent wanted to know what the trouble was; but the explanation was always, "the car inspectors are to blame." A number of delays were always going on and the poor car inspectors always got the blame. When the car was turned out of the shops repairs were not properly made. I called the chief joint inspector in and said to him, "This thing is not running." He said, "What is the matter?" I said, "We are not doing our work here in the shop. I said after to-day I will number each man and have them work together, and have them make out a slip showing the car they repair, and if you reject a car and that car comes back, I want you to report it to me and I will make a personal inspection of it." He said, "That is a good thing." What was the result? Inside of two weeks that chief joint inspector did not send one car back to the shop. It was my fault, not his.

I think most of the inspectors are honest and honorable, just as much as you and I would be under the circumstances; it is not because they are not intelligent and don't understand their business and don't care. I know better. They are good men as a class. Occasionally Mr. Boutet or I may be obliged to call up a car inspector for careless work, and maybe that man has been sick; a few instructions, or by moving that man to another point, probably he will get along if properly encouraged. He may make mistakes and his pride may be hurt for being blamed for something that he did not do or is not responsible for, and when you come down to the fact, the chief joint inspectors may not be far behind him in that. The chief inspectors and foremen should stand by their inspectors and aid them. Possibly we don't understand the rules and don't study the rules carefully. I would like to hear from all the men here and I desire to resent what I would consider a grave insult to the car inspectors of the United States of America, because even Mr. Boutet, a practical man, must agree that they do honest work as a general thing, that they are good, honest fellows, and if foremen and chief joint inspectors in charge of an inspection will do their duty, and if the inspector does not understand the rules, but is made of good timber to build on, he will make a good inspector after he is educated. If he hasn't got qualifications to build on, we should return him to the repair track. I will be pleased to hear from the foremen and others on this matter.

Mr. Boutet: Mr. President, before I go any further on that subject, Mr. McCabe must have been asleep when I read that letter. My intention was not to cast any reflection upon the car inspector, but to lift him up and have given him the closest attention and helped them along in every way possible. I was only trying to provide some means to lift him up a little higher. I know what a hard time he has and what his work means, and I know they are blamed for every whip stitch that goes wrong. But in talking the matter over with the car foremen and others is what led me to writing that letter.

The President: Mr. Cressey, of Omaha, we would like to hear from you.

Mr. Cressey: I do not understand just what started the discussion—there seems to be quite a difference between them. It is a mistake. There is a mistake between Baker and I and we don't know that each other are living. We get along as peacefully as can be. I don't know of any trouble with my inspectors, and I have one man go around over the country and see that they have done their duties, and if I have got to blame any one, I blame him. I treat them all alike—they are men, and they get a fair salary and they do their work in a first-class manner, and I don't believe that I have any kick coming on the inspectors.

Mr. Baker (Kansas City): Mr. President, we don't have very much trouble with our inspectors. We may have a little where our inspectors have difficulties to contend with which they don't have to contend with in other parts of the country, but there are undoubtedly conditions existing there in that part of the world that we don't have. We can't complain very much of the car inspectors; they do very well. I will state further that the chief inspector don't control the car inspectors to any great extent. They are largely under the control of the car foremen.

Mr. Wohrle (Columbus, O.): We have no trouble at Columbus. We have an association there and they all come together, and we include the inspectors in it. We all come together pretty often and we understand matters alike. We get along very well.

Mr. Hamilton, of Texarkana: We have no diagreements at Texarkana. It is under the inspectors, and the chief inspector goes out once in a while and goes around with his inspectors and shows them the difficulty and the different defects, those that we try to pass, and want to pass the cars along and let the cars run if safe at all. I think that a good many of the defects if the inspector would use his judgment, that a great many of the defects could be repaired quickly, and let the car go and save delays.

Mr. Dyer, of Youngstown, O.: Mr. President, so far as my experience goes, I think the inspectors in general do first-class work. If there is any failure on their part, it may be due principally to lack of time. It is, of course, necessary that a chief joint inspector or a foreman get out amongst his men and explain to them the necessity of cutting out or letting a certain car go on. The inspectors, I think, do good work.

The President: St. Louis is differently situated in regard to inspectors from most of the chief points. The inspectors at St. Louis and East St. Louis are directly under the charge of the foremen. I personally know that there are foremen of St. Louis who are either ignorant of the rules, or they don't properly instruct the inspectors as to the rules. It is not the fault of the inspector. He is obeying his instructions to the letter. And if the foremen would first teach themselves the proper interpretation of the rules and properly instruct the inspectors, there would be no trouble at St. Louis so far as that is concerned. It is human to err. I am one of the humans, and I think all of the foremen and inspectors are with me. If the foremen will first get acquainted with the rules properly, and properly instruct the inspectors, I think there will be no trouble on that score so far as this town is concerned.

I would like to hear from some of the foremen from our visiting cities.

Mr. Skidmore, of the Big Four, Cincinnati: Mr. President, I understand that a meeting of this kind is called for the purpose of improving ourselves in the interchange of cars and other things, and from the manner in which some of the chief joint inspectors have spoken on this question it appears to me that these meetings may as well be discontinued, if they are all in the condition that they think the inspectors are in. They seem to think that the inspector is perfect and no further improvement is to be made in him. Now, I am of a different opinion. While I think the inspector does the best he can and carries out his instructions and understands the rules probably just as well as any of us do, they are sat down on rather hard about some things. Still I think they go to the extreme, and the foreman does not get out with the inspectors probably as much as he should, and try to explain the matters to them—that the instructions are not intended to see if he can't stop all cars in interchange, but to only stop those which are really unsafe for traffic. Now, the framers of the M. C. B. rules took it into their heads to draw up such rules as would facilitate the movement of cars, and those rules have passed thousands of cars out in the past few years that ought all to have been rejected by the inspector as unsafe to go forward. So I think, as does Mr. Boutet in his letter here, that it is a good chance and a good thing to get out among the inspectors and try to facilitate the movement of cars and not to keep on in the same old rut. It would appear from what they have said that it is perfectly satisfactory, and that we can continue in the same old way. But we can't. That is what these meetings are called for, to get each other's ideas and keep the freight moving.

Mr. McCabe: I just want to say a word to Brother Skidmore. I think that I agree with Mr. Skidmore, but that he misunderstands what I said. My idea is to educate ourselves. There is where we should think alike.

Yet there is a difference existing between the foremen and the chief joint inspectors. Now, then, what I am aiming at is to have us see it from his point of view, and then it is easy to understand one another. We are not perfect; we all make mistakes. What I want to impress on this association is the importance of first taking and educating ourselves and understanding one another, and not having the foremen think different from the chief joint inspector. No rules can move cars and get out what is safe and cut out what is unsafe. We should have the proper understanding of the rules.

Mr. Skidmore: Mr. Chairman, I wish to reply to Mr. McCabe. His ideas are right. But the inspectors, the chief inspector and the foremen at Cincinnati get along very agreeably. Don't have any more trouble there than at any other place. But while we are educating ourselves, don't let the inspectors stand there still, but keep him educated up with us.

Mr. McCabe: That is right.

Mr. Cressey: Mr. President, at Omaha, at South Omaha, we are a little differently situated than at some other points where there are joint inspectors. The roads have no foremen and all men are joint repair and inspection men. I believe there is only one other point in the United States that has the same system. The roads seem to know no one except the joint repair and inspection men. So their joint men are hired and discharged by the general foreman. He employs sufficient force to carry on the work according to the business. Any complaint that comes in he has to answer for personally. He has no one sharing in the responsibility, no foreman of the I. S., the N. W. or the Union Pacific to blame it on. He must stand for it all. So the condition cannot be the same as it is in Cincinnati or in other places where the joint inspector can get out from under and let it fall on the foremen of the Big Four or some other road.

By the President: I can readily see how the Omaha man will have a good deal of treasure in heaven.

Mr. Boutet: The occasion of writing this letter was my own idea. Mr. Smith—we call him Smith—the superintendent of one of the railroads, while in a meeting of railroad officers in Denver, was trying to make it appear how radical the inspectors were, and was trying to make it appear that it is impossible to get a car by the car inspector. Of course, we know that is not true in all its terms, but I say it is true that a great many cars are cut out that should be allowed to go forward. I judge, gentlemen, that you don't want the managements of the railroads of the country to think that their car inspectors are poor. I think if we can get here together and we can unite upon some uniformity as to the instructions in regards to the inspectors, it would be a big help.

The President: In reply to that, Mr. Boutet, I will state that to a certain extent we have had the same trouble in St. Louis for the last ten months, and we all agree, I believe, that it is all on account of the Cincinnati rules.

Mr. Boutet: Mr. President, the Cincinnati rules are not universal.

The President: Here at St. Louis we inspect more cars in interchange than at any other point.

Mr. Boutet: There are other points that interchange cars.

The President: We have ten thousand a day.

Mr. Wohrle, of Columbus: Mr. President, at Columbus we have a little association, and call ourselves the Car Association. We take the inspectors in with us. We mix together and we have a meeting once a month and we talk matters over, and we all understand matters there the same and find out from each other what each one knows and thinks about this and that, and scatter our information among all of us, and where an inspector makes a mistake we take him and teach him, and all the others get the benefit of the information, and we all get along that way so well that very few mistakes are made.

The President: We have had the same thing here, Mr. Wohrle, but we don't get out the foremen very much; they are very delinquent in this town.

Mr. McCabe: There is just one word I want to say; in order to handle this matter intelligently I would like to have a word on that, and have the matter referred to a committee to consider all inspection points and report, so that we could get something definite to figure on.

In order to show you how absurd opinions a man on the railroad can hold: A general yardmaster in Cleveland represented to the superintendent of his railway that the joint inspector had blocked up his yard with transfer cars that were in bad order. He said something must be done to stop this practice of receiving bad order cars from connections, and the matter was referred to me, and I found that he had two cars in thirty days for transfer, and I referred it back with my report, and it was up to him to say where he got the cars; and he said the other roads were making his yard a dumping ground. The way to get at this thing, in my opinion, is to refer it to a committee and have them make a thorough investigation and get the figures to show. I got some figures for the city of Cleveland for six months as to our interchange, not including the local work, and is shows as follows:

For a period of six months our record shows one defect card issued to every 75 cars inspected. One car ordered repaired, with delivering company's defects, to every 117 cars inspected. One car ordered transferred to every 693 inspected. One car ordered reloaded to every 787 cars inspected. There were 411,700 cars interchanged.

Mr. Reagan: In regard to this letter I would like to say a few words which it has seemed to me I know something about. A great many inspectors are blamed for their negligence, and a great many foremen are likewise. It does seem to me, Mr. President, as you have stated in regard to this place, that we handle about as many or more cars in interchange at St. Louis than any other place in the country—(By the President: "Than any other five places")—than at any other five places. I would say this, then, that they have got a great deal with the regular cars alone that they have to contend with. The switching facilities and motive powers at St. Louis have a great deal to do with the trouble in that respect. Motive power is so heavy and the trains are so long and heavy that it has its effects on a car and makes it bad after we have probably called it all right. And it was all right, but after being handled the car is bad. And furthermore, we apparently see the cars to be all right—that is, apparently in good condition in good shape to go forward—but after a car is switched into a train for furtherance, we then find that the car is in such a condition that it has to be cut out. I can't attribute this trouble to the inspectors. No inspector can look through the car in the train, and all he can observe of it there and judge of the condition of the car. And furthermore, the foreman, while he does his "rubbering" probably the car is in good condition, while rather somewhat decaying, and after being put into the yard and switched about, being placed into a train and ready to go forward, we find that the switching of this car has been so careless that the car is ready for the rip track, and is turned out. I do not attribute this to the negligence of the inspector or foremen. I say that the railroad companies and the switching of this car, also the movements of the car are to blame; they are more responsible for this than the inspectors or foremen. Futhermore, I know that on the National Car Line Company, of which I am chief inspector at St. Louis, that we have had cars handled to and from one road to another, and when the car arrived at home the car was in a critical condition and it needed a general overhauling. If it had been reported at the beginning, it would have saved a great deal of expense and labor. We can't attribute this to the inspectors or the foremen. I would not be responsible for the condition that car came home in. It has been due to the carelessness due to the railroad companies in handling and switching these cars. It is impossible for us to take the car that is in here, when switched and handled as careless as they are, and look to the inspector or the foreman for the responsibility.,

Mr. Julian (South Omaha): Is it not a fact that in the past five years, with the enormous business the railroad companies have had, that we have allowed the rolling stock to run down considerably? To-day on the Union Pacific we are running trains of eighteen hundred and nineteen hundred tons. Our seventeen hundred ton trains are numerous and our eighteen hundred ton trains are sent over the road regularly. Load up a double-header and give them two engines and you have three thousand tons on one train. It is their looking to the master mechanic and the general foremen to keep those cars running, and at the least possible cost. It is at the expense of to-day that they are looking. They are, on one division of that road, moving trains at a cost of two and a quarter mills per mile per ton for a thousand miles. On the Wyoming Division it is moved at two mills, and on the Nebraska Division at two and one-half mills. On the other hand, if a poor inspector happened to think that a car is safe to run on the ordinary train, what are they to do? If the car goes out and a wreck happens, if a break-down happens, the general car foreman gets a letter from headquarters, and that fellow wants to know why that car has been allowed to be placed in that train. And for such accidents the foremen of the car department are relatively to blame on that proposition as much as the inspector, as Mr. McCabe stated—that we need greater care while we have the cars on the repair track in order to repair them properly. But if the management demands forty or fifty or one hundred cars, we are a little hasty in allowing them to leave the repair track to please the management, who are calling all the time for more cars. On the other hand, if we feel that those cars are in bad order, I think we should give them time to repair them properly. I had been in Denver a good many years before I came to Omaha. I know the situation in Denver. I know that the cars are receiving a great deal of rough handling in the switching, and they are having a great many setbacks; in fact, a great many more than they should have, for the simple reason that the Superintendent's Association ruled the chief joint inspector, and if he allows a car to go out that is not in a first-class condition, why, they blame him for it. On that ground, I believe, lies the trouble. They have as good men in Denver, as good a chief inspector—as good as Mr. Bacon, and I have known him for thirty years. We have in Omaha Mr. Cressey; we depend entirely upon him to do our work. On the other we have our own inspectors at Council Bluffs. We have twenty-three inspectors, and I think it is a little our fault for not taking those inspectors, say once a month, having a talk with them, tell them what we must expect of them. We have a number of straw "jumpers" built out on the road; we get after them and they will have to take their jobs, which we should not do. We do not look enough to the conditions under which they have been working, and although I don't claim that all the inspectors are faultless—none of us are—there are some careless and shirkers and just a little wrong judgment. When we find those men the quicker we get rid of them the better. I think as a general rule to-day, in the past five years especially, that all our roads, with few exceptions, have secured the best men that could possibly be secured to fill the important position of a car inspector.

A Member: Just add there, "for the money paid."

Mr. Julian: For the money paid, yes. (Applause.)

The President: The statement made by Mr. McCabe, of Cleveland, regarding the number of cards issued, cars handled, etc. I would like to understand how Mr. McCabe can manage in Cleveland to issue only one defect card to 75 inspected, and how they manage to arrange it to issue one repair card in 117. The ratio here is about one to every 700, and if we issued cards here as they do in Cleveland, it would mean fully 30 per cent of the cars handled. Cleveland must either be in God's country or there is something wrong with the inspector.

Mr. Cressey: In regard to the number of cars handled by Mr. McCabe, I will say that we have quite a number of cars that come through Mr. McCabe's territory in the way of refrigerator cars especially. It seems to prevail over the country to quite an extent that the number of cars that are handled in the way of refrigerators is large. A great many cars are handled at the point where I am located of these refrigerators, belonging to the Cudahy, Swift and National and Armour car lines. These cars seem to pass the eastern points with what we would term the box car inspection. If any damage is caused to the siding or exterior of the cars, due to the punching of holes through the end by overreaching loads, they are given the box car inspection, the exterior can only be inspected. With most of these refrigerator cars we have from three to five courses, of say, papers, and five courses of lumber and the outside overhand will be crowded up against the end of the next car, and while the next car is probably worth twice as much as the lumber, are generally left off the cars and only the exterior carded, which consists of the siding, and the inspectors generally seem to use poor judgment in regard to location of the posts, and perhaps some overlook the fact that they are in the car. In carding the refrigerator cars, they overlook to a great extent the amount of work between the blind siding and the insulation. Many boards broken to a great extent, and we find in Omaha that there are quite a number of these cars that pass the eastern points or that there is an additional card issued, and when we refer it back to the point where it came from, they claim that all their inspection was made in the proper manner and that they are not responsible; and we have quite a number of cars that pass in this manner, and I think if every car foreman and joint inspector in this room at the present time would take that matter up, and act on it, we would have less trouble in issuing defects cards:

The President: Mr. Cressey, the east has not yet gotten to the idea of the west in using the X-ray machine for inspection.

The President: Gentlemen, the programme calls for 12:30 sharp with the ladies at the Des Peres restaurant, near "Creation" on the "Pike," for luncheon. It is fifteen minutes now of that hour. Therefore, we will adjourn to the restaurant and all are invited to partake of refreshment, until 1:30 sharp, in this room.

Afternoon Session.

At 1:40 P. M. Mr. Boutet said: It is now after the time for the meeting, and I move that we proceed to business.

The President: The meeting will come to order.

Mr. Boutet: Mr. President, before we proceed with any other business of the convention, I wish to state that the executive committee was requested to fix the amount of the assessment, and we make as a report that the assessment be made at $1.50 per member and that the members come up and pay their assessment to the secretary.

The President: Is that a motion?

Mr. Boutet: That is the report of the executive committee.

Mr. Starke: I move that an assessment of $1.50 each be levied on all members.

Seconded by Mr. Julian of the Union Pacific.

Upon the motion being duly put, the president declared "It a vote."

Mr. Boutet, vice-president, takes the chair and says: The first order, gentlemen, we will proceed with the discussion of the letter presented by myself, if there is any further discussion on the matter. Any other gentleman in the room who desires to discuss the matter further?

Mr. Taylor: Mr. President, I suggest that you read the letter over again. (Chairman proceeds to again read the letter in full, signed by H. Boutet.)

Mr. Taylor: Mr. President, in discussing that letter this morning, I remember your saying that the local agreement at Cincinnati did not interfere with the M. C. B. rules, and that the St. Louis foremen will be glad to hear anything regarding the Cincinnati agreement. Mr. Waughop said that the Cincinnati agreement did not work well here. I would like that explained, regarding the Cincinnati agreement, as to where they conflict with the M. C. B. rules. I would like to ask this further question: Are they in harmony with our interchange rules?

The President: Yes, sir.

Mr. Taylor: Are they fac simile with Cincinnati?

The President: Not exactly fac simile; the general principles are carried out. The rules in Cincinnati are based mainly upon M. C. B. rules—the same that we interchange cars under. We will say a car comes in on some road and destined for the switching limits. Those cars can all be allowed to go as if they were going to be delivered from one line to another with a through shipment, then we accept cars as a shipped car. We have also what is known locally as locally consigned cars. So far as the Cincinnati exchange is concerned, it is based on M. C. B. rules. Under conditions in Cincinnati that do not exist in St. Louis, a car comes in on one line and is inspected on the rail before delivery. All our inspecting is done before delivery.

Mr. Taylor: That is the point I wanted to get at.

Mr. Boutet: Instead of waiting before we inspect for the delivery, that car is inspected before it leaves the yard. If that car is in a defective condition it is set out in the yard of the delivering line before delivering it. Unless it happens to be some hidden defect, that is not discovered the first time. But, then, that does not bear on the letter. It is really out of order, but I did not see how I could get rid of answering that question.

Mr. O'Brien: Mr. Chairman, I would like to ask if the supervision of inspectors is directly under the foremen at Cincinnati or under the chief inspector?

The President: Directly under the foreman.

Mr. O'Brien: What supervision has the inspector?

The President: None at all, except that he is expected to report as to the efficiency of the inspectors.

Mr. O'Brien: This covers only the matter of work; in the matter of discussion, how is that settled?

The Chairman: That is a matter of arbitration solely.

Mr. Waughop: I would like to ask a question, Mr. Chairman: How many chief joint inspectors have the inspectors under him?

The Chairman: How many does the chief joint inspector have directly under him? None.

The Chairman: That is all, I believe. But we are drifting away from the subject, gentlemen. Let us confine ourselves to what is before the house. I will not allow any more diversion until we dispose of that paper. We will proceed to take up and talk about that until we dispose of it and then we will proceed to the next order of business.

Mr. O'Brien: I believe that the educational rules of an inspector is based on the chief inspector himself, when he comes directly under the inspection of the chief joint inspector. If we will look upon the conditions such as are existing at St. Louis as an illustration; there are twenty-six foremen, each one giving his own interpretation of the Master Car Builders' rules, it is easily to be seen that there is a dissension and difference in opinion. As a result, congestion in the movement of traffic. Therefore, it is my belief that the foundation of the movement of traffic, so far as inspection is concerned, can be remedied and rectified by placing all the inspectors under one chief inspector, who will be in a position to issue one kind of inspection, and only that kind of inspection orders, so as not to confuse the inspectors. I think by so doing it will have a tendency to eliminate that part for which the inspectors are blamed for irregularity in inspection.

Mr. Starke (C. C. & L.): In order to rectify the present condition, we must go with the inspectors, go over the Master Car Builders' rules with the inspectors, go with each man, and go with him and determine what would be the best to do with any particular car. Tell him how to take care of that car under the rules, and take them along to the car and determine what defects caused the car to be cut out, and what would also determine would be the safe part of the car, in what condition it would be safe to let it go. We do that, and we don't have any trouble.

Mr. Julian: I believe we are to blame for some of the trouble we are having to-day. As Mr. O'Brien says, each and every foreman interprets the rules in many important cases differently. I believe we could form an association here among car men, among foremen, and go to our companies and make them understand the importance of the chief joint car inspector's position, and inform them and convince them that it would be to their interest in the movement of trains to place their inspectors entirely under the chief joint inspector at every point where there is a joint inspector. I think with that done the problem would be solved. I do not believe that it will be solved without it. (Applause.)

Mr. Chas. Hitch: If the inspectors should receive their instructions from the foremen or their superior, the foremen or the joint car inspectors, and it also appears to me that the foremen, having an organization throughout the United States, should have a proper interpretation of the M. C. B. rules, and should be in a position to transfer the interpretation of these rules to the inspectors under their jurisdiction in an intelligent manner, that they, too, may interpret and understand the rules as they are printed. Now these organizations are intended and are supposed to bring the foremen and the joint inspectors together to go through these rules and interpret each and every rule as they understand it, one and all. I think you might in this way get a thorough understanding of the rules, and not one have this understanding one way, one have on interpretation and another have it another way at the same point.

Another point to be considered is this, that there is in the rules which are adopted by this association should be, that the same rules apply at all points in the United States, so that if you pass a car at one point it will pass at the other point without question. Now as all cars are interchanged under the M. C. B. rules—there may be some local rules existing—but the idea is if that is the rules announced, the M. C. B. rules, it should be thoroughly understood at all points that when a car was passed at one point, that car would pass the different points with the same inspection. I believe that that is what these organizations are for, and that each and every inspector and foreman that attends it could go back to his respective place with a uniform understanding to be given the M. C. B. rules.

Mr. Julian: You might think that I am thinking a great deal of the chief joint car inspector and not enough of the foremen. Still, I am a foreman, and I think as I have said before that it is no reflection of the foremen in having the chief joint inspector handle all the men at the different joint points. We have on the Union Pacific a plan, a favorite idea, of placing a chief joint inspector wherever we can and allowing him full control of his men. Let the men be independent of any railroad companies. Let them understand that they are working for a chief joint inspector and not for the different railroads, and that they are not looked to for results. Then men won't think that they are representing their company, or any company. They don't know any company. They know their superior, and that is all. I know that we had a great deal of trouble in Denver prior to placing our men under the chief joint inspector. The Union Pacific had twenty-two men on their transfers; the Santa Fe had six; the Rio Grande had six; the C. & S. had eight; the D. & M. had five. We consolidated the men, placed them under the chief joint car inspector, and reduced the expense at that point thirty-seven and a half per cent on the inspection. I believe to-day if the railroad companies get to understand that it is to their own interest to adopt that system at every point, that it will be a great saving in the handling of inspectors, great responsibility taken off the shoulders of the foremen and a great responsibility taken off the shoulders of the different superintendents. I am in favor, Mr. Chairman, of the chief joint car inspector having control of his men.

The Chairman: The discussion, the president informs you, has got to close at 3 o'clock, to take up the M. C. B. rules. He will not allow any longer than 3 o'clock on this subject.

Mr. Hitch: There is another matter I would like to say something about. The present rules make the receiving road the sole judge of the fitness of the car passing over its lines. In order to place this matter where it should be, and relieve the foremen of responsibility, it must be placed on the chief joint inspector. As long as that rule exists, nothing can be done.

The President (breaking in): I believe we are deviating from the subject; it is not a question of whether he should or should not be placed under the chief joint inspector. The question is as to the best manner of educating the inspectors.

Mr. Hitch: Then I have nothing more to say than what I have said and that the foremen should be in a position to instruct the inspectors and see that they know their business.

Mr. McPherson: My experience at St. Louis is that we get hold of the wrong idea of things and are blaming the inspectors for what they have no control over. The man that you want to get at is the foreman. The conditions will, I expect, be hard to get at, at every point, but I will simply say that we want to double our capacity for switching and motive power. There is no one here that ever has increased the number of men in proportion to the work; they are inspecting the cars and expecting the cars to be repaired and handled under the same conditions as ten years ago. You have got to get after the foremen and then after the companies that own these cars and equipment and get force enough to keep the cars in proper order, then you won't have any trouble with the car inspectors. (Applause.)

Mr. Chas. Waughop: The conditions existing at all other points in the United States are entirely different from those existing in St. Louis. There are no other points in the world like it. There is no other point, nor any other five points, where the interchange of cars is so heavy as it is at St. Louis and East St. Louis. I have been asked the question, if the inspectors were placed under the chief inspector directly, wouldn't it be a benefit? I will acknowledge that in a way it would. It would certainly tend to be an economical move. On the other hand, it would require a considerable expense in managing the chief inspector's office, in looking after it, looking after what I call "kicks" from the foremen. We will grant that the inspectors are placed under the chief inspector. I made the statement the other day, and I made it in good faith, that there are a great many foremen who have failed to either learn the rules properly and to properly instruct their inspectors. Just such foremen as that would stay awake nights, looking over the inspector's inspection and find some missing parts or defects that he had missed. And the first thing the next morning that foreman would be after the chief inspector and say that the inspector is "doing" their company. It would require the time of the chief inspector and one or two men to settle just such cases as that. So far as St. Louis is concerned, I don't believe that the inspectors have ever been instructed properly by the foremen. It is no fault of the chief joint inspector, because he has tried to instruct the foremen on that score, and if they fail to explain the rules to the inspectors it is not his fault.

The Chairman: Gentlemen, we have brought out most of the points which I think will cause some thought during the next year, and put your wits to work to remedy the evil. I would suggest that you appoint a committee to report on this same matter, to report at our meeting one year hence. As we have gone to the time of closing, I will declare the discussion closed, and I will offer that as a suggestion.

Regularly moved by Mr. Wohrle, and seconded by Mr. Cressey, that the recommendations of Mr. Boutet be carried out by the appointment, by the president, of a committee of three to consider the matter.

The President: It has been moved by Mr. Wohrle, and seconded by Mr. Cressey, that a committee of three be appointed by the president to report on this matter at our meeting one year hence. All in favor of the motion will raise their right hands. The motion is carried unanimously. I will appoint as chairman of that committee Mr. Julian, of Omaha, and as other members Mr. Stephen Skidmore, of Cincinnati, and Mr. McPherson, of St. Louis.

Mr. Waughop resumes the chair.

The President: We will now come to the order of business of the rules. There has been several changes in the rules in the last June convention of the Master Car Builders. I will take up the rules and read them, and where any changes are noted we will discuss.

Beginning at the preface, there is no change. Identically the same as last year. Any discussion?

Rule No. 1. No change; any discussion.

Rule No. 2.

Mr. McCabe: Mr. Chairman, I think it would be a very good idea not to pass that rule without some discussion. I would like to say from my experience that car men all over the country are not living up to this rule. It is a very important rule, too. It looks very simple. I will read it. (Mr. McCabe reads Rule No. 2.) Now, I find out that men all over the country are not living up to this rule. They are not insisting on having repair cards applied. Possibly they make the bills, but they neglect to apply the repair card. This is very important. It is important in your own territory when one road repairs a car to see that it has the repair card on it; to see whether they apply second-hand material; to see what they do in regard to applying couplers. I find the rule is not lived up to. If every inspector in the country would insist on having cars properly carded with an M. C. B. repair card, that car would pass home to the owner; and if there were any improper repairs there, the owner could take it up and settle it. Give the inspectors an opportunity to check up. Now, in Cleveland, if any road repairs a car and they fail to fill out a repair card, we simply send that car back to them to comply with the rules instead of allowing car to pass home to the owner; thus we avoid a great deal of tracing and confusion. I would like to hear from the members on that.

The President: I would like to ask Mr. McCabe, how do you account for the peculiar conditions existing at this point, that we never see a Cleveland repair card? I hear the same comment from Omaha, Cincinnati and all around; we never see a Cleveland repair card.

Mr. Boutet: Let me answer for Cincinnati. During the time that the Mississippi division of the B. & O. S. W. Ry. was known as the O. & M. Ry., it seemed that every car that went west as far as St. Louis, when it returned to Cincinnati there was a defect card that was on the car when it went west, was invariably missing on its return.

The foreman of the O. & M. Ry. informed me this was caused by the goats in East St. Louis eating the cards off, and I expect that is what is the matter now, as St. Louis claims there are no repair cards on cars from Cincinnati and other points.

The President: We got rid of the goats for all time in East St. Louis, I am glad to say.

Mr. Clara: To help Mr. McCabe I will say we use on an average of twelve repair cards a day.

The President: Where?

Mr. Clara: At Cincinnati.

The President: It is very evident that Mr. McCabe has not attended the Master Car Builders' convention in recent years, as the majority of the master car builders now concede that that rule is now a dead rule, so far as the putting on of repair cards is concerned.

Mr. Boutet: I do not concede that; there isn't a man in Cincinnati or elsewhere that would not support my position of the whole and put on a card.

Mr. O'Brien: Is that the proper interpretation—is not that Rule No. 74?

The Chairman: No part of the inspection.

Mr. McCabe: This is part of the inspection. When a car comes to you it is up for inspection.

Mr. O'Brien: It is a matter of designating the rule. When we get down to Rule No. 74 we get down to repair cards.

Mr. McCabe: To see that cars get the same inspection as your own. If it is repaired in your territory, you will be able to check up.

The President: McCabe, do you get any cars from the west with repair cards on them?

Mr. McCabe: Yes, and from the south.

The President: How about from the east?

Mr. McCabe: And we get them from the east.

The President: How about Cincinnati?

Mr. McCabe: We get them from there, too.

Mr. Boutet: I told you we were honest at Cincinnati.

The President: We don't apply the rules to the inspectors at this point. We don't see them. Any further discussion on that rule?

Mr. Hitch: It appears to me that that rule ought to be very plain. This rule applies to foreign cars on your own line, and in handling those cars that you will give them the same care that you give your own cars. The second rule covers all the cars in interchange. That car is not in interchange at all; it is simply being handled on your road as one of your cars.

The President: The point is well taken, Mr. Hitch. We will pass on to Rule No. 3, unless there is further discussion.

Rule No. 3; no change.
Rule No. 4; no change.
Rule No. 5; no change.
Rule No. 6; no change.
Rule No. 7; no change.
Rule No. 8; no change.
Rule No. 9; no change.
Rule No. 10; no change.
Rule No. 11; no change.
Rule No. 12; no change.
Rule No. 13; no change.
Rule No. 14; no change.
Rule No. 15; no change.
Rule No. 16; no change.

Mr. Sebring: Last year those rules were discussed by the joint car inspectors and they did not change them; I think we had better take the rules that are changed and find out what they are.

The President: Everybody who wishes to discuss the rules has the privilege to do so.

The President: Rule No. 19; there has been a good deal of discussion in the past years by different inspectors as to what constitutes a "slid flat" wheel, and it has been voted on in two or three instances, and they have decided that the proper interpretation of the rule is that the slided spot must be two and one-half inches with no points on the gauge shown. Everything on the gauge must cover the solid flat spot. It must cover the entire gauge. I believe that has been decided upon and is no longer in doubt.

Mr. Stack: The flange cut by sliding.

The President: I never saw it except on a curve; that is, a cut flange; I think it is a case of rough usage.

Mr. Stack: How much is shown up?

The President: The same dimensions as would apply to a chipped flange wheel.

Mr. Stack: An inch and a half?

The President: Yes.

Mr. Boutet: I don't think that a very rare occurrence; I find it a very frequent occurrence. Such cars frequently come in from crooked roads. Possibly it may be four inches long; lots of times it is four inches; but if it is slid deep enough and if there is any danger of the flange catching on a rough joint or a switch point, then I condemn it. But if it only slides so that there is no danger of catching in a joint or switch point, then I let it go forward.

Mr. Stack: Should it not govern when wheels are to be removed to the shop—could not that be determined on?

Mr. Boutet: I do not think that any wheel that is not bad enough to come out from the car should be carded. Neither should I believe that a slid flat wheel should be disregarded. It should not be carded. If condemnable, it should be taken out.

Mr. Cressey: I would like to ask in connection with this, what would be done with a wheel two and one-half inches on the flat and another with two inches?

The President: We would refuse a card.

Mr. Cressey: Would you remove the wheel?

The President: Yes, remove the wheel.

Mr. Cressey: Unfair usage?

Mr. Baker: I would like to know the sentiment of all here, but we never can agree on what the rule means exactly.

The President: Let me read the rule. Personally, I do not think the master car builders ever wrote a rule that was plainer, that was in plainer English, than Rule No. 19. (President reads Rule No. 19.) What is the meaning of the word "flat?" It is not round. It is one continuous slide, taking the gauge for two and a half inches, or more.

Mr. Boutet: That is very true, Mr. President, but the exception taken by Mr. Stack was very good. You can have a slid flange wheel where the gauge will not set down on it perfectly flat and is not a thirty-second of an inch on the flange or slid flat where the gauge would not sit on that point. The question is, how far that slide would be before we would condemn the wheel. I don't know whether you have much of that kind in this locality or not, but we have from our crooked roads.

Mr. Skidmore: I don't think there is much room for discussion on the matter. If the slid spot is two and a half inches long it is condemnable; if it is two and three-eighths inches, it is not condemnable.

The President: That is all there is to it.

Mr. Boutet: And that refers to the slid flange?

The President: The point is not a slid flat wheel; it is a slid flange.

Mr. Baker: It is not a question of whether a wheel is two and a half inches or not; it is a question of whether it is dead flat or not; it is whether it should be condemned as dead flat or not. I claim you cannot pass wheels on an arbitrary interpretation of the rule, but that only a wheel dead flat must be removed.

Mr. Dyer: A flange is slid flat and yet it is not so slid flat that it would be condemnable by the gauge, as the worn flange, worn so thin or worn vertical, if the gauge was flat on no point. The flange is not condemned or condemnable, and what would be the use of condemning the wheel because of two and a half inch flat on it?

Mr. Stack: The part of the gauge that gets on the flange that makes it unfair—that means, it is the shoulder they slide on. It is the same as a vertical flange.

The President: As I have said before, questions of that kind very rarely come up at this point. We are fortunately in a position where the engineers cannot see the back of their heads on their own track.

Mr. Hitch: It appears to me that it should be left to the discretion of the foremen and inspectors in regard to that. There is no rule to govern it. And the condition of the flange would have to be taken into consideration, and also the depth of the slid spot. It would be a matter left to the discretion of the party having it in charge, in my opinion.

The President: I think when we consider the gauge, as shown on pages 6 and 7 of the rules, we will find they will govern that point. If they go under the limit of the gauges, the wheel is not condemnable.

Mr. Cressey: There seems to be a division of opinion here. I believe that the majority of the chief joint car inspectors are against my idea of a car sliding by flat sliding. With the exception of Mr. Baker, I do not believe that I have another man who coincides with me. My interpretation of that is that whenever it is necessary to remove a wheel on account of flat sliding, whether two and a half inches, eleven or fifteen inches, no matter what the flat sliding is, at the time it is discovered, that party is responsible and must pay for the wheel, either by card or by removing the wheel. I had a wheel some two years ago that I had set aside to show Boutet or Waughop and ask why it was set aside. It was given the uniform inspection, but there was no place where it would take the full interpretation of the gauge. I says, "Roll that wheel over to the corner of the shop and I will see if Waughop rules it out—Waughop's inspection." No, sir; would not card it. I carded the wheel, and I insisted on getting the card we usually get when the car did not move.

Mr. Boutet: There are twenty million people who do not agree on your point.

Mr. Julian: I concur in the opinion that it is not a question of whether a wheel is removable; it is a question of whether the wheel is condemned by the gauge, and I think that settles the whole question. If the gauge shows two and a half inches by the gauge, that settles it. I would not ask any man to card a wheel that had a seven or eight-inch contact flat.

Mr. Riger: I do not think that two and a half inches on the flange would be sufficient to cause the wheel to be removed. I do not think that that distance on the wheel would be sufficient across the shoulder, enough to derail the wheel, and I think the shoulder would not be crossed under about five inches slide where wheels had been slid, and I think I have seen where the wheel, the flange, had been so worn off, I suppose, five or six inches; but at the distance of two and a half inches I could not see sufficient cause to justify the wheels being removed.

Mr. Stack: Does this rule refer primarily to the slide, or does it include the flange?

The President: It means the slide of the tread of the wheel.

Mr. Bockwitz: There is no gauge to condemn a worn switch. Therefore, when we have a defect of that kind, with a defect in the switch point that would cause derailment, and we have no gauge to condemn those—that is, a defect in the wheel and in the switch point, these defects would cause derailment.

The President: To stop argument, I will consider a motion that the arbitration committee be requested to interpret Rule 19, slid flat flanges, describing what is codemnable.

Mr. Boutet: I would move that suggestion, that it be sent to the arbitration committee, requesting them to define a slid flange wheel, and describing at what point it should be removable.

Which motion was duly seconded, and being put to a vote was declared duly carried.

The President: Rule No. 20; no change.

Mr. McCabe: We have lost something—on the slid flat tread and the two spots are on one spot; that was not decided whether Mr. Cressey was to be on that committee. There is room for that gentleman on that committee. I want to make a special point of that. He differs from others on that commitee, and we want to hear why Omaha and St. Louis differ. Let them make special efforts ot find out why there is this difference. That is what I am here for. If you have the inspection done, under whatever head it may be, and under whoever may be wanted by the companies, we will do that work, and if, for instance, Mr. Waughop runs all the cars in St. Louis according to his ideas, no road in St. Louis loses anything, because one offsets the other. But if the foremen differ, then there is a difficulty. Now, then, Mr. Cressey at Omaha reverses the decision here, and all the roads at Omaha get the benefit of his decision. What is good for one is good for the other—what is good for the goose is good for the gander. Don't you see the idea? And let the chief inspector be subject to the foremen if you will. If you will only try this system in every joint inspection point, just watch results.

The President: How many chief joint inspection points in the country think differently from St. Louis on that subject, besides South Omaha, in regard to slid flat wheels and slid flat tread? How many joint inspectors do not concur in the opinion of St. Louis that a slid flat wheel must be two and a half inches, and that if it has a two, three, five or ten-inch, they don't condemn the wheel so far as charging the delivering line is concerned?

Mr. Cressey: I mean that if the spots are each less than two and a half inches, but if there are so many that they endanger the safety of the wheel, that the delivering company should pay for the wheel. It is not the fault of the receiving road.

The President: The discussion was up once or twice before, and I believe the vote taken on the subject was that out of the vote of twenty that there was possibly two that did not concur in the main, and it is unreasonable to suppose that the two out of the twenty were right and the other eighteen were wrong.

Mr. Hitch: In answer to the gentleman from Cleveland, the joint car inspectors and the car foremen from all over the United States that assembled here today in convention, for, if possible, a unanimous interpretation of those rules. Now, if they cannot get the proper interpretation of the rules here, where can they get it? The idea is to have a united interpretation and each and every man the same. The rule seems to me to be very plain and there is no reason why there should be a difference on this, when there is a unanimous opinion that the slid flat must be two and a half inches flat. If it does not take the gauge at any point for two and a half inches, it is not slid flat and then the rule is that it does not condemn it.

The President: For the purpose of getting an opinion from all the foremen and from all the chief inspectors that are present, I will ask all foremen or inspectors that are present to raise their hand, all who are in favor of carding of cars where it does not show on the gauge two and a half inches.

Mr. Boutet: Before you put that to vote, Mr. Chairman, I would like to say something.

The President: We will take the vote first, then you can talk about it.

The President's suggestion was seconded by Mr. Julian.

Mr. Clare: I would ask that you add to that motion, that you state whether the wheel is condemned or not unsafe, by us.

The President: I will grant that, and the wheel is unsafe in the opinion of any car foreman or inspector, and still does not take the gauge.

Mr. Boutet: I don't think there is any difference of opinion on that point, and that there is not a joint inspector or foreman, but what will acknowledge that they have seen slid flat wheels that they could not put the gauge on at any point; I don't think there is a foreman or inspector in the room but who has seen that. And when we find a wheel of that kind I think we will want that wheel removed. I think a card should be given for it. I believe the delivering line should be made to pay for it. I have seen wheels that are slid three-eighths deep, but you could not get the gauge on it. And yet there is not a man in the room who would run the wheel in that condition. Theree is not a point on that whel that you can put the gauge on. Some are slid flat three-eighths deep; Mr. Waughop said he would not card it; but I want to say that we would give a card against the company that would deliver it.

Mr. Cressey: Before the vote is taken, I would like to appeal to you for a point of reason. That you can slide a wheel two and a half inches and it is condemned, the minimum by the M. C. B. Association, but our friend Waughop says you can slide the wheel ninety-nine inches and not condemn the wheel. I ask you if it is consistent?

The President: I will answer that, gentlemen. The chief inspector at St. Louis does not say that the wheel is not condemnable; but he does say that it is not cardable against the delivering company, and that is according to the rules. (Applause.)

Mr. Ecker: Would not the receivinlg road be the judge of whether they would take that wheel or not?

The President: They are; the law is there; they are the judge except as to the law.

Mr. Riger: Who would be the judge as to the two and a half inch slide on the wheel? If the receiving roads accepts the car, it is responsible the same as if any accident should happen and the owner of that car is perfectly safe, it seems to me, anyway, if the owner of the car is all right.

The President: I will state for your benefit that that is one of the idiosyncrasies put in there by the master car builders.

The President: All in favor of carding a car with slid flat wheels ninety-nine inches and not taking the gauge, will please raise their hands.

Vote counted; nine votes for.

The President: All not in favor of carding the car, raise their hands; ninety-nine against.

Mr. Parks: Would it be in order to have this club ask the Master Car Builders' Association to amend that rule, to read: "Or if the spots are so numerous as to endanger the wheel?"

The President: I believe the association recommended that once before, and it was not received favorably.

Mr. Sebring: Who would you charge the work to after sliding?

The President: If it is a foreign car, going to the L. & N. say, in that condition, I would simply say you will transfer the car and let it go back to the place where it came from.

Mr. Sebring: Suppose you run the car?

The President: Wouldn't run it; if you did, it would be at your own risk; you run cars that way to somebody else.

Mr. Sebring: Would we be justified in charging that car to the owner?

The President: No, sir.

Mr. Sebring: Is not that done?

The President: I suppose it has been done where there is some sharp practices resorted to.

Mr. Sebring: Isn't it almost always done?

The President: I don't know; I am honest.

Mr. Sebring: Well, say it has been slid for about six inches and both wheels worn out at the same time, it wants new wheels; I say there is a chance to be dishonest in that, and I would recommend that the association decide on that point, who it is chargeable to.

The President: I will be honest enough to say to you, Mr. Sebring, and I say that under these rules I would rip up every railroad in the country, and I guess that every foreman in the country could; but I won't.

Gentlemen, the motion is lost.

Mr. O'Brien: I would like to ascertain from the chairman what disposition he would make of it on behalf of the intermediate switching line? How would you dispose of it? Would you run the car?

The President: Send the car back, providing they transfer.

Mr. O'Brien: Suppose he won't take it?

The President: He will have to.

Mr. O'Brien: Who will pay for it?

The President: The man that gets the car.

Mr. Stack: I think that point should be settled; if the company delivers it, it ought to pay for it, the one it was transferred against.

Mr. O'Brien: I demand from the Chair and the representation here a decision on that point; I have specified in the case if the intermediate road or switching line should happen to slide the wheel ninety-nine inches, how would the chief joint inspector dispose of the car in behalf of the switching line? I want a decision.

The President: So far as St. Louis and East St. Louis is concerned, so far as the switching lines here are concerned, during the past twenty-three years I have been in the business, they have never been carded or condemned. They would simply have to accept or refuse it, or run the car at their own expense.

Mr. O'Brien: Who would repair it if necessary?

The President: The receiving line if they run it—if they wished it repaired.

Mr. O'Brien: Suppose they didn't?

The President: The line that first delivered it to you, they repair and return it to you.

Mr. O'Brien: The delivering line would be responsible?

The President: The line delivering to you, yes, so far as you would be concerned.

Mr. Julian: The wheels could not be condemned?

The President: No, sir, they could not be condemned, so the switching road would not be responsible for the wheel; the ninety-nine inch flat does not take the gauge, and for that reason they cannot be refused by any road; they have got to take it.

Mr. Stack: It is not slid flat—it is ninety-nine inches and does not take the gauge.

Mr. Clare: If A. road offers to B. road a car that belongs to C. road with those spots so numerous that the wheel must be taken out, the B. road would not accept the car until tohse wheels or wheel is removed, and A. takes the wheel out; can A. make a bill against the car owners for the cost of the repairs?

The President: He cannot unless he uses sharp practices.

Mr. Clare: If it is the owner's defect?

The President: No, sir.

Mr. Clare: This it is the delivering company's defect.

Mr. Julian: It is not a defect at all; or, rather, it is a defect, and not being cardable, it is not a defect.

The President: Rule No. 4 says: "Defect cards shall not be required for defects for which the owners are responsible, except for missing material on cars offered in interchange, as provided for in Rules Nos. 27 and 39, neither shall they be required of the delivering road for improper repairs that were not made by it," etc.

Rule No. 2 says: "Cars offered in interchange must be accepted if in safe and serviceable condition," etc.

You cannot call for a card, consequently the car is not rejectable.

Mr. Tainey: Is the wheel safe?

The receiving line is the sole judge and jury as to the fitness of a card offered in interchange to go forward over its line, and Rule No. 2 says it must be accepted if safe and serviceable and the receiving road to be the judge, then you can take the freight and return the car in the condition in which you received it, and that road in turn can deliver it to the party they received it from, and you in that way dispose of it the best that you can.

The President: Rule No. 20.

Mr. Stack: I suggest that that rule be read, as there are many interested.

The President proceeds to read the rule in full.

Mr. Stack: Rule No. 20 says one-eighth of an inch past the center of the flange; is it condemnable?

The President: Yes, the center of a flange of a wheel means the roll of the wheel, the thickness of the wheel flange, not the length of it, the thickness. One and a half inches, whether it goes to the center or not, condemns it.

Mr. Baker: I understand, if the chip is on the throat side of the flange and exceeds one and a half inches, it is condemned; it must exceed that extent, exceed one and one-half inches.

One-half inch wide, or one-eighth inch past center; I believe that ought to be the word in there "Or" one-half inch wide to condemn; the chipped flange—"Or" one-half inch wide should be in there.

The President: That suggestion has been made, but the arbitration committee does not concur in it.

Rule No. 21.

Rule No. 22.

Rule No. 23.

Rule No. 24.

Rule No. 25.

Rule No. 26.

Rule No. 27.

Rule No. 28.

The President: Under Rule 28 considerable discussion has been made in these meetings, where a car is delivered in interchange with a defective axle or defective wheels, if it was necessary, particularly so where the car had a hot box or cut journal and cut brasses, and I hold that according to the rule a card is not necessary except for the defective parts, as the rule carries with it a charge for the price of the brasses, also the box bolt.

Mr. Stark: The same way with a slid flat wheel, anything that the delivering company is responsible for.

The President: It carries with it the price of bearing.

Mr. Stark: I contend that he is wrong, that he has got no business to do it; he should issue the one card for a slid flat; that is the way I interpret the rules, the receiving company making the bill.

Mr. Boutet: The Cincinnati man does not issue another card for two parts; if he don't, how is he to hold the company responsible for it?

The President: The people that do that don't understand the rule.

Mr. Boutet: I beg your pardon, they would have to correspond to explain whether you card the car for a cut journal that carries with it two parts; we give the card and save the correspondence on the subject.

The President: As I say, you should understand the rule.

Mr. Skidmore: That is rather an accommodation at incinnati, the giving the two cards. We all understand the rules there the same as you do. That defect card issued for the cut journal carries with it the charge for the brasses. But to avoid any future correspondence, we ask the chief inspector there to give us another card, so that in rendering the bill we present that defect card with the bill for the brasses. We make a separate bill for the wheels altogether. They are not made in the same bill, and to avoid questions being asked about the car only.

But the chief clerk of the car department when he looks up the matter, that is the chief inquirer, and finds that either card is gone, not because we don't understand the rules, because we agree that if you have one defect card it is sufficient, and carries with it the average charge for the brasses as well as the wheels.

The President: I will give credit to the superintendent of motive power that that question has not come up here from any road for the last five years. They know their business, and if you card twice in Cincinnati because it is necessary they don't know what that rule means and you ought to tell them.

Mr. Stark: The reason I asked that question was when we have found these two cards, the one card just covers two brasses and I have asked why the other card and they have come back with the answer and say a card is demanded for the two brasses and an aditional card with another bill for the cut journal, probably. That was the point I was after.

Mr. Taylor: Is it proper to card the car for brass burned?

The President: No, sir.

Mr. Taylor: That is done at St. Louis right along.

The President: Not by me.

Mr. Taylor: But it is done under your jurisdiction.

The President: No, that is under the instruction of the foremen.

Mr. Burns: Under this same topic, as I understand it, delivering an owner's car home for the slid flat wheel, they are not required to furnish a card for the renewal of brasses, but if it is a foreign car, they can bill in anything that is required to make the necessary repairs.

The President: Yes, sir.

Mr. Malone: You say it is not necessary to make out a card for the brasses on burned brasses?

The President: No, should be carded for the cut journal only.

Mr. Skidmore: It does not carry with it any further responsibility, does it? It is all the same job.

The President: Certainly, it carries with it the full price of the cost necessary to remove it.

Mr. Skidmore: Well, the one card would carry the same responsibility; it is the same.

The President: The point I make is, it is not necessary to card it; if it is not carded, it has the same effect as if it was.

Mr. Skidmore: The only difference it would be to make a bill against the foreign cars for a wheel, but the cost is given in the bill separate; then on another bill, we make the change for a brass.

The President: Don't you state in that bill why you put in the brasses?

Mr. Skidmore: No, we do not; just two brasses, say 20 pounds, that is all that is shown in the bill; they pick up the bill for the foreign car, you have on that list, on the bill, paid for brasses, and they ask the question.

The President: I think you could stop all further argument if you would state for brasses removed, on the defect axle, etc., and charge it on the card.

Mr. Skidmore: We are having complaints and that is the only reason, if the delivering lines do not choose to furnish defect cards, because they could contend that one card is sufficient.

Mr. Stark: And that shows it is a bad policy, because the bill for the brasses might be duplicated.

The President: A card for the journal bearings against the delivering company, before the arbitration committee, it would be the same as a bank check; should never be given except it has been done in a regular way, for rough usage.

Mr. Howe: As I understand this now, the gentleman from Cincinnati gives an additional card, and in that case I should think that in his charge should carry with it the journal bearings and the journal box bolt; wouldn't there be a possibility of a duplicate bill?

The President: There is a possibility.

The President: Rule No. 29.

Mr. Stack: Under Rule No. 29, I would recommend that it be changed to read, "Also torn air hose;" torn air hose, as I understand the rules, is known as a defective part.

The President: I don't think so; if you will read Rule 32 you will see that point.

Rule No. 30.

Rule No. 31.

Rule No. 32; that covers that point, Mr. Stack, in interchange.

Mr. Stack: Yes, but a car in transit?

The President: You can charge to the owner.

Mr. McCabe: Defective would cover it.

Rule No. 33.

Rule No. 34.

Mr. Stack: I believe some of our Cincinnati friends could say something in regard to Rule No. 34; we had some discussion at one of our meetings in regard to steam pipes.

The President: I will entertain a motion to recommend to the arbitration committee to have steam pipes added to Rule No. 34.

Mr. Skidmore: Should not also steam hose be added to it? The rule would then read, after "Signal pipes," "Steam hose pipes," or "Air brake pipes," etc.

The President: All in favor of the motion will say I; it is a vote and unanimous.

Rule No. 35; there is a change in that rule. Side doors now become cardable in interchange; that is in conjunction with Rule No. 39; it has been added to the Rule this year.

Mr. Dyer: Provided a car turned over on August 31st, say at Youngstown, with a side door missing; that same car arrives on September 1st with one side door missing; from the acceptance of the car at Youngstown, that side door is not cardable as a defect with the exception of the line which turns it over to the other line on September 1st, who has to account for the defect?

The President: That is one of those unfortunate things that occur; it was the business of the receiving road to find out; according to the rules I should repair the car and charge it to the owner; it is ignorance in overlooking the rule.

Mr. Stack: Rule 35 says, say, for instance, a stock car, loaded, all well equipped with slats on the inside, the concealed part that is on the inside car, the inside part; is not taht car cardable?

The President: Inside or concealed inside parts, slats or any other part of the inside of the stock cars; slats are the inside.

Mr. Boutet: They are discernible from the outside; the slats of a stock car at Cincinnati are treated as outside portions of the car as they can be seen.

Mr. Stack: They are, some of them are, on the inside.

The President: Those slats on the inside of the posts, yes; they are all on the inside of the car.

Mr. Dyer: Is it not a part of the exterior, at least, when between the posts?

The President: No, inside of the posts.

Mr. Dyer: Then there is no part of the slats on the exterior of the car?

Mr. Boutet: If you take them off of it you have got to treat the sides of the coal cars as parts of coal cars.

The President: I don't agree with you; you can get up on them and look in on them.

Mr. Stack: The way I interpret the rules here, they say: "inside or concealed parts." They are the inside or concealed parts.

Mr. Pearce: My friend here has taken up this question in the technical meaning of the word 'Inside" regarding the stock car. The slat of a stock car actually is more outside than inside of the car; it is part inside and part outside and is governed by the majority, and the majority of the slat is outside, the filling parts of the walls of a stock car. The technicality of it of what part of it is inside the posts does not actually mean that it is the inside of the car, and the interpretation, as I understand it, is it is inside anything that is interior and not visible to the eye outside; all the slat is visible to the eye outside, and therefore they are outside.

The President: Supposing the car is loaded with stock; how are you going to see it from the outside?

Mr. Boutet: Couldn't help seeing it from the outside.

Mr. Brady: It says "inside or concealed."

The President: The Rule says "Inside or concealed," it don't say "inside and concealed."

Mr. Longdon: I think we ought to consider that as direction, and not inside, but outside the car.

Mr. Dyer: Now, get to the sense of this body, I would move that the stock car slats should be considered as exterior of the car.

Seconded by Mr. Boutet.

The President: Practically the lining, or slats?

Mr. Dyer: I meant to use the word "lining" when I used the word "slats," the word slats to be considered as exterior of the wall.

The President: You have heard the motion, that all inside slats on a stock car be considered as part of the outside.

Mr. Dyer: All bory slats forming the walls of the car.

Mr. Boutet: The motion that I seconded was that the slats of stock cars be considered as outside parts of the car.

The President: I want you to tell me what you consider slats are.

Mr. Skidmore: The slats are all and only on the inside of the posts of the car.

Mr. O'Brien: Although inside, they are supposed to be a part above deck or superstructure constituting the wall of the car; forms a part of the car and part of the superstructure of the car. If on the other hand it was the slats concealed, concealed lining, to my mind it would be a different proposition.

Mr. McPherson: What are they going to do with a New England stock car; they have slats both inside and outside; they are slatted inside about three feet, and outside the rest of the way.

The President: How about western cars built that way?

Mr. McPherson: The same thing.

Mr. Stack: The reason for constructing them that way is to protect the cattle; they take the strain better and so very often they have double slats; other people for economy's sake make the slats on the inside, make a smooth surface next to the cattle.

The President: The slats described here by this motion are all those cars built in the regular way, or with outside slats and are to count as inside slats on the inside of the posts; it does not apply to the car where the posts are visible and the inside slatting would then compose the outside slatting. What they are trying to get at, is where they are double slatted.

Mr. Stack: In a car double slatted, none the less the inside slats would constitute a concealed part.

Severay members: We concede that.

The President: All in favor of the motion, calling cars slatted on the inside of the posts, and no slats outside, as being exterior, parts will make it known by a show of the right hand.

Contrary the same: It is a vote.

Rule No. 36.

Rule No. 37.

Rule No. 38.

Rule No. 39.

Rule No. 40.

The President: On Rule No. 40 the question was brought up once in these meetings, I don't know how long ago, that there is not a road in the country living up to the Rules, because they could not live up to them because they don't know what metal is in the Knuckles.

Does anybody in the country condemn a car with malleable iron knuckles? Is there anybody in the country that knows that kind of knuckle when he sees it, on quick investigation.

I think the discussion on that Rule once before brought out the fact taht it is a great American privilege of any railroad company to apply whatever kind of knuckles they like if they like, but that they must stand the consequences when they are delivered in interchange.

Rule No. 41.

Mr. Brady: Under this Rule, I would recommend to the Arbitration Committee that that Committee take up and consider that Rule and consider all matters in connection with making proper repairs. I would like the views of those men as to making repairs to metal brake beams. As I understand it, they remove the metal beam on account of a broken head or brake beam coupling and charge only for the piece defective. I would like to make that suggestion, that we supply any beam that is suitable. I will make it as a motion that we can apply any brake beam that will properly fit the hanger.

Motion duly seconded.

The President: It is moved and seconded that any kind of metal brake beam that will properly fit the hanger must be accepted in lieu of the original metal brake beam removed.

Mr. Baker: The proposition has already been turned down by the Arbitration Committee.

Mr. Dyer: I know that the Railway Club made the same proposition and it was turned down.

Mr. Stack: I would like to amend that motion to include brake rods.

Mr. Boutet: We have got in standard brake rods.

The President: Don't get too hard on that Committee; they are a little touchy. Any second? All in favor of the motion will say I.

The President: It is unanimous in favor—except two; the recommendation will be made to the Arbitration Committee.

The President: I would recommend on Rule 43, that a recommendation be made to the Arbitration Committee, that they recommend to the Interstate Commerce Commission that where cars are offered for interchange with uncoupling attachments not operating, that no prejudice will be held against the receiving line, provided they place it on the repair track and repair the car.

Mr. Boutet: I will make that as a motion.

Duly seconded by Mr. McCabe.

On being put to vote, it was declared by the President duly carried unanimously.

Rule No. 44.

Mr. Boutet: There is a question I would like to ask the L. & N. man at St. Louis and East St. Louis: If he has one of his cars delivered to him with wrong repairs, does he hold the delivering line responsible for a card.

Mr. Sebring: No, sir.

Mr. Boutet: Did you ever have any correspondence with your Superintendent of Motive Power on that matter?

Mr. Sebring: Not that I know of.

Mr. Moutet: The Superintendent of Motive Power of the L. & N. insists on a card against the delivering line for wrong repairs.

The President: The Superintendent of Motive Power ought to read the Rules.

Mr. Sebring: There were some years ago, not of late years.

Mr. Boutet: I only answered the correspondence for the last time last Tuesday.

Mr. Sebring: I hold that years ago we were right in demanding cards for repairs of that character; since then the Rule has been changed and I do not think we could now hold the delivering line under the Rule; the Rule is clear; they should put a repair card on it properly, but if they didn't do it, we could not demand it.

The President: Particularly so from Cleveland and Cincinnati they do it.

Mr. Stack: I think we all thoroughly understand that rule; if the repair card is there, it is authority for the bill; if without repair card, the joint evidence is all that the delivering company can ask for.

The President: Rule No. 45; here comes in Cleveland and Cincinnati; didn't put repair cards on. How many companies under Rule 45 live up to it? I will read it.

"Rule No. 45. The Company making such improper repairs shall place upon the car, at the time and place the work is done, an M. C. B. defect card, which card shall state the wrong material used."

The President: How many roads do that? Nobody answers yes.

Mr. Julian: I do.

The President: The whole road?

Mr. Julian: Yes, sir, the whole road.

The President: You are entitled to credit.

Mr. Sebring: You can't tell what is right and what is wrong. If it is right, it is not wrong and you let it go.

Mr. Skidmore: We have endeavored to put them on, but I found out that we did not get them on in all cases. As our friend from St. Louis says, we don't always know whether the repairs are wrong or right. We make them as near right as possible, and what we believe to be right and when going home, they take exceptions to them and furnish joint evidence, and we furnish defect cards without question.

Mr. Stack: Even without the application of defect cards, I believe all roads to be honest enough to put repair cards on, and then if the owners find objection and that such repairs were improper, it would be willing to allow the authority necessary. If a man knew he was applying improper repairs, he wouldn't do it. He can only do what he thinks is proper.

Rule No. 46.

The President: I have something to say on the matter of combinations of defects, myself.

Gentlemen, I wrote the heading of that Rule, which I will read: "Combinations of defects which denote unfair usage if caused at one and the same time and at the same end of the car." It was passed on by the Master Car Builders' convention and it was adopted as I wrote it, and I want to pay them my compliments by saying I don't know what it means.

Mr. Skidmore: I understand that, defects which may be caused at one and the same time and at the same end of the car. I also understand that the Arbitration Committee have decided that if a car has defects that have existed for some time and the road handling the car has caused additional defects, which form a combination, the road having the car in their possession at the time are responsible. So I am like you, I don't understand the meaning of the Rule.

Mr. Dyer: Or rather you understand it, but not as it reads.

Mr. President: He understands it as it reads, but not as they interpret it.

Mr. Baker: It was decided to mean different defects caused at the same time at the same place.

The President: The Arbitration Committee does not hold so.

Mr. Baker: They did so hold in one case, and that the defects were caused at one and the same time; there is one case on record.

The President: I am going to ask the President of the Standing Committee on Interchange at St. Louis and East St. Louis, he is not a car man, he is a Superintendent—to state to this Association what he would think the meaning of that heading was from a standpoint of an outsider. Mr. Ustick, I will read this and ask you that question. (Same read by the President). I will ask what idea that would convey to you.

Mr. Ustick: I understand that rule, Mr. President the same as the gentleman here, Mr. Skidmore, understands it exactly.

The President: It might be well for someone to make a motion that this body of Chief Inspectors find that the Arbitration Committee don't understand the rule. I would consider that as a motion.

Mr. O'Brien: Mr. Chairman, the Committee on Rules of the Central Association, are about to place before that body, and have already to a certain degree, a rule covering that point for the local conditions in St. Louis and East St. Louis, which would mean the interpretation of the rule laid down in the M. C. B. Rules, but not as designated by the Arbitration Committee. The part of it reads this way: "Should the car be delivered defective and the line receiving the car did further damage, causing a combination, denoting unfair usage, the receiving line will be responsible for the damage done by it."

The President: I believe, Mr. O'Brein, that that rule can be made applicable to St. Louis or to any other joint point, so far as cars belonging to members is concerned; but on foreign cars, it would not fit by the interpretation of the Arbitration Committee.

Mr. Boutet: I would move you that this Association recommend to the Arbitration Committee that the Heading of the "Combination of defects' there be changed, or the rulings of the Arbitration Committee be made to conform with the heading of these articles.

Motion duly seconded by Mr. Dyer.

The President: You have heard the motion; all in favor say I, contrary, No; no one but Mr. Fred Baker, of Kansas City.

Motion carried.

Mr. Boutet: We have a letter from the Secretary of the Association that if you have a car on your line with two draft sills broken, and you run that car and break a third sill, or an end sill, you have a combination of defects that you are responsible for.

Mr. Baker: I believe the Arbitration Committee ruled on that case that usually there was other damage at the same time. I have heard so that in one case they decided that the delivering company was not responsible if the defects were not caused at the same time. If it was, the delivering company was responsible.

Rule No. 47.
Rule No. 48.
Rule No. 49.
Rule No. 50.
Rule No. 51.
Rule No. 52.
Rule No. 53.
Rule No. 54 is covered by that "Combinations."

Mr. McPherson: If you will read Rule 51 in the 1903 and 1904 Rules, you will find the difference there.

The President: Only in the item which is supposed to be an obsolete thing now on account of that having been given up by the railroad companies.

Mr. O'Brien: Rule No. 54, "Damaged corner and end posts, if necessitating the replacement of, or repairs to, more than two end or two corner posts at one end," etc. We will consider a loaded car, post at the end; it is almost impossible for an Inspector, with that lead of probably lumber, to get to it account of that lead to determine how many posts are broken. That can only be determined after the transfer of the car and unloading. Could it be possible that that defect had it occurred before and not discovered until the other defects were discovered, that that would form a combination? It is not visible.

The President: From my standpoint in answering that question where an end of a car is broken out at the top, the entire end, I think it is proper to repair the car, and really that should carry with it, the broken end posts.

Mr. Boutet, Vice President takes the chair.

Mr. Stack: Sometimes it is impossible to determine that in time; in my opinion it should be, if the entire end is broken and the posts are all broken, that would cover it. The card would cover the entire end, and the posts too.

Mr. Smith: In requesting information in regard to a card for an end pressing out, the acting president ruled that we should furnish defect cards on request for the entire ends, corner posts and sides. Just let us argue that and understand it.

Mr. Boutet: I would rule that if there is more than two end or two corner posts—if the whole end of the car is broken out, the delivering line is responsible for all defects on that end, if it occurred that way, being more than was designated in the combination.

Mr. Smith? And the defect card stated the end burst out?

The Chairman: I believe the defect card to be made out properly should cover what actual defects there were on that car.

Mr. Julian: How could you determine it on a loaded car, loaded with lumber?

The Chairman: Inside or concealed parts? Why, I expect that car would be transferred, and after the car was transferred there would be no trouble to determine what was broken.

Mr. Julian: If the car is not transferred, if they take the car to the end, and by braces allow it to go to its destination?

The Chairman: Well, if I had a car passed to interchange and that car was run to a connecting point and was unloaded and found in that condition, I believe I would be obliged to furnish a liability card or a card to the line that delivered that car in that condition.

Mr. Julian: I believe the end pushed out should cover the entire end of the car. Leave it to the honesty of the railroad companies; the railroad companies are not a gang of thieves. When they make repairs, if they find that the end posts are not broken, I don't think they would collect for the end posts, if they were not broken; I don't think the railroads would collect the full extent of the card if the posts were not broken. They would collect only the actual damage. I know the Union Pacific does not. If we find we have cards issued by other companies, that we can make repairs without covering the entire card, we simply go ahead and make the repair and charge them for the actual repairs made on the car. I believe Mr. President, that if the car burst out it should be carded in its entirety.

Mr. Regan: As I understand Mr. Waughop, the impression he has was this: If the man or the foreman who did the repairing found that the posts were broken; when he got his card calling for the end being broken out and if the post was not broken, no charge to be made.

Mr. O'Brien: The point at issue in connection with an end burst out in a loaded car, particularly in interchange at a point like St. Louis and East St. Louis, where it passes three inspectors—that is, from the delivering line to the intermediate and again from the intermediate to the receiving line and by the receiving line—the question is how would these three individual inspectors regard or card that car, if they attempted to designate as to the extent of the damages? Would it not be policy to regard the car, or card it, for end burst out? It seems to me that is the only relief.

Mr. Malone: Mr. President, that might be all right for Mr. O'Brien here, but they do not all take that view; they all want to card the car.

Mr. O'Brien: I will answer the gentleman by stating that we are not giving any more than others are asking.

Mr. Bunting: I think that my friend over here covered that question; I think the end, the entire end, should be carded, and trust to the honesty of the Car Foreman when the bill is making out for the repairs, and to bill in for what actual damage is done.

Mr. Waughop: Where are you from?

Mr. Bunting: From Cleveland, of course. (Laughter.)

Mr. McCabe: You see the whole trouble is simply due to the fact that we have got a class of very intelligent inspectors our trouble is to get the other felows educated. Now, I take the stand that we ought to educate ourselves first. That is right, maybe. Now, when you come to handling with few men at an inspection point, a large number of cars, especially in the night time, there is very little time to talk matters over as to how much a car should be repaired or carded. When an indefinite card goes in to the Superintendent of Motive Power, on its face calling for an end burst out, and he takes that card and looks at the bill and he sees the bill does not cover the items all of them as indicated by the defect card, he wants to know why it did not cover the items that the bill should be made for. In Cleveland, I object to Car Inspectors carding for an end burst out, because it is an indefinite card. I will show you my reasons for that. We may get a car loaded with lumber and the end bulged out. We inspect the end of that car accordingly, if the end is bulged. We simply have to cut it out or let it go. If it comes back with all the posts burst out visible, we would consider the combination and it is a misfortune to the road that received the car. It is their misfortune. I have had cases where an end was bulged out; the car went East and came back, and if some other defects were not seen the car went on still and the end still bulged, and we may strip it and find all the end posts and corner posts burst. We do not strip cars in the ordinary inspection to inspect whether a combination exists. We are not going about the yard to see whether there is any combination concealed or not. If we can get to see it, then we are sure to card it; but we are not going to strip cars, interchange cars, if we can't see it. With a combination actually existing at the time and can be seen, then we will card it. That is my idea of it.

Mr. O'Brien: Mr. McCabe I am afraid has devoted a good deal of time to bulged out and burst ends. That has been thoroughly discussed as to when it is not visible defects. We know all defects are not visible. And the question to be solved is when we designate it as a burst end, does not cover the defects when we find them.

Mr. McCabe: For instance, you get the two end posts burst, that is not a combination.

Mr. O'Brien: We don't know.

Mr. McCabe: It is not.

Mr. O'Brien: We can't tell, we can't remove the load and find out, and, therefore, the receiving line must be protected.

Mr. McCabe: All right, we will protect the receiving line. You offer that car to the receiving line and give it the general inspection. Two end posts are visibly broken, the car loaded with lumber. You call my attention to it, and you say here is a car to run East or West as the case may be. I say no, there is no combination there, but I do not consider that the thing is safe and you will have to make temporary repairs to make it safe. I inspect that car there and it is without combination. But if my judgment is poor and that car goes East and the whole thing gives out because my judgment was poor and did not cut it out; but I was a man representing the receiving company? Yes. And when they return the car to you, they are responsible for all the defects that existed?

Mr. O'Brien: Possibly they will not return it to you.

Mr. McCabe: But under the Rule they will have no right to with all the end posts broken and the corner posts, it is a combination.

Mr. O'Brien: What rulings?

Mr. McCabe: They had the right to reject it in the first place.

Mr. O'Brien: Will—you hold—

Mr. Boutet: I will call the two gentlemen out of order. I don't think any one person is allowed to speak more than fourteen times on any one subject.

Mr. Julian: I move you Mr. President, that the end of a car burst out should be cardable for the entire end.

Duly seconded by Mr. O'Brien.

Mr. Brook: Don't say "bursted" out, but "burst" out or burst end. Only a portion of it is damaged.

Mr. Julian: I will make that as an amendment.

Same concurred in by the second.

Mr. Skidmore: I would seriously object to carding cars in that manner for this reason. In the first place an end burst out is a car owner's defect and not cardable. Before carding the car there must exist the combination of defects and you must know that they existed at the time you card the car, and not take it on supposition that the end is burst out and put a defect card on there and it goes to the other fellow, it may have rough handling and another end is burst out that is already covered by the defect cards.

Mr. Clare: I agree with Mr. Skidmore on that proposition.

The Chairman: Gentlemen, I believe the motion is really out of order; the point made by Mr. Skidmore is well taken: the combination must exist before it becomes a cardable defect. It would be proper to make it where the end of the car was bursted out that the delivering line may receive the car with a combination if it exists.

Mr. Brooks: I would like for Mr. Skidmore to give us a little illustration.

Mr. Skidmore: The ends burst out are generally in cars loaded with lumber and in many cases entirely loose from the plate, from the jacket and there is no defects on that car except the parts burst loose from the end plates and the mortices in the end plates broken holding the end posts to it may be perfectly sound and in repairing that car it would be necessary probably to put in a new plate. If I put a defect card on that car for a new post, it is the evidence of an unfair using and the company repairing the new part which I had carded for a defect that the owners were responsible for at the time.

Mr. Waughop: I move you, sir, that where a car is offered in interchange with an end pressed out and the indications are that a combination exists, that car should be received back by the delivering line with a combination, if such exists.

Duly seconded.

The Chairman states the motion.

Mr. McCabe: The only fault I find with this motion is it will bring about the establishing the law regarding what cannot be maintained at all points except in city deliveries. You see there is nothing in the M. C.-B. Rules in regard to that. There are two classes of defects under the rules, the defects of owners and delivering line defects. In order to keep track of any posts or other defects increasing in transit, we would be obliged to make records of owners defects that existed at the itme we accepted the car. That is the only objection I have got to adopting the present motion. At Cleveland we do not make notation of defect at all. Of course, if the car is not for city delivery, we mark it for that delivery; if going out of the city, we card it. That is the only record we get.

Mr. Brooks: I want in regard to making the amendment to the motion to state it was for this reason: I could not see the reason for arriving at the broken ends and, therefore, in the first place, I consider the broken end due to shifting load, as unfair usage. Consequently as there was no solution, I felt that the defect card given to the delivering line would be proper.

Mr. Pearce: In regard to the end question, it is a little inedfinite to my idea in the handling of a car. In the first place, here is a load of lumber shifts and out goes the end plate as my friend just said, with the mortice the side plates split. Well, that end is not burst; it is practically stove out; it is true but very little time is required to repair that end. The side end and plate is practically intact. Now you back that car load back into its place, practically the owner's defect, but the end is not broken, you could not call the end broken. The only structural part is the mortice in the side plate and the bursted out, so far as I can see that is all.

Mr. O'Brien: I consider that point well taken. You eliminate the difference between the Inspectors at St. Louis and East St. Louis and other places.

Rising vote on the motion being called: it resulted: favorable 21; contrary 22, and the motion was, therefore, declared lost.

Rule No. 55.

Mr. Waughop: Rule No. 55 and the rest of the rules, principally, govern car foremen and chief clerks in the office in regard to charges, except Rule 115 on page 53. You will note a change in rule 115 they having added to it this year. I will read it:

(The Chairman reads the rule).

Do you understand the rule now, that the switching road can charge the owner for all those parts and that they are not cardable? It is so understood.

Mr. Stack: In reference to billing, I received a bill from a road in St. Louis for two ⅝-inch brasses used and no credit for scrap for the spoiled brasses on the car. The bill read no credit for scrap and I returned the bill as not being correct under M. C. B rules.

The President: What kind of a journal bearing did you have?

Mr. Stack: Malleable top.

The President: You ought not to be allowed anything properly still the rudes allow you nine cents a pound.

Mr. Stack: We allow it for returned brasses.

The President: Is it not a filled brass?

Mr. Stack: Yes.

The President: You ought to have nine cents a pound for it. But properly you ought not to have anything for it, because it is not worth anything.

Mr. Clare: I would like to find out on what road they use that kind of brass.

Mr. Stack: The Belleville Electric.

The President: Gentlemen, I would like to introduce to you Mr. E. C. Baxter of the Chamber of Commerce of Cleveland.

Mr. Baxter in a very able speech invited the Association to Cleveland for its next convention.

The President: Mr. Baxter, on behalf of the Association we thank you for your kind invitation. Our rules provide that the selection of the next place of meeting will be under the jurisdiction of the Executive Committee, and they will consider the proposition.

Mr. Baxter: I thank you, Mr. President.

The President: We will turn back to rule 85; who called it up?

Mr. Stack: I did.

The President proceeds to read rule 85, and says: "What is the point you wish to make, Mr. Stack?

Mr. Stack: Is this applicable when offered in interchange?

The President: It is when enrolled.

Mr. Stack: Is it in repairs not offered in interchange?

The President: No, it is chargeable to the owner.

Mr. Stack: Hangers also?

The President: Yes, when broken.

Mr. Stack: How is it if missing?

The President: For the labor only.

Mr. Stack: Where the shoe is, I think the hanger is.

The President: There is no Rule that covers that.

Mr. Skidmore: I beg to differ with you, Mr. President, in your decision, that only a labor charge can be made for a missing hanger.

The President: Wait a minute until I read that rule again, and then you may change your opinion.

The President then again reads Rule 85.

Mr. Skidmore: Your interpretation of the rule is proper when the brake beam is missing; only a labor charge can then be made, as they are considered a part of the brake beam; but when a brake shoe is lost and the beam is on the car, it becomes an owner's defect and it is proper to charge for the brake shoe. The same applies to a brake hanger; there the broken or missing hanger is chargeable to the owner providing the beam is intact.

Mr. Dyer: I am also of the same opinion as Mr. Skidmore is in that respect. After the word "brake beams" there are some items mentioned as to what labor shall be charged for when the brake beam is missing. Then comes separate items on which labor only can be charged and in the separate items "brake shoes, brake heads, key bolts, jaws and hangers," are not included.

The President: I do not so read the rule.

Mr. Dyer: And I therefore, look at it the same as Mr. Skidmore.

Mr. Stack: Cars with hangers—

The President: It has escaped me; what is your pleasure with it gentlemen?

Mr. Stack: I make it as a motion that it be changed.

Mr. Skidmore: I do not understand that this car offered in interchange is on the line of the road. We all know what material missing interchange is cardable against the delivering line, but the one in interchange is chargeable with the defect to the car accordingly when it is a defect.

The President: That was not the Rule voted in this Association we simply deliver them in interchange.

Mr. Beckwitz: We have your decision where it was offered in interchange. You decided that a brake hanger where it was missing in interchange was chargeable, and I say it is cardable if offered in interchange.

Mr. Baker: The labor charge.

Mr. Brooks: I say that it is perfectly proper to charge for the attendant fittings of the brake; if the brake beams are missing the hangers are probably missing, for the reason that it is generally presumed that if they are broken and missing, they are broken and removed by the trainmen.

The President: I will call you back to Rule No. 27, page 13 "Material missing from trucks of cars offered in interchange," missing material, the delivering company is responsible.

Mr. Dyer: In speaking as I did on the subject I spoke as Mr. Skidmore did, because the question was one of repairs not of car interchange.

Mr. Beckwitz: That is one of our complications; rate sheets are considered less in interchange and the cards are made as in rule 3. That is one of our complications, in my opinion, and I think that it is to be governed entirely by the Master Car Builder Rules.

The President: That will likely come up in the new rules that are now promulgating.

Mr. Stack: Your decision was on the new rule, and the brake hanger was not. That would mean the same question, that it was not chargeable, that the material was not chargeable; that was your decision.

Mr. Baker: They are both out of order; they are mixing up St. Louis rules with Master Car Builders' rules; they don't apply here at all.

Mr. Stack: I make a motion that the sense of this meeting is that Rule No. 85 governs the bill to car owners only for the labor of suppying the missing material; as stated in the rule here, in transit, and does not govern these items when missing in interchange at all. We all thoroughly understand that when these parts mentioned in Rule 85 are missing when offered in interchange, that they are cardable.

The motion was seconded by Mr. Cressey.

The President: All in favor of the motion say I; contrary, no. Gentlemen, the motion prevails.

Mr. Boutet: We have Mr. Treat, of Niagara Falls, here; he wants to offer some of the advantages of Niagara Falls for the next meeting.

Mr. Treat in a very happy talk invited the association to Niagara Falls for its next convention.

The President: Mr. Treat, on behalf of the association, I desire to thank you for your kind invitation. There is one little question that I would like to ask for the benefit of the executive committee: Does the Niagara Falls run all night? (Laughter.)

Mr. Treat: In this connection I may say that I have the invitation not only from the mayor, but our common council, passed as a special resolution backing up this invitation, and on that occasion it was decided that if you would come we would keep the Falls going all night.

Mr. Regan: As it is getting late, I make a motion that we proceed now with the election of officers.

The President: I wish to state that I have an invitation here, for today, or tomorrow or any time that the members who wish to visit and inspect the Gould Car Heating Company, in this building, from Mr. Stock.

I move that the invitation be accepted and that it be included in the list and thanks given for the invitation, and I include in that list the National Malleable Iron Company.

Upon being put to vote the motion was declared unanimously adopted.

Mr. Baker: I would like you to refer back to Rule 84, the joint evidence card.

The President: We will consume ten minutes on that (President proceeds to read Rule 84.) The rule is out of order in this association; we don't handle it. The Car Foremen may, but the chief joint inspectors don't.

Mr. Baker: What do we do with the case of a car being delivered at some point without any card?

The President: Refer that joint evidence back to the delivering line.

Mr. Baker: In case you can't locate that party?

The President: You never can; you will have to take your own medicine. (Laughter.)

Mr. Baker: Is it in keeping with this association to make some recommendation on that subject?

The President: If you can, yes.

Mr. Baker: I will make a motion to that effect.

Mr. McCabe: In speaking on that, there is one rule there that will help you out of your troubles. The rule says all this book has been gotten up, accepted and agreed to. You must take it as a whole; you cannot pick out one part and despise another. That is what I was speaking about this morning when I said some of the members were out of line. I am always willing to admit that I am wrong when I find I am wrong in speaking on this or that. Now in speaking about the repair card, gentlemen: It seems to be very important that all foremen and inspectors should see to it that repair cards are put on. In Cleveland, when cars come in on any train with improper repairs and no repair card on there, we are simply put to sea and we cannot do anything, but I tell you the square thing to do when cars are sent to the shops in your territory, hold that car up until repair cards are applied. We hold that car up and we call up the foreman that made the repairs and ask him why he has neglected to put a card on, and tell him that we want your repair card so we can check up. We compel them to put on the repair card, and if that repair card is not there on a foreign car, we hold it up and find out why it is not there. If everyone in this country who is handling cars will be interested in seeing to it that repair cards are applied, it will avoid very great delay to us all and make it easier for all. We will supose, for instance, that the L. & N. repairs a C. & O. car in their shop and the C. & O. inspectors or men representing them see that car go in the shop and they have a record of all the repairs that should be made, to check up by, and the car came out and was delivered back to the C. & O. and the inspector understands the rules and declares that the repairs are not made as they should be and there is no repair card when you receive the bill there is trouble. The rule says that those cards should be applied. You know it is a benefit to you and you should do it. You might think that you are putting some other fellow to the expense and that you are very clever, but the other fellow may be wise without your knowing it and may be doing the same thing to the fellow next to him. The honest way is to put on your repair cards; don't you think so? So the inspectors can check up and make an intelligent report of it.

Mr. Boutet: I would recommend that this association recommend to the arbitration committee that another line be inserted in the repair card subject that accompanies the bill that the foreman certifies that he had placed a repair card on the car at the time the repairs were made; and if not that the bill could not be collected.

Duly seconded by Mr. Regan.

Mr. O'Brien: If it was not possible to put on a card and then take it off again before reaching home would not that be done?

The President: It would be, probably. You have heard the motion duly seconded. On being put to a vote it was declared carried.

Mr. Dyer: I am perfectly satisfied that a repair card should be applied and would like to know whether Mr. McCabe, when they are offered in interchange for another company or the repairs made by another company and then offeered to another company, I would like to ask whether he does not take that action? Or what he does?

Mr. McCabe: I don'tu nderstand there is any compulsion and I agree upon that, but you will find it is your experience that the men under you do not do as they are told all the time. The foremen at Cleveland do, or have the intention to do that anyhow, and try to obey instructions; but they have men around the repair tracks that neglect the instructions and will let cars go without putting the repair cards on. In answering Mr. Dyer here, I will say we do not return the car to the shop but hold the car up and the inspector reports to our office and our office calls the foreman and tells him that there is no repair card applied to the car, with the demand that the card be put on the car. They send us the card and we apply it to the car. As I said, you are supposed to give a foreign car the same inspection that you would your own. You understand that there are cases where the car comes in from a line and we can't hold the car up, but this is done in our own territory; we compel the furnishing of the card and hold that car up and see that the card is put on.

Mr. Dyer: The only question is whether you would be justified in interchange and not be justified in refusing the car of the other company. Because the rules say "if in safe and serviceable condition" the receiving road ought to judge if it is under the provision of the rules.

Mr. Riger: I move that the election of officers be proceeded with.

The President: The next order of business is nomination for officers.

Mr. Cressey: Mr. President and Members of the Association: Some time ago I received a letter from a member of the association to the effect that as Mr. Waughop has served as president of the association for the past five years, and perhaps longer than that in a temporary organization, that he would refuse to accept the office for a further period of time; and in view of the fact, I would place in nomination a man who has served the association long and well and has been to all of our meetings and taken a very active part, and I place in nomination for president of the association for the ensuing year, Mr. Henry Boutet, of Cincinnati. (Applause and numerous members arise to second the nomination.)

The President: Are there any further nominations?

Mr. Dyer: I move the nominations close.

The President: All in favor say I; it is carried; it is a motion. The secretary will cast the vote of the association.

The Secretary: Mr. Boutet is elected president for the ensuing year, and until his successor is elected and installed.

Mr. Boutet: I will state to the members that I thank you for your nomination and election. And I assure you that I will do everything in my power to make the association a success in every way as to being the success for ourselves in meeting and interchanging views and ideas. I do not feel that I am able to serve you as our past president has, for the majority of you have no idea what the exertion has been by the president we have had to carry on the association and keep it up and make a success of it so far as it has been. I think the success the association has made is all due to our president, and I move that we pass a vote of thanks to our president for his efforts in maintaining the association and bringing it up to an organization such as it has become, by a rising vote of thanks.

(All present rise to their feet and express their appreciation of the services of the retiring president, Charles W. Waughop.)

Mr. Skidmore: Mr. President and Members of the Association: I desire to place in nomination for vice-president of the Car Foremen and Chief Inspectors' Associations a gentlemen from the west, who is entirely fitted to fill the office, and that is none other than Mr. Cressey, from South Omaha. (Applause.) Several members seconded the nomination.

Duly moved and seconded that the nominations close.

Being put to a vote it was unanimously declared carried.

The President: Mr. Secretary, you will cast the ballot for Mr. William H. Cressey, of Omaha. He is now elected as vice-president for the ensuing year.

Mr. Cressey: Mr. President and Gentlemen: I thank you very much for the honor you have conferred upon me and I will say that I think that if our president we have just elected serves as faithfully as president as he has done as vice-president, it will be unnecessary for me to take a very active part in the meetings. However, I will try to be present whenever possible.

Mr. Boutet: Mr. President, I desire to rise to place in nomination a member who has served us faithfully also during our permanent and temporary organization, as secretary and treasurer, and he has never yet absconded with any of the our funds, but has went down into his own pocket for money when necessary, Mr. John McCabe, of Cleveland.

Mr. McCabe: Mr. Chairman—

The President: You are out of order. Duly moved and seconded that the nominations be closed. Duly carried unanimously.

Mr. McCabe: Should I have had the chance to speak, gentlemen, I say I am sincere when I tell you that I will do all I can for the association, but I presume the members of the joint inspectors will agree with me that while to you it may look simple, there is a good deal of work to do, and the joint inspector has not got a great deal of time in his office, and holding the position of secretary since the organization of the association, I now believe in giving others a chance. I am honest in my convictions when I tell you so. I do not think I should be kept in this office. While I thank you in considering my name in connection with the office, I would honestly like to be relieved. I think the office ought to go around and give others a chance to become familiar with the details. There is more correspondence than you imagine. You would be surprised to know how much correspondence there is all the time from inspectors and others all around the country demanding your time and courtesy, correspondence with the executive committee, and then replying, and as a rule there is a second reply immediately after, and to the president. So there is really more work than you imagine. While I thank you, gentlemen, for honor, yet I would be better pleased to havey ou select somebody else.

The President: You are elected unanimously and you will have to serve.

We have next two members of the executive committee to elect. You, gentlemen, understand the rules that the officers under the rules form part of that committee; the president, vice-president and secretary-treasurer form members of that board, and the ex-president chairman of the board. Two members outside of that are to be elected for the ensuing year.

Mr. Dyer: I nominate Mr. Skidmore, of Cincinnati.

The President: All in favor of the nomination say I.

Mr. Boutet: I nominate Mr. Baker, of Kansas City.

Mr. Taylor: I desire to nominate Mr. J. J. O'Brien.

The President: Mr. Baker and Mr. O'Brien are placed in nomination Is there any other nominations?

Duly moved and seconded that the nominations close. Carried.

The President: You now have in nomination, gentlemen, Mr. Skidmore, of Cincinnati, of the Big Four; Mr. Baker, of Kansas City, and Mr. O'Brien, of St. Louis. Gentlemen, you will prepare your ballots by writing two names, either of Skidmore, Baker or O'Brien, and the two receiving the largest number of votes will be declared elected. Vote for two. Mr. Cressey and Mr. Boutet being appointed tellers.

The President: While they are collecting the ballots, gentlemen, I will state that we are due at the same place for a little luncheon at 6 o'clock sharp; you are all invited. At 6:30 we will leave that place and go, all of us, to the Kensington Hotel, where the ladies will have an opportunity to brush their hair, etc., etc. We will then take the car from that point to the Odeon Theatre, at the Masonic Temple, Grand and Finney avenues, where we will have a little box party for you.

The ballots for two members of the executive committee being collected and counted, resulted as follows:

For Mr. Skidmore, 38 votes.
For Mr. O'Brien, 27 votes.
For Mr. Baker, 38 votes.

The President: Gentlemen: By your ballot you have 102 ballots cast, necessary to elect two receiving largest votes, by your ballots you have elected Mr. Skidmore and Mr. Baker.

Mr. Skidmore: I am not a very great speechmaker, but owing to the remarks about lunch I will omit what speech I might otherwise make and simply say, I thank you very much for the honor.

Mr. Baker: Mr. President and Gentlemen: I looked entirely upon Mr. Skidmore to do the honors in that respect, and I will also simply say I thank you.

Mr. McCabe: I would like to say one word for myself personally, and from the city I come from. I would be glad to see the executive committee select Cleveland as their next place of meeting, and I would be very glad to meet the members from St. Louis and from other western points there at Cleveland, and I hope that if you feel disposed to do so, you will encourage your executive committee to select our city, and I will be in a position to better entertain than the last time you visited Cleveland. I hope you will come to Cleveland.

Mr. McCabe (continuing): Personally and for the railroad men at Cleveland, but I speak particularly for myself, and I think Mr. Bunting, of Cleveland, is authorized to speak for the foremen—personally I extend to you a warm invitation and will be glad to meet you in Cleveland a year hence, and I will promise to do all I can to make the meeting a success and to make the proper arrangements for the meeting, and I hope you will encourage your executive committee to select our city.

Mr. Bunting: Mr. President and Gentlemen: I would be pleased to have you make your next meeting at Cleveland, as we have a foreman in Cleveland who will try to do the very best he can for you.

The President: I would invite you again to St. Louis, but we don't have any more World's Fair there next year.

Mr. Boutet: There is something else. A collection was taken here this morning for thep urpose of paying for a little token.

Mr. President: On behalf of the Association of Chief Joint Inspectors and Railway Foreman of America, I desire to extend to you our sincerest good wishes both for yourself and your family's welfare, and for the good you have done the association, and as a slight token of respect and appreciation I desire to present you a slight token of our memory and trust that you will always keep it as bright as it is now. (Presents badge.) (Hearty applause.)

The President: I ought to fall dead, oughtn't I?

Gentlemen, I didn't expect this, really. Well, the only thing I can say in response is that I thank you all, and give you all my latest toast and that is: "God take you all—but not too soon." (Applause.)

Mr. Skidmore: There are some who have not seen it. Put it on and let them all see it.

Session adjourned at 6 p. m.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

Paint Removers Versus Paint Burners

BY J. H. PITARD, M. & O. RY., WHISTLER, ALA.

There is an old saying that "fire is a good servant but a hard master," the truth of which has been most strikingly, or, I might say, most blazingly, demonstrated to certain members of our association within the last few years, caused by the contact (strange to say) of the two principal agents used for removing paint and varnish—two agents that do not work in unison, but, on the contrary, are entirely at variance with each other so far as the question of harmony is concerned. I refer to varnish removers and the paint burner.

An instance of recent occurrence is perhaps fresh within the memory of the members of the Master Car Painters' Association, where a very costly conflagration resulted from the contact of the two agents mentioned above, as a result of which the least harmful of the two agents was ruled out of the shop, and, I believe, off the entire road. There is always danger of a conflagration where fire is carried openly about a building, and the danger is greatly increased in the paint shop, where the atmosphere is constantly impregnated with the combustible fumes and gases emitted from the various highly inflammable chemicals and liquids being constantly used in the various processes of cleaning and painting. On account of a realization of this danger, it is always a source of much concern to the master painter, who at times must, perforce, intrust the paint burner to careless hands.

In view of the above mentioned objections to the open flame in the paint shop, why, I ask, should the car painting fraternity continue to invite disastrous conflagrations by continuing the use of the paint burner? Varnish removers have superseded the carpenter's scraper and the work is performed much cheaper and more satisfactorily. Why should not paint solvents displace the paint burner on the exterior of our cars? The opinion has long been held by many painters that the use of solvents for removing paint from the exterior is not practical. This theory, or opinion, doubtless has its basis in the fact that paint removers of an encaustic nature had been tried, but penetrated the wood and proved disastrous to succeeding coats of paint and varnish, and as it is said "it is the burnt child that is afraid of fire," such compounds apparently received a "black eye" for all time. But there are other solvents upon the market in the form of paint and varnish removers which will accomplish this work effectively and without menacing the succeeding coats of paint and varnish. Most any of the semi-paste varnish removers of a volatile nature will accomplish the desired end along this line.

The writer has recently conducted experiments, and finds that the method is not only practical, but has the advantage over the torch that the work can be done by unskilled workmen, and may be done in the carpenter shop, or other places where is would not be wise or safe to use the torch. My method of procedure is to apply the semi-paste remover freely, then scrape off and wash the surface with the liquid remover. The writer fully realizes that the recommendation of such a radical departure is to invite opposing argument from some perhaps who have come up "through fire," so to speak.' Such argument is desired, as by that means the strong and weak points will be exposed, and if science has not already met the demands in this particular, it is more than probable that it will arise, equal to the occasion and give us something that will most effectively supersede the paint burner with its attendant dangers. Then with the steam heated and electric lighted paint shop, the master painter's cares by day will not only be greatly lessened, but his slumbers by night will not be disturbed by dreams of the reddish hue.

Among the Supply-Men

FRANK W. PHILBRICK.

Mr. Philbrick was born in Portsmouth, N. H., 1865, and graduated from Dartmouth College in the class of '89, intending to make teaching his life-work and began with a school that year in Hoboken, N. J., when James T. Furber, former vice-president and general manager (now deceased) of the Boston & Maine R. R., to whom he was related, sent for him to begin his career in railroad work and placed him as chief clerk in the purchasing department, which position he held for thirteen years when, in 1902, he resigned and formed a business connection with the A. Wheeler Company of Boston, Mass., the same being one of the oldest paint-houses in that city, Asahel Wheeler being its founder more than fifty years prior to his death several years ago. Mr. Philbrick attended the Atlantic City Convention as this firm's representative.

Mr. Philbrick is very well known in sporting circles in Boston and vicinity, especially among bowling leagues. He is captain of the Calumet Club's bowling team and inventor of the New Boston candle pin, which is creating much interest and demand amongst lovers of this wholesome sport, and is himself a skillful roller, close to if not actually holding the world's record. His picture has recently appeared in the Boston Herald and Boston Globe in connection with articles regarding his bowling and his new pin.

FRANK W. PHILBRICK.

Our associate, Eugene Laing, Foreman Painter of the Pennsylvania Railroad's Northern Central shops at Elmira, N. Y., wrotes as follows, under date of Dec. 8, and encloses an obituary from a local paper:

"I herein send you a notice of the death of the wife of Charley Wallace, Foreman Painter of the Erie shops at Susquehanna, Pa. They have both attended the conventions and I suppose he is a member. Wife and I attended the interment here at Elmira."

OBITUARY.

MRS. ANNIE HUMPHREY WALLACE.

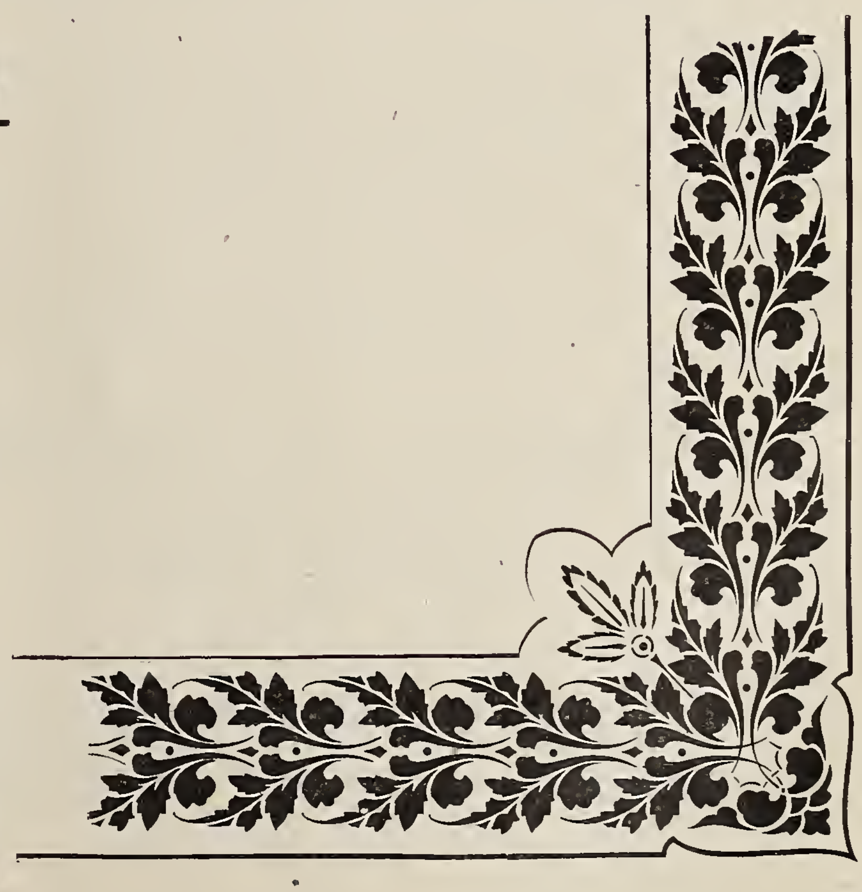
Mrs. Annie Humphrey Wallace, wife of Charles R. Wallace, and a well-known former resident of this city, died at the family home in Susquehanna, Pa., Saturday morning at 7 o'clock. There survives besides her husband, one daughter, Nellie, and one son, Frank, also one brother, G. W. Humphrey, of Reading, Minn., and one sister, Mrs. Eugene Fletcher, of Allentown Pa. The funeral will be held at the home in Susquehanna Wednesday morning at 10 o'clock. The body will be brought to this city Wednesday afternoon on Erie train No. 15, arriving here at 2:45 o'clock and will be taken directly to Woodlawn cemetery, where burial will be made in the family plot.

Enamels and Varnish Colors

Enamels, or varnish-colors can be safely employed to play an important part in putting through the passenger equipment of a railroad in its annual shopping for painting and varnishing if the mechanical officer and his master painter are thus minded. It is simply the question of putting on a coat of color and a coat of varnish, formerly two operations, at one operation; that is all. It has been done advantageously for year on car trucks and steps and has for some less time, but with no less a degree of success been employed on the exteriors of turrets, or clere stories. It is also being used on the interiors of mail, baggage and caboose cars.

Now what is the matter with it for the exteriors of baggage, mail and milk cars which run on a passenger train? We mean the annual renovation of old cars; we are not now talking about any system of four-coat work from the wood, which was in vogue in the West some time ago. We believe in varnishing the letter-boards of such cars so long as they can be maintained in good shape (and they do not get damaged much) but for all below that—the sheathing, doors, etc., we think one good coat of a free-flowing, elastic, durable varnish-color for any road that paints its cars Pullman color, Tuscan red, or any dark color is all that is needed for most cars of this class. They may need some puttying with a putty made to nearly match the color and in some instances may need a foundation coat of paint. If gold lettering and numbers are used an enamel yellow, made to match the gold in color, may be employed.

Well, says one, we stripe our baggage and mail cars with gold bands and so that method is not feasible. Better leave it off then. Baggage, mail and express cars that are being continually raked with barrows that are placed in too close proximity to them in loading and unloading are not fit subjects for striping; it is not economy to stripe them; it is



Stencils by Warner Bailey.

doing mighty well to maintain anything like a presentable plain surface upon them, let alone striping. For this reason we believe in doing them plainly; and to this end a varnish color, or enamel, is just the thing for this class of car and will wear just as long as the clear varnish. While it is being applied on the exterior and the numbers, etc., replaced, the interior can be washed and painted if necessary, and your baggage car, or mail and express car, is not long a habitue of your shop, but when blacked off and the roof and platforms painted it is ready for service and away she goes just as good for another year's service as by former practice and painstaking effort. If prejudice can be set aside and a fair trial of this made, there can be but one conclusion and that will be to go ahead and do these cars in this way. What is the use to bestow so much labor and varnish upon a class of equipment that receives so much abuse? Why not instead make them durable and presentable to run on a passenger train and let them go at that?

The Protection of Steel from Decay.

In the discussion of the above subject in the conventions of the Master Car and Locomotive Painters and elsewhere much has been said, especially with regard to the painting of steel cars, about various pigments for the purpose, as though that were all there is to the question of a protection against rust. The arguments have been made and the changes rung along the whole line of paint pigments, such as red lead, white lead, lampblack, Prince's Metallic, graphite, carbon, etc., but little or nothing has been said about the vehicle that they should be mixed with, as though this were a minor consideration, or of no consideration at all. Perhaps, however, it has been taken for granted that—"why"—"of course"—"linseed oil is the proper vehicle; what else?" Well, now, right here hangs the tale that we are about to relate. If some of our readers are settled in that old rut that there is nothing that paint can be mixed with to stand the weather except linseed oil, especially as a protector of metals, steel for instance, and will not hear about anything else, they will have to be excused, it is to be supposed; but there are others who are of an investigative mind in piety, politics, pills and paint and do not take everything for granted that their granddaddies have handed down to them, but want to know the whyfores, the what and the whence of this, that and the other. It is to this class that we love to talk on either of the above subjects beginning with "p." We will talk on the last one in the list this time, viz., paint. That the life of a paint depends upon something besides the pigment we are going to assert at the outset, Dr. Dudley's opinion to the contrary notwithstanding; especially is this the case in a protective coat for a steel structure. Of course, we admit, that paints have to be constructed differently for various purposes and according to their several needs. A water-proof paint is not needed on interiors of buildings that do not leak; nor is it best to apply such a paint to wood on the exterior that is subject to leakage on the interior, for in such a case blisters will be the result of water trying to get out to meet its bosom friend, the air. In this case a paint that will allow the moisture to exude through it somewhat, such as upon wooden freight cars, will prevent blistering and peeling. Not so, however, with steel cars. Here a water-proof paint is required. Are the pigments above referred to water-proof? That depends entirely upon what they are mixed with as a vehicle, and it is the purpose of this article to point the reader in the direction of selecting an oil that will be as near water-proof as can be obtained. That the best linseed oil is not water-proof—far from it—it is only necessary to conduct some tests to prove it; and these tests will reveal the nature of other oils as well, if the reader will procure samples and try them. We do not feel like naming some here on account of the "advertising" aspect of it, but, if desired, can do so by private correspondence that which we would like to have tried; and we hereby recommend the Test Committee of the M. C. & L. P. A. to take hold of this subject. It is plainly evident that if a paint upon steel allows water to go through it and attack the metal, rust must be the immediate result. And the same will be true of a locomotive tank that is filled with water warmer than the atmosphere without and sweating takes place from beneath the paint; rust pits will form and work their way out, no matter whose or what paint is used. But with the steel car a different problem is met. Here the moisture from without is the most to be feared, to work its way through the paint to the metal.

We would therefore suggest some tests to reveal the water-proof qualities of vehicles with which to mix pigments for this purpose. We can name a specially treated linseed oil that is good, and we can also point the reader to another oil that possibly may prove better that contains no linseed oil whatever! That the day has come when chemists are finding something, not in the earth, but in what grows out of the earth, that will beat linseed oil as a preservative vehicle for a pigment for painting steel, we have no reason to doubt.

Now there are various ways to test oil for their water-proofing qualities. We may suggest the following, among several:

Take strips of sheet gelatine and stand them half way in the oils to be tested and take them out to drip and dry. Then stand them in water, but not quite up to where the oil came, and in twenty-four hours or so those not water-proof will swell up with the water that soaks the gelatine through the oil. Those coated with water-proof oils will not be so affected. Another way is to dissolve the gelatine and pour some in a puddle on as many pieces of glass as there are oils to be tested. When dry, submerge them in water and those not water-proof will swell up like so many toads; and raw linseed oil will be "the biggest toad in the puddle"—as it always has been in the eye of the old painter. By the way, however, do not let the reader run away with the idea that we are condemning linseed oil by wholesale. Far from it. We only condemn its use for some purposes, while for others, such as for priming and under-coats in painting passenger cars when water-proof qualities cut no figure we give it the most unqualified approval. But as a vehicle for pigments for painting steel cars we believe it should be discarded, and the sooner the better.

Other tests consist in taking dry pigments, such as dry white lead and dry graphite, and mixing them with the various oils to be tested and paint the lead samples on glass and the graphite on pieces of sheet iron or steel and lay them flat on the shop roof exposed to the rain and weather; and in the course of time Fathers Time and Neptune will tell you something never dreamed of in your philosophy. We commend this subject to the attention of the Test Committee of the M. C. & L. P. A. for 1905 and to all others who wish to arrive at speedy and reliable results in this direction. We will furnish any other information desired by mail, if asked.

Committee on Information.

OFFICIAL NOTICE.

To the members of the M. C. & L. P. Association: Your committee on information desires to announce that it is ready to transact business. Requests for information on subjects related to car and locomotive painting may be addressed to any one of the undersigned: Committee—J. D. Wright, B. & O. R. R. (chairman), Mt. Clara Shops, Baltimore, Md.; W. O. Quest, P. & L. E R. R., McKees Rocks, Pa.; J. G. Keil, 123 Seabright avenue, Glenville, Ohio; F A. Gowe, F. P., Vandalia R. R. Shops, Terre Haute, Indiana; Geo. Schumpp, No. 641 E. Gray street, Louisville, Ky.

Advisory Committee Meeting Notice.

Boston, Dec. 22, 1904.

The annual meeting of the Advisory Committee of the M. C. & L. P. Association will convene at the Imperial Hotel, New York City, Saturday, Feb. 25, 1905, at 10 a. m.

A very cordial invitation is hereby extended to those members of the association who can attend. Also any suggestions as to subjects for discussion at the next annual convention will be very thankfully received and duly appreciated by the committee.

A. P. Dane,
Chairman.

Notes and Comments.

Here's wishing a happy new year to all, and the best convention at Cleveland that we ever had anywhere; also free transportation thrown in. Clink!

Apologies may not be out of place for the quantity and quality of the editor's work in this number. At the most important time in its preparation he is in the throes of the worst cold he ever had. Sneeze!

Amos Beatty, Altoona, Pa., who has been in the employ of the Pennsylvania Railroad as a painter for forty-four years, has retired on a pension.

When a man comes, in the forenoon after a night's booze, and gets into the wrong house, as one did in the writer's some time ago, it needs some explaining to straighten things out. It is a good deal so with the top line of second column in "Notes and Comments" in our December issue. If the reader will carry it down to near the bottom of the next paragraph after the words "Secretary McKeon," all is plain.

"Comrade" B. E. Miller of the D. L. & W. R. R. dropped down on us like a shower out of a clear sky on Tuesday, Nov. 22. His Supt M. P. sent him out after some information on the subject of new shops and Concord was his objective point. He there learned from Mr. Bailey how the heating system in the paint shop works with the pipe-outlets for the hot air away above the roofs of the cars. We suspect that when these two flower and plant admirers got together at Mr. Bailey's house their tongues ran on a different subject. Come again!

Regarding the subject of varnish-removing, it is not in accordance with usual shop practice, nevertheless varnish, old and much accumulated, can be successfully removed from natural wood finish by the aid of the flame and scraper and without any varnish remover at all, particularly upon plain surfaces, if the flame is properly manipulated without scorching the wood. The interior sides of mahogany car sashes are thus being successfully treated at the same time that the exterior painted and grained sides are burned off with a quick flash and light heat from a well-controlled compressed air and gas jet. Try it and be convinced. It is much cheaper than any other process.

To use a slang phrase, the Committee on Information are "on to their job." See their notice in another column. Mr. Wright evidently does not think it is right to have this committee appear in the official records of our association as a mere piece of dead-wood; so for the first time in our history he is actually advertising for business. Now if anyone in any trouble in the most perplexing business on earth does not avail himself of advice through this channel, whose fault is it? This is an important committee and they should be given enough to do. We do know that when we were on it we answered many inquiries.

Speaking of "the material-saving paint sprayer," or the material-wasting, as you look at it, one general foreman was inquired of by the officials as they were being shown over the shops, and incidentally paint-spraying, if the operators did not inhale a good deal of paint. "Oh," he replied, "that's all right; they spit it right back in the pot." They had a great laugh.

The "Overland Limited" trains of the Chicago, Milwaukee & St. Paul, running between Chicago and Omaha, will soon have added to their equipment a new design of observation car different in some ways from anything heretofore used. They are described at length and illustrated with floor plan and two interior views in the "Railroad Gazette" for December 9, 1904. We make a brief extract of the style of interior finish, as follows: The interior design and finish is artistic and pleasing, the treatment being in the new L'Art Noveau style. The woodwork is St. Jago mahogany and is inlaid with marquetry designs. Many rare woods have been used in this ornamentation, including tulip, amaranth, saffron, olive, boxwood, satinwood, English oak, white holly, prima vera and cocobola. The carpets are woven to a special design to conform to the ornamentation of the car. The upholstering in the observation room is frieze plush and in the smoking room Spanish effects in leather are used. All of the hardware lamps, etc., were specially designed for the car.

The Lehigh Valley R. R. has, we learn, changed the style of numbering and lettering its passenger equipment from the 5-inch semi-black letters and numerals to 4-inch extended Roman letters and numerals. The Pullman scroll formerly used at the ends of the single broad line drawn at the bottom of the car has likewise been omitted. This latter change being directly in line with the abandonment of the scroll by the Pullman Company. In this connection we may state that the standard letter on the letter boards of B. & M. passenger cars is 6-inch Roman extended. There are two sizes of extensions (both same height) to fit various lengths and classes of cars, the shorter set being used chiefly on shorter baggage cars, mail and milk cars. Our own preference when we struck out the new style some four years ago, when the Fitchburg was leased, was to make them 5½, like the Pullman, but we thought that if we made a Roman letter to cover the height and general space of the semi-block our people could not object to it when submitted, and they did not.

We hear that the Pullman Car Company has decided to abandon finishing their car sash in mahogany, painting the sash instead with the regulation Pullman car body color; and the change is said to be satisfactory! Shades of—Pullman! Where will this company stop in its retrenchment of this character? We remember when their cars were decorated inside and outside to beat the bandwagon, and now they are becoming plainer and plainer. They have been painting their wide vestibule side doors in Pullman color for some time, and the B. & M. is about following suit in that respect, but as to the sash—well, we are hardly ready to follow in that just yet. Still, there is a good deal in getting used to a thing; and what will do for the Pullman parlor cars ought to do for any road over which they run by contract. Years ago the B. & M. abandoned maintaining its deck sash in mahogany color, also its passenger car end-doors, and paints them in its car-body color which is Pullman color. We think this a most sensible move and would be loth to go back to the former practice. And it may seem just as reasonable to do the body sash in this way, once it is started.

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 501 and 503 The Plymouth Building, 305 Dearborn Street, Chicago

TELEPHONES - - Harrison 3357, Automatic 7357

Eastern Office: Room 714, 132 Nassau Street, New York City.

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent.

Vol. XXIX. CHICAGO, FEBRUARY, 1905. No. 2.

Contents.

A RECENT visit to a new shop under construction disclosed the fact that large chimneys were under construction. This was rather a surprise, as the old shop of the road, which is located quite near, had a system of mechanical draft which had been pointed out on a number of occasions as very efficient.

It seems that the chimney has the advantage over mechanical draft when the question of operation is taken into consideration, while the first cost may be considered high. In one plant of 1,800 horse power the three steel chimneys cost $6,000. Allowing 8½ per cent per year for interest, insurance, taxes and repairs the running expenses per year would be a little over $500. The first cost of putting in mechanical draft apparatus in the same plant would amount to about $3,000. The operating expenses per year would be about $680, to which would be added 10 per cent of the first cost for depreciation, interest, insurance and taxes, making a total of $980 per year for the operating expenses of the mechanical draft system.

The chimney system apparently has the advantage in cost of operation, yet there are some other advantages in favor of the fan system. The chimney depends for its operation upon the maintainance of a temperature difference between the external air and the products of combustion. This loss can not be eliminated except by the substitution of artificial draft. With mechanical draft a large percentage of the heat is saved which would otherwise be taken up in inducing a draft in the chimney.

A very good use of mechanical draft is to force the boilers when the demand for steam falls below their capacity. This frequently saves putting in several boilers and appears to be the best use for the system.

INCLUDED in this issue we are publishing a description of the Elkhart round house of the Lake Shore & Michigan Southern Railway. One of the interesting features of this plant is that there are two separate houses, one for freight engines and one for passenger engines. There are two inbound and one outbound tracks for the freight house and two inbound and one outbound track for the passenger house with ample cinder pits for all emergencies. This will prevent engines being stalled in getting them into the house.

The houses have provision for future growth of engines, as the turn-tables are 85 ft. and the houses 90 ft. long.

One of the features of particular interest is the design of roof and smoke jacks. The roof has its highest point at the smoke jack and is 45 ft. high at this point. This leaves a large volume for smoke and gases in case that there is an exceptionally large amount present. The smoke jacks are 12 ft. long and about 6 ft. wide at the bottom, tapering towards the top. On the top is a large bonnet to prevent rain and snow from entering. The sheathing is on the outside of the studding, while below it is on the inside. This leaves an opening for gases to pass from the room into the jack.

Another feature of interest is the tunnels leading from the power house around the outer edge of both houses. These are of sufficient size to carry all the piping needed in the system of heating and washing boilers, making them accessible for repairs at any time.

The system of boiler washing has been worked out very carefully and will be explained in another issue so as to get more accurate data on its work. In a preliminary test a boiler was washed out in one hour and fifty-three minutes, including the dumping of fire and getting out on the table with sixty-five pounds of steam. The test was as follows: Dumped fire at 9:45, engine in house at 9:50, started blowing off at 9:55, steam and water blown off at 10:27, plugs removed at 10:38, started washing at 10:40, completed washing at 11:17, engine on turntable with sixty-five lbs. of steam at 11:38.

When this test was made all the machinery was new, and the men not any too familiar with the operation of the system. With the description of the washing out system we expect to have a number of tests which show up better than the preliminary one.

MR. C. L. BRETZ.

GENERAL MANAGER, CUMBERLAND & PENNSYLVANIA RAILROAD CO.

Mr. Bretz was born on March 28, 1847. He entered railway service in 1868 as telegraph operator of the Pennsylvania Railroad. Since then he has been consecutively train dispatcher and train master of the same road. On April 1, 1888, he was appointed general manager of the West Virginia Central & Pittsburg Ry. Mr. Bretz was appointed general manager of the Cumberland & Pennsylvania Railroad Company last spring.

PRACTICALLY all locomotive engineers of this country received their early training as firemen, even if not on the same railroad on which they are at present employed. As many firemen come from minor positions in the roundhouse or shops, it is important that the employing of firemen and shopmen and their training after suitable men are employed should receive all due consideration. A great many points of interest in connection with this were brought out at a recent meeting of the Western Railway Club.

Several methods of employing firemen were discussed. The one brought out in the original paper was that the master mechanic of the division should be the employing officer. He should keep in touch with all applicants, keeping them advised when they may be expected to be called upon for their services. This would keep a list of men ready for an emergency. The men employed should be temperate, healthy, with an education of at least the eighth grade. Exception was taken to not employing men that were financially embarrassed at the time. The author of the paper contended that they are a roving class that will not stay after they get started and that they usually got discouraged before they were very far along. A number of engineers insisted that some of their best firemen had been men that had started work without capital.

The experience obtained in working in a roundhouse or at the cinder pits is undoubtedly invaluable to the fireman in his future work. It teaches him the effects of poor firing as seen after the engine comes in the house, besides learning how to clean ashpans.

A course of study was outlined in which the fireman has to pass three examinations before he receives his promotion to the right side of the cab. This system has proved very successful in that the fireman learns why he does certain things and teaches him to study his machine, with the result that he gets more work out of it with less fuel. It makes him a future engineer who can guide his fireman and raise him to a higher efficiency.

Another excellent way of selecting the prospective firemen is to have them serve as brakemen previous to their becoming firemen. The head brakeman becomes familiar with the operation of the locomotive, being called upon frequently to help the fireman. He knows all the signals and does not require any instructing when he is called upon to enter the duties of firing. Another point in connection with this system is that the transportation department employs more brakemen so that a rush call for twenty-five or more firemen can be easily filled without crippling any department.

It was pointed out that the best fireman is one that uses his head. If brawn and brains could be combined it was the best combination, but if there was to be a choice, that the small man using his head would be the better man. Or as one remark was made, "The saving of coal should be at the wooden end of the scoop."

New Roundhouse of the Lake Shore & Michigan Southern Railway at Elkhart, Ind.

THE Lake Shore & Michigan Southern have completed their new roundhouse at Elkhart, which is one of the most up-to-date plants for handling engines at terminals. The buildings are located south of the main tracks and a little west of the depot. The freight yards are located west of the roundhouse.

There are two separate roundhouses, one for passenger and one for freight engines. Each is served by an 85-foot electric turntable. The buildings are of similar construction and connected by a machine shop. The outside diameters are 202 feet, and the inside 111 feet 6 inches. The freight-house is divided into five parts, and the passenger into two by 12-inch brick fire walls.

The foundations are constructed of concrete and the outer walls of brick. Between the doors are cast iron pillars, to support the roof trusses and doors. The outer wall is well provided with windows. The roof is supported on the outer and inner walls and two intermediate posts.

FIG. 1—GENERAL VIEW OF THE NEW ROUNDHOUSE OF THE L. S. & M. S. RY., AT ELKHART, IND.

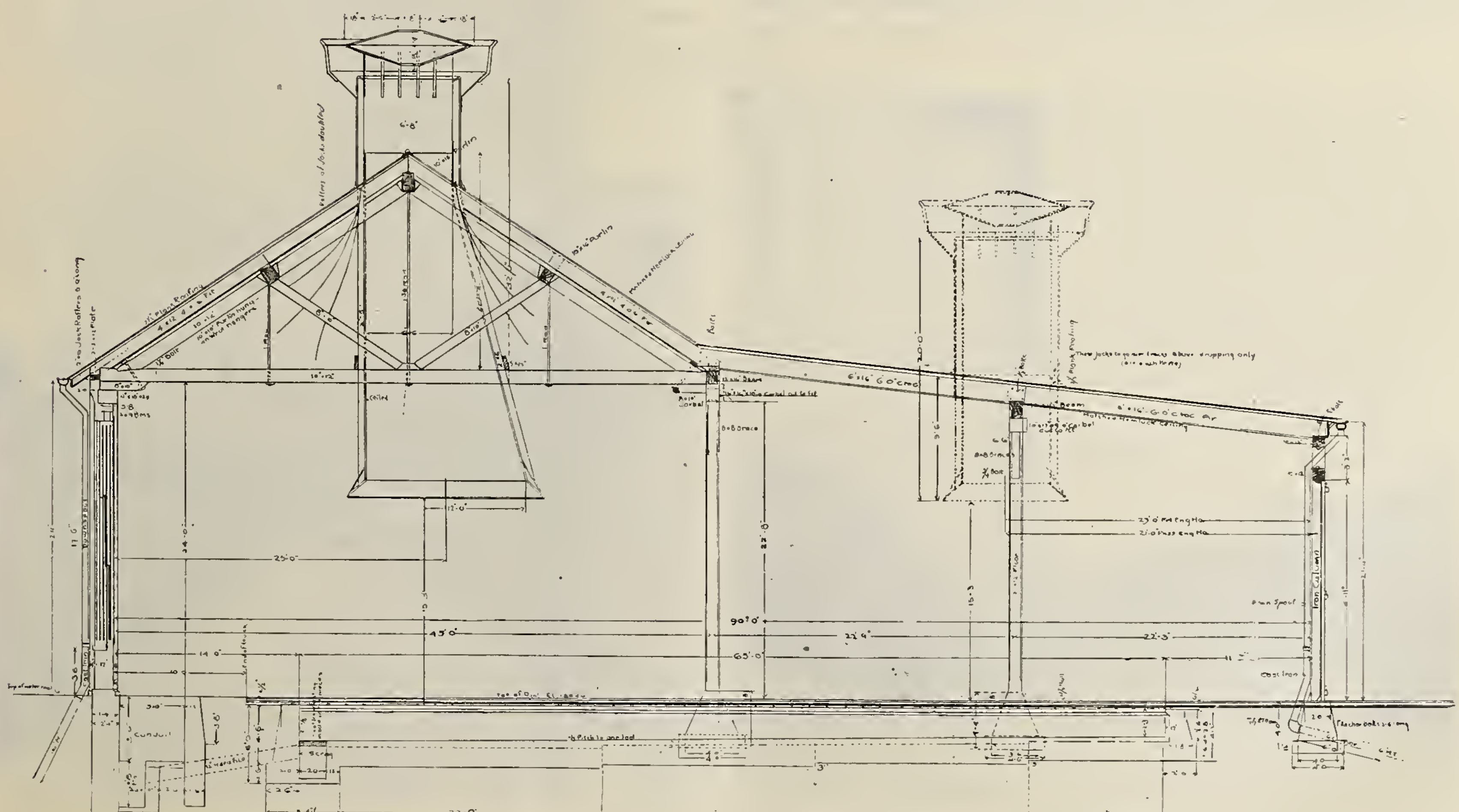


FIG. 2—CROSS SECTION OF THE NEW ROUNDHOUSE OF THE L. S. & M. S. RY., AT ELKHART, IND.

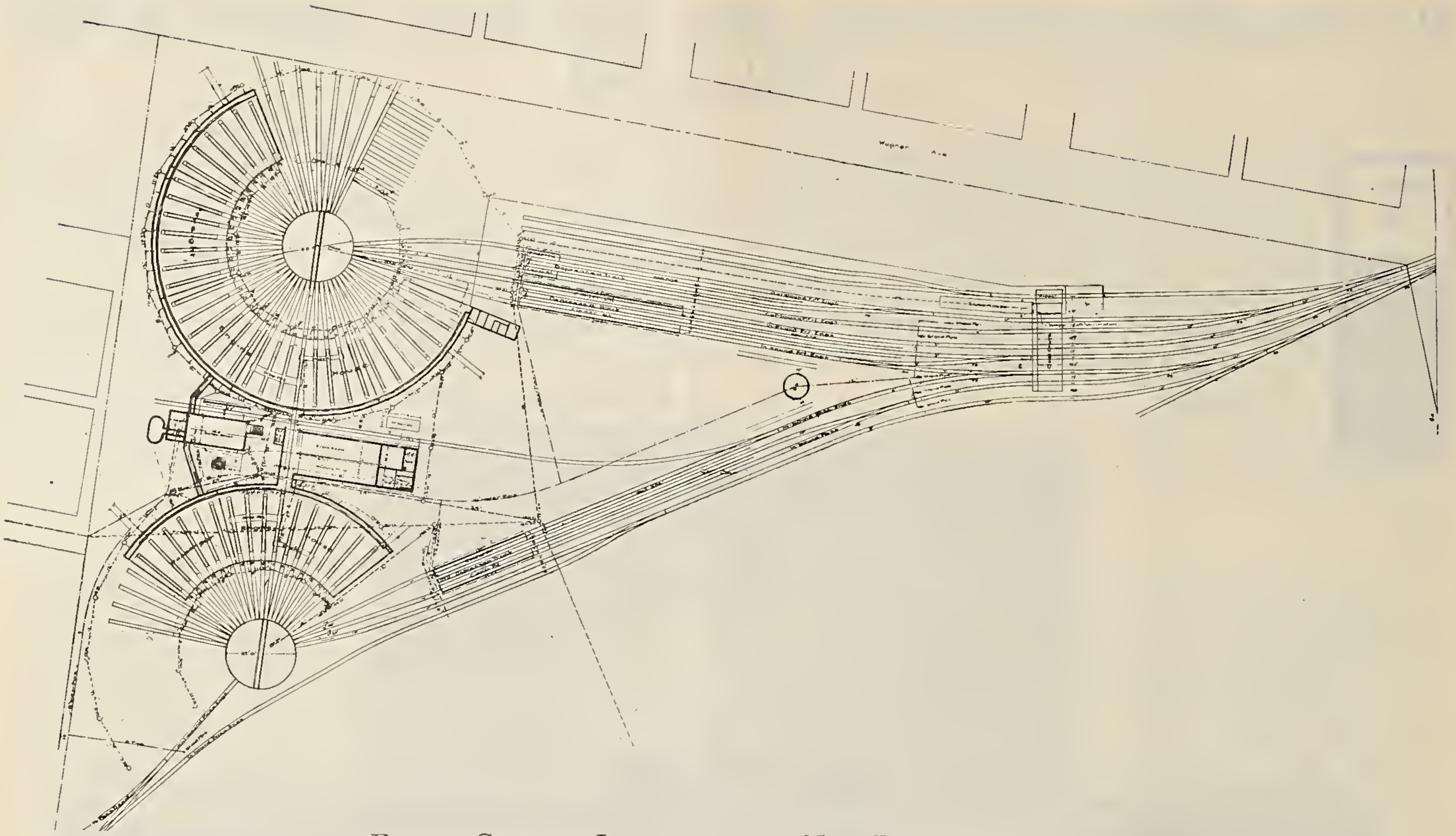


FIG. 3—GENERAL LAYOUT OF THE NEW ROUNDHOUSE OF THE L. S. & M. S. RY., AT ELKHART, IND.

The roof of the houses is of particular interest. The construction is of wood with tar paper covering. The highest point is at the smoke-jacks and above the front end of the locomotive. The smoke-jacks are constructed of wood, with an opening twelve feet long at the base. This makes it practically impossible to miss the jack with an engine. Ventilators are provided around the outside of the jacks. With this form of jack and roof there is very little chance for the collection of gases or smoke.

The floor has a cinder foundation with planks on top. The cracks are filled with asphalt to prevent the accumulation of water.

There are 34 pits in the freight-house and 16 in the passenger. These are 63 feet long and extend to within 14 feet of the outer wall. They are constructed of concrete with a special cast iron top for fastening the

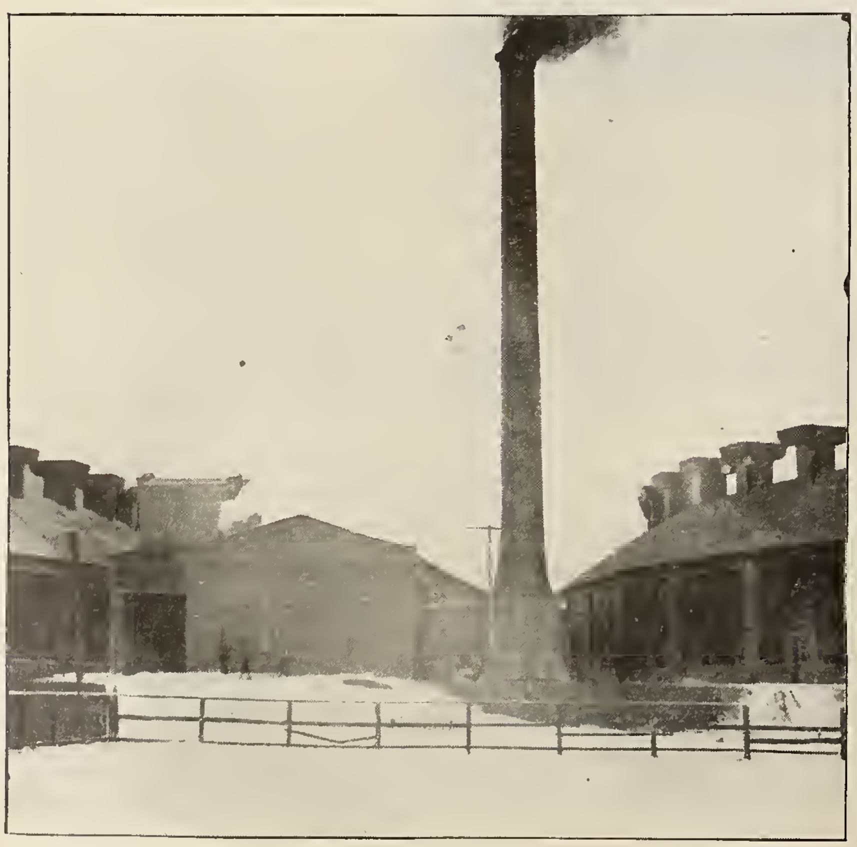


FIG. 4—VIEW OF POWER HOUSE AT ELKHART ROUNDHOUSE.

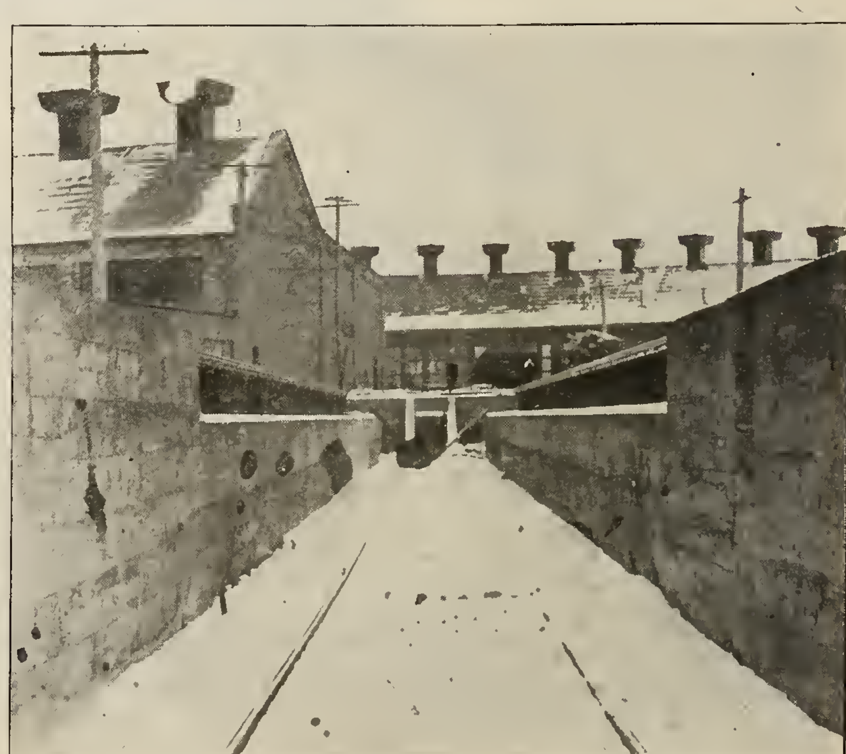


FIG. 5—CINDER PIT, ELKHART ROUNDHOUSE.

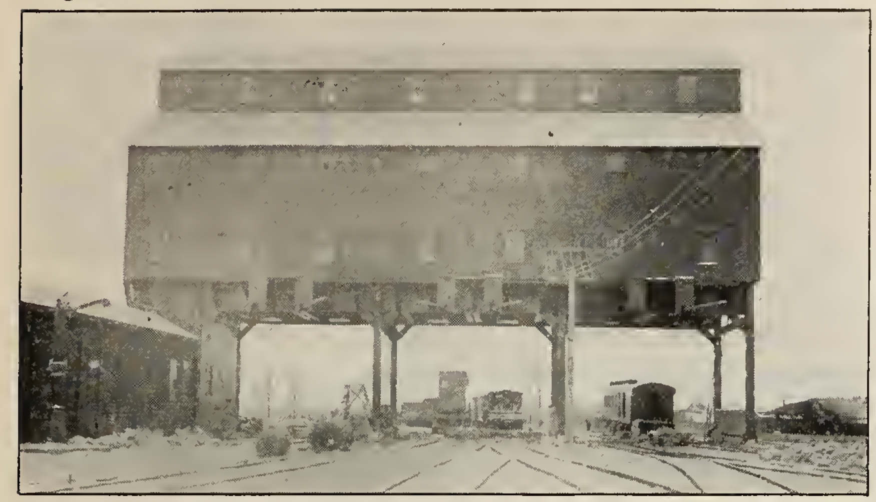


Fig. 6—Coaling Station and Sand House, Elkhart Roundhouse.

Fig. 8—Interior View, Showing Windows in Outer Wall and Bottom of Jack, Elkhart Roundhouse.

rails. The depth is 2 feet 3 inches at one end and 2 feet 11 inches at the other. The distance from center to center of tracks is 13 feet at the door. There are three drop pits for driving wheels and three for truck wheels in each house.

The building conecting the two houses contains a machine shop, store room, oil room, bunk room, toilet and lounging rooms.

The office is located at the west end of the freight house, making it easily accessible from all points.

The power house is located a little east of the machine shop. This contains the boilers, pumps, feed water heater, etc. It is connected to the engine houses by means of tunnels, which extend along the outer walls of the houses to carry the piping. The coal and cinder storage is in an annex to the power house. The coal is brought into the annex on an elevated track and dropped into the bins through the bottom of the cars. The cinders are elevated by means of an air hoist and dropped into a bin above the coal bins, where they can be loaded into the empty coal cars by

Fig. 7—Ash Handling Apparatus in Power House, Elkhart Roundhouse.

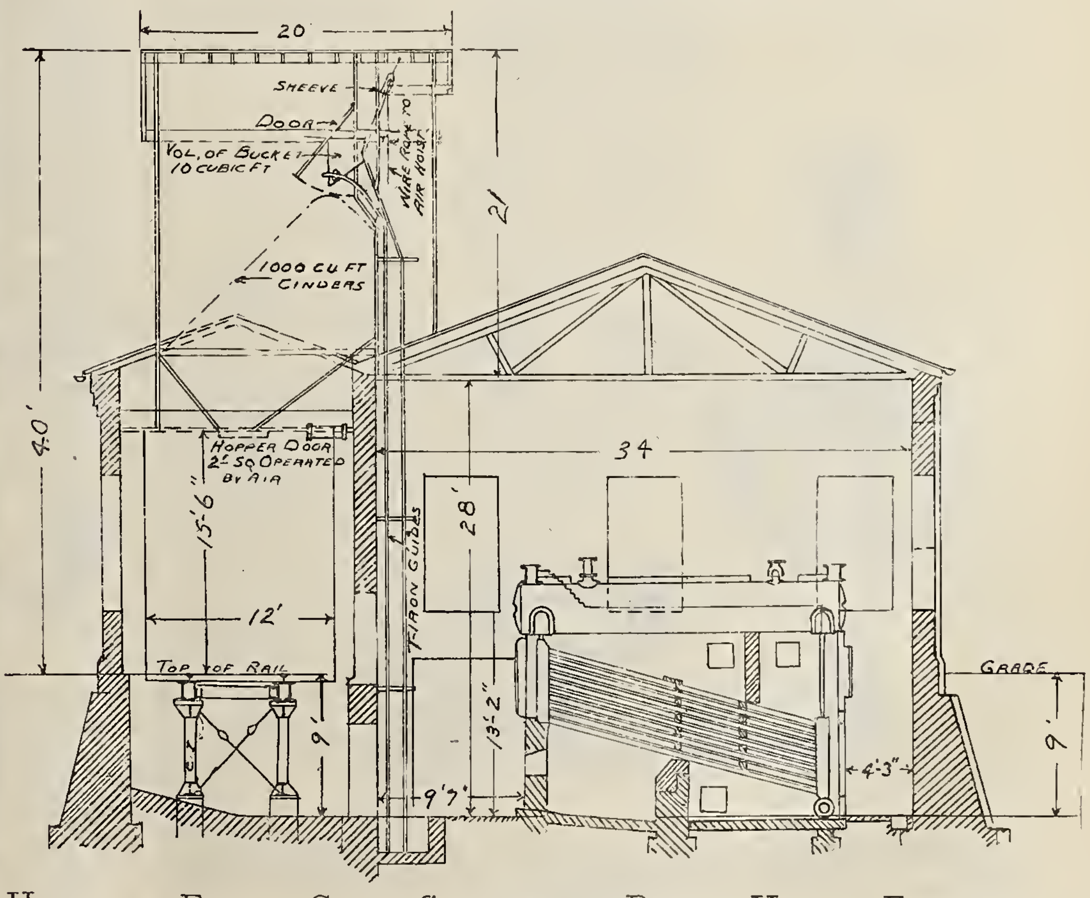


Fig. 9—Cross Section of Power House, Elkhart Roundhouse.

opening the bottom of the hopper, which is operated by air.

There are two sets of cinder pits for the freight house and one set for the passenger house. The cinder pits for outgoing engines in the freight house are short ones, and are used only in case there is a collection of cinders in the ash pan while standing in the house. There is a depressed track between the pits for the cinder car. This allows cinders to be loaded without any elevating mechanism. The construction is of concrete.

The coal chutes and sand supply are in one building, west of the roundhouses. Coal can be taken on six tracks. The coal is elevated by link belt machinery, and scales are provided for weighing before it is put in the tender.

Water hydrants are located between the cinder pits and coal chutes. These are so situated that water can be taken from any track leading to the roundhouse.

In our next issue we will have a description of the lighting, heating, boiler-washing system and some more of the details of the buildings.

Device for Regulating the Braking Power of Cars

THE accompanying illustrations show a method of equalizing the braking power applied to the wheels of a car by the weight of the car body and the retarding force of such braking power; or, to express it in another way, this device regulates the retarding force applied to the wheels and allows it at no time to exceed a certain proportion of the weight of the car on the rails.

To accomplish this the original braking power is figured much in excess of what would with the present device be safe. Any standard brake beam (A), figures 1 and 2, is suspended in the usual way by hangers B, which in turn are connected to lugs C on cross-heads D and E. Cross-heads D and E are held in position on truck bolster F by guides G and H, which in this case are riveted to bolster F, and which permit cross-heads D and E to move only in a vertical plane.

Guides G in addition to being guides of cross-heads D and E also form so-called inside column guides, which limit the lateral motion of truck bolster F. There are two cross-heads (D) and two cross-heads (E) to every four-wheel truck. One cross-head (D) is located directly inside of brake head on one wheel, and one cross-head (E) is located in the same way on the other wheel on the same axle, and both on the same side of bolster F. This same arrangement is applied on the other side of bolster F.

Cross-heads D and E have each a pin (I) which engages levers J and K. Levers J and K are identical, except they are reversed when applied. The detail of lever J, shown in figure 3, will help to make clear their construction.

There is a set of levers (J and K) on each side of bolster F. (See Fig. 1.) To truck bolster F in this case, is riveted fulcrum L, which engages levers J and K on the longitudinal center line of the car. On levers J and K are lugs M and N respectively, to which shoes O are attached. Shoes O each pass over truck

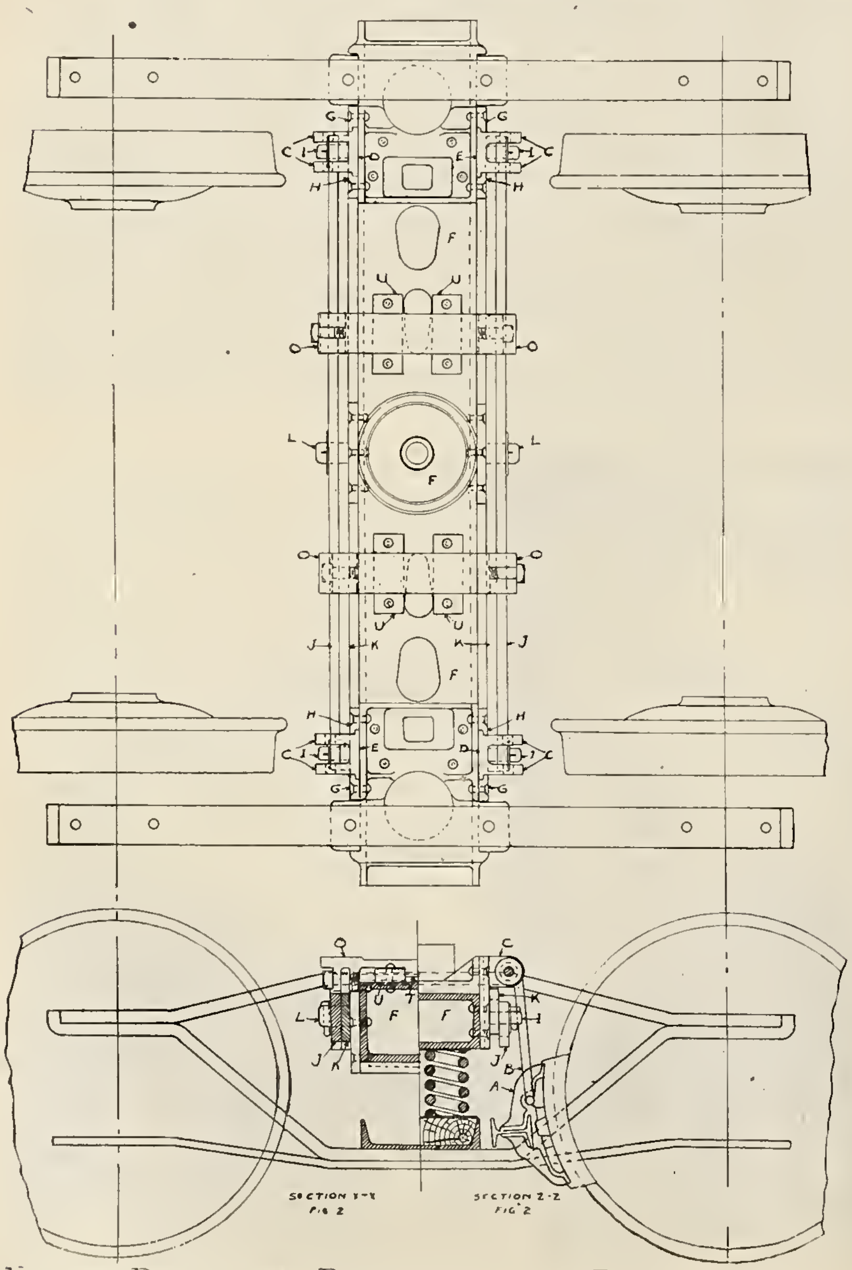


FIG. 1—DEVICE FOR REGULATING THE BRAKING POWER OF CARS.

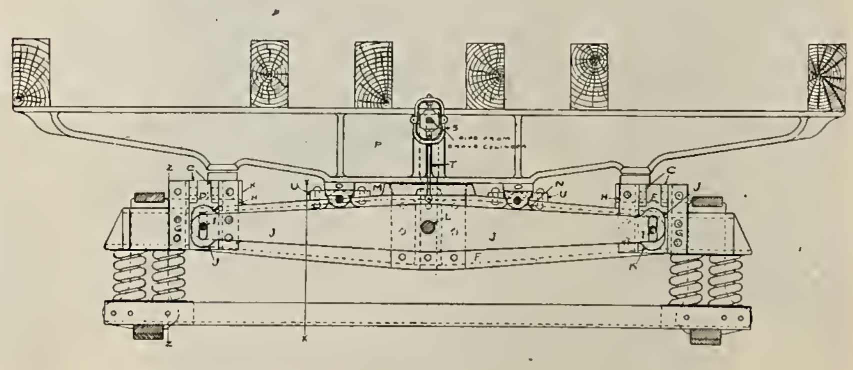


FIG. 2—DEVICE FOR REGULATING THE BRAKING POWER OF CARS.

bolster F and engage the lugs M and N on the levers on the other side of truck bolster F. (See Fig. 1.)

Shoes O have each a lug T (see Fig. 1) extending down on the longitudinal center line of truck bolster F. This center lug T engages two lugs U, in this

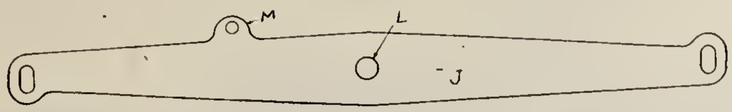


Fig. 3—Device for Regulating the Braking Power of Cars.

case riveted to truck bolster F, which permit of no lateral movement of shoes O and levers J and K independent of the truck bolster.

In substance, then, these lugs U engaging lug T on shoe O compel shoe O to slide on bottom of bolster P, just as the lower side bearings act on the upper ones. This is done to make the levers J and K really a part of truck bolster F and avoid any twisting of levers J and K due to the changing position between the body bolster P and truck bolster F when car is rounding curves.

The upper side, or the top of shoes O, also engages in this case, body bolster P. Levers J and K are so applied to fulcrum L that the slot on lever J, which engages pin I on cross-head D, extends down with only its upper end in contact with pin I; and lever K, therefore, being just the reverse, its slot extends upward and has only the lower end in contact with pin I. This arrangement of levers only applies to cross-head D on the left of Fig. 2. As for cross-head E on the right of Fig. 2, the arrangement of the levers is just the reverse. Here the slot on lever J extends up and has its lower end in contact with pin I of cross-head E, while the slot of lever K extends down with the upper end against pin I of cross-head E.

It is evident that when the brakes are applied, the force exerted (which tends to pull the brake beam in the direction of the revolving wheel, and which force is the co-efficient of friction multiplied by the pressure against the wheel) will pull or push on hangers B, and communicate the same motion to cross-heads D and E.

Let us suppose the revolving wheel as pulling down on hangers B, the cross-head D then will move down and, through pin I, will engage lever K on the left in Fig. 2, and the cross-head E on the right in Fig. 2 will for the same reason move down and engage lever J. It is plain to be seen that through the movement down of lever K, lug N being on the other side of fulcrum L, will tend to raise shoe O on the right side of Fig. 2, while the lever J through lug M will raise shoe O on the left side of Fig. 2.

Let us suppose the revolving wheel pushes up on hangers B. Cross-head D, then, through the medium of pin I, will raise lever J and tend to raise shoe O through lug M on the left of Fig. 2, while cross-head E will do the same with lever K, lug N and shoe O on the right of Fig. 2.

As has been said, shoes O are in contact with the body center plate, or body bolster P, and any movement of the levers through the movement of cross-heads D and E, either up or down, will tend to raise body bolster P, providing the power applied on cross-heads D and E is sufficient to overcome the weight of the body of the car and separate the body and truck center plates.

This cannot happen except when an excessive braking power has been applied to the car, or more retarding force applied to the wheels than the weight on the rails will permit.

Valve body Q is attached to bolster P, and valve R in Fig. 4 is unseated by the raising of body bolster center plate P from the center plate of truck bolster F by the yoke S and rod T, which rod (T) is attached to truck bolster F.

The brake cylinder pressure enters below valve R in valve body Q, through a pipe from the brake cylinder to valve body Q, so valve body Q is always charged with brake cylinder pressure.

When valve R, Fig. 4, is unseated, the brake cylinder pressure is reduced by exhausting the excessive brake cylinder pressure to the atmosphere, until valve R closes, which will occur when the retarding force on the wheels has been reduced to the pre-determined proportion of the weight of the car on the rail.

When the body bolster center plate P has been raised a certain distance from the truck bolster center plate F, a distance sufficient to exhaust the air from the brake cylinder to the atmosphere by unseating the valve R, levers J and K lock themselves about pin I of cross-heads D and E, so no difficulty may be experienced from the severe application of hand brakes, or if from any cause whatever, the reduction in the retarding force as applied to the wheels should not be realized.

The locking feature of the levers can be explained

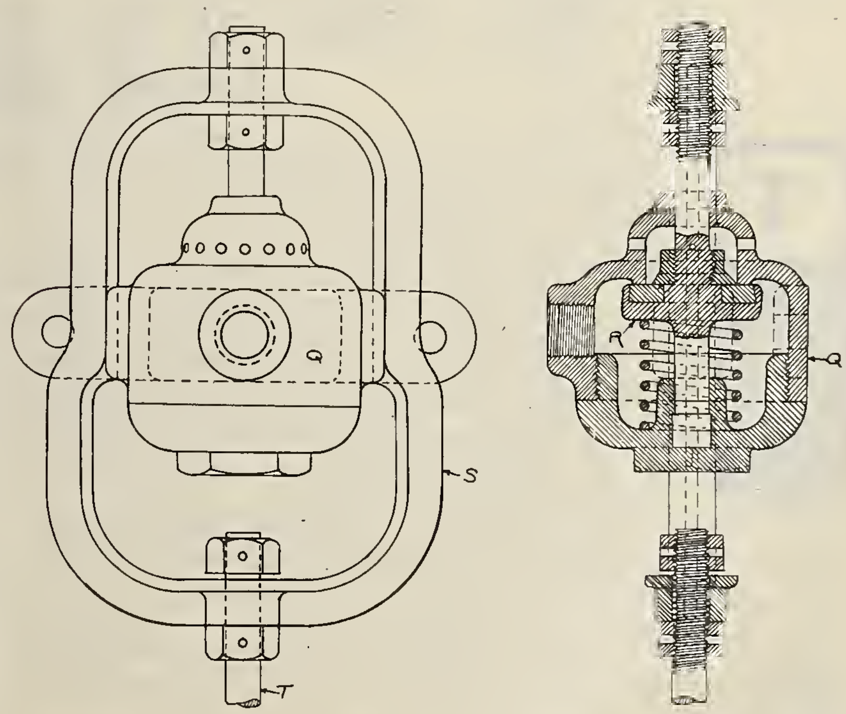


Fig. 4—Device for Regulating the Braking Power of Cars.

in this way: When cross-head D pulls down on the left end of lever K, it is evident that the other end of lever K will go up, and each end will travel in opposite directions one-half the length of slots minus the diameter of pin I. Cross-head E will then pull down on the right end of lever J, and in the same manner the left end of lever J will go up and again each end of lever J will travel in opposite directions one-half the length of the slots minus the diameter of pin I.

We have, then, the left ends of levers J and K each traveling in opposite directions half the distance of the slots minus the diameter of pin I on cross-head D, which of necessity makes them lock, and since both sides act simultaneously we have both ends of both levers locked after they have separated the center plates enough to unseat valve R and reduce the excessive cylinder pressure.

The car can be equipped with a braking power figured as heretofore, in excess of its light weight, so that it will be a proper proportion to the loaded car. For instance, if a car is loaded to its full capacity with a braking power proportional to its loaded weight, the levers J and K will not have power enough to raise the body from the truck and all the braking power will be realized. But when that car is empty, the retarding force applied to the wheels will, through levers J and K, raise the car from the truck, unseat the valve R, and exhaust the excessive pressure when the body of the car will return to its natural position and exhaust from the brake cylinder will cease, and there will be applied to the empty car all the retarding force the weight on the rails will permit.

The high speed feature of this device should not be overlooked. It is an established fact that the co-efficient of friction between the wheel and the shoe of brake beam A reduces as the speed increases, and that the co-efficient between wheel and rail is not materially affected by the speed of the car. With this in mind, it is evident that with the old methods of braking, there was no increase in braking power for an increase in speed, but really a reduction in retarding force when running at a high speed. While with this device the original braking power, as figured, can be much greater than a car with an ordinary braking device would allow at slow speeds.

It is evident that where this device is applied, a certain co-efficient of friction must be attained before an automatic reduction in cylinder pressure occurs.

Let us suppose the train equipped with this device is running at 60 miles an hour, and the retarding force exerted on the wheels is just enough to cause a maximum safe reduction in speed. When the speed has been reduced say to 50 miles per hour, the co-efficient of friction has increased to such an extent as to necessitate a reduction in brake cylinder pressure or slide the wheels, which would reduce the retarding effect of the brakes. Just as soon as this condition arises the force of that co-efficient multiplied by the brake applied, exerted on levers J and K, will raise the car body and reduce the brake cylinder pressure to a maximum safe retarding power for this speed. As the co-efficient again increases, due to a still further reduction in speed, it is evident the levers must act again and raise the car body in the same manner and continue to do so until a higher co-efficient than the one of last exhaust cannot be attained.

This device was designed by Mr. W. J. Schlacks, superintendent machinery of the Colorado Midland Railway, to whom we are indebted for the description and illustrations. Although Mr. Schlacks has not been able to give the device a trial we feel confident that it will be a means of avoiding a large number of slid wheels.

New Shops of the Pere Marquette R. R. at Grand Rapids, Mich.

THE Pere Marquette R. R. Co. have put in operation their new shops at Grand Rapids, Michigan. These are situated at the junction of the Chicago, St. Joseph, Benton Harbor & Grand Rapids Line; Grand Rapids, Traverse City & Petoskey Line; and Detroit, Lansing & Grand Rapids Line. They are designed to handle about 125 locomotives per year. Provision has been made in the locomotive carpenter shop for furnishing the necessary material for the freight car repairs at this point.

One of the notable features of the plant consists of a square engine house as part of the general shop scheme. This seems to work out very well in connection with this plant as it was necessary to have a transfer table in connection with the erecting shop which serves the engine house at the same time.

The general layout of the building and surrounding tracks are shown in the illustration. The Machine, Erecting, Boiler and Blacksmith shops are practically in the same large building, although the blacksmith shop is separated from the others by a brick wall and its roof is lower and of different design, as it was not necessary to have a traveling crane in this section. The storehouse and office building is situated a short distance east of the main shops, two leads to the engine house and a storehouse track intervening. The oil house is south of the storehouse building, but connected by the large platform, which surrounds three sides of the storehouse. Near it is the cinder pit. A system of narrow gage supply tracks connect the dif-

Fig. 1—General View, New Shops of the Pere Marquette at Grand Rapids, Mich.

ferent shops with each other, with the store and oil houses, wheel yard, and also run to the repair yard and engine house. The same system is laid with standard-gage track for most of its length. The power house is located just south of the main shop building, the water tank and cistern being near by.

As can be seen from the layout of the tracks, the Y for turning engines is placed south of the shops and is near the classification yard (not shown in illustration). The coal-handling plant is on the odd leg of this Y and is so arranged that after an engine is coaled she can be taken to the cinder pit in either direction, depending on which way she is to be headed. The cross-overs on either side of the cinder pit and the double track through the coal-handling plant prevent the probability of engines getting seriously blocked, either going to or coming from the transfer table. It will be noted that there is a track leading directly into the main shops, and also a depressed track near the wheel storage yard for easy loading of wheels, and one near the power house for loading ashes.

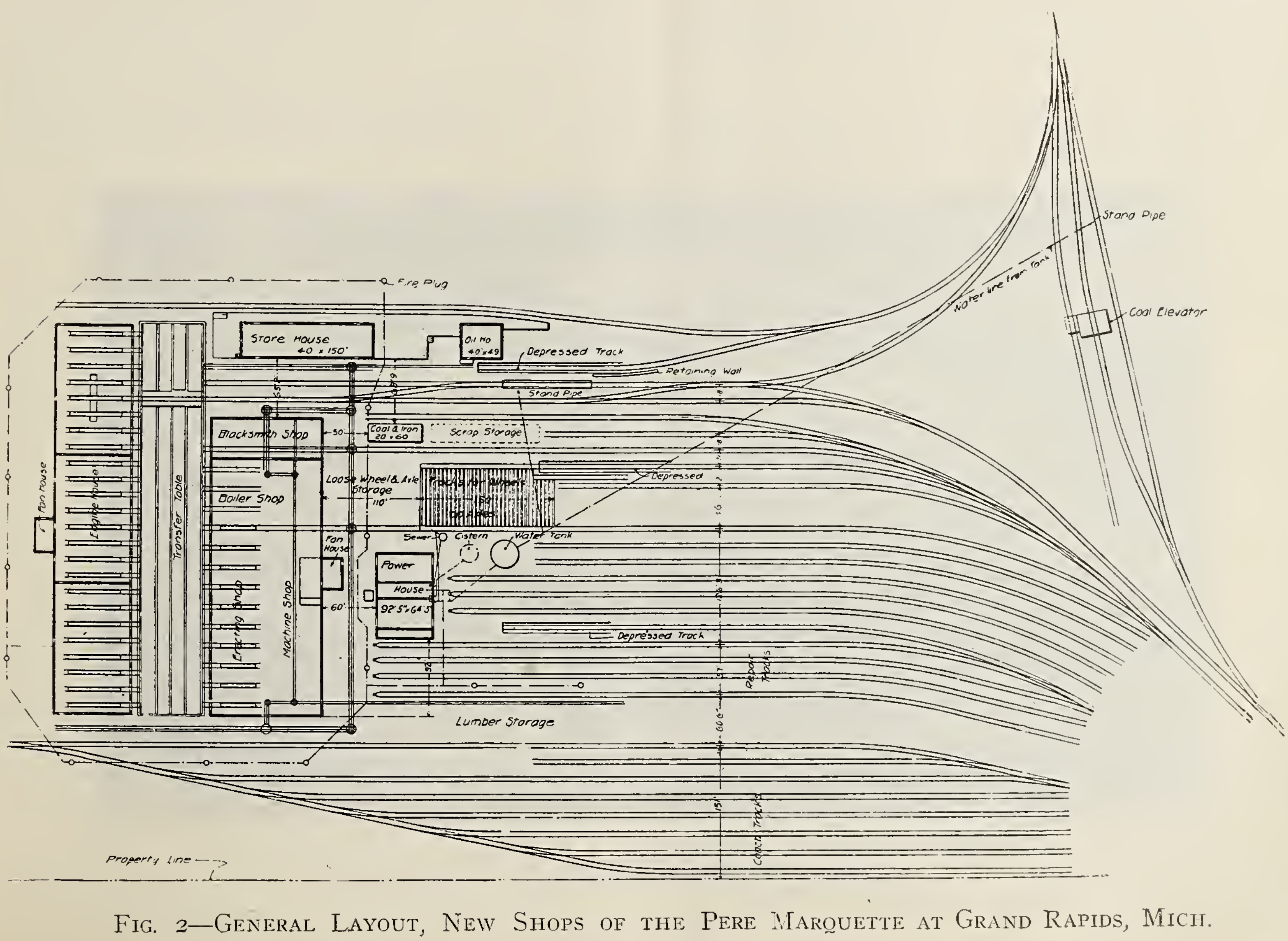


Fig. 2—General Layout, New Shops of the Pere Marquette at Grand Rapids, Mich.

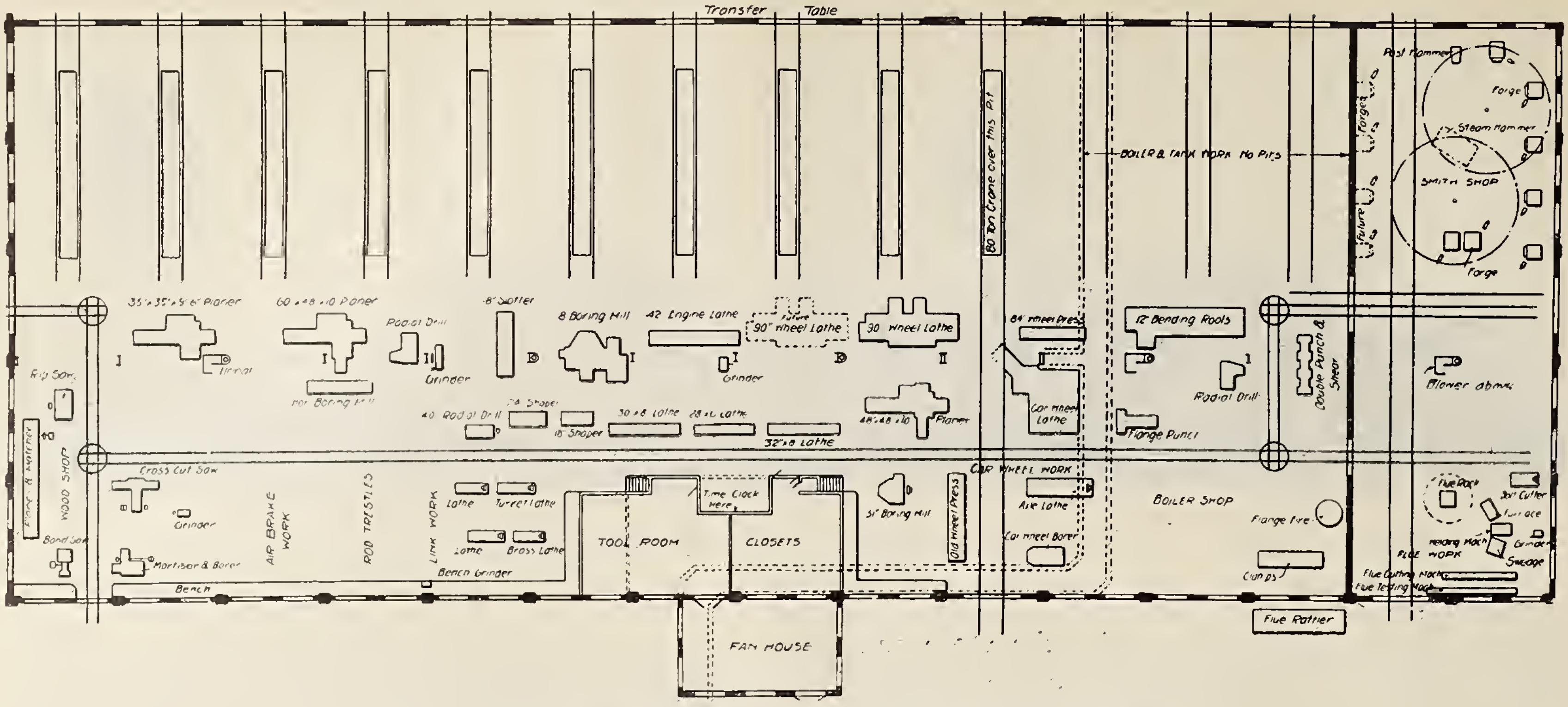


Fig. 3—Layout of Tools, New Shops of the Pere Marquette at Grand Rapids, Mich.

Main Shop Building.

This building is constructed of steel on concrete foundations with brick walls. It is 286 ft. 4 ins. long by 72 ft. 6 ins. wide and contains the erecting shop and a bay 50 ft. 10 ins. wide for the machine shop. On one end is an extension 43 ft. 6 ins. by 123 ft. 4 ins. for the blacksmith shop.

The roof of the main building is a simple design of steel truss. The bay roof is of similar construction, but is slightly heavier for the purpose of supporting shafting.

A wide gable skylight of steel and glass extends nearly the whole length of the erecting shop roof and similar smaller skylights are arranged over the machine tools at frequent intervals. The space between the eaves of the main building and the top of the roof of the bay, as well as the same distance on the other side is of solid glass arranged in a large number of small sashes, many of which can be opened for the purpose of ventilation. The space on the end of the erecting shop above the blacksmith shop roof is also of glass. Over the pit, which has a track leading to the outer yard, a super-structure has been built above the roof extending the whole width of the erecting shop for the purpose of housing a stationary crane for lifting the locomotives from their wheels. The sides

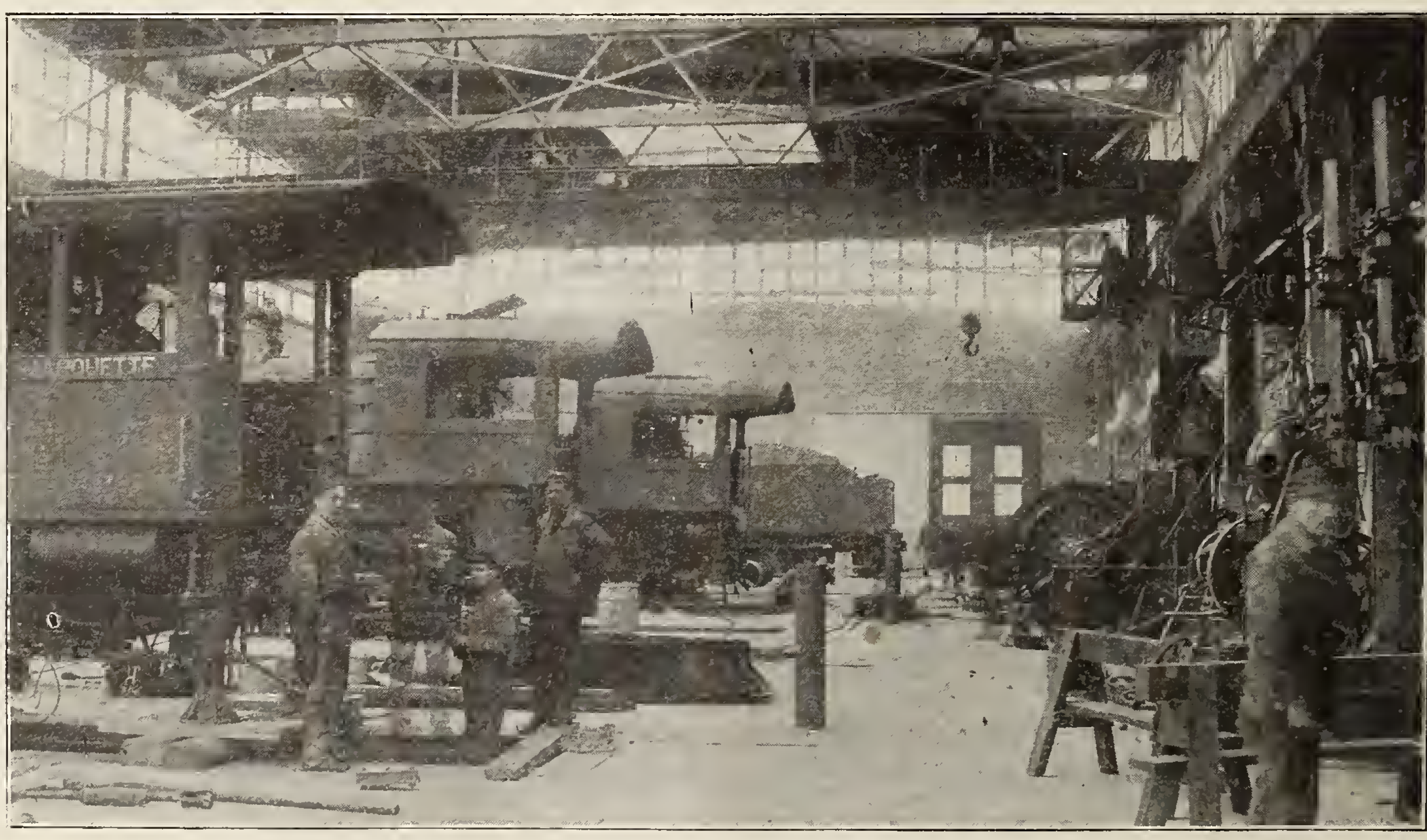


Fig. 4—View of Erecting Shop, New Shops of the Pere Marquette at Grand Rapids, Mich.

MACHINE SHOP TOOLS.

Shop No. of Tool.	Description of Tool.
1.	84-inch 300-ton wheel press.
2.	90-inch driving wheel lathe.
3.	5-foot Universal radial drill.
4.	48-inch radial drill.
5.	40-inch drill press.
6.	42-inch engine lathe, 10-foot C.-C.
7.	32-inch engine lathe, 8-foot 3½-inch C.-C.
8.	28-inch engine lathe, 6-foot C.-C.
9.	18-inch engine lathe, 8-foot bed.
10.	20-inch Fox brass turret lathe, 8-foot bed.
11.	2x26-inch turret lathe.
12.	2-inch double bolt cutter.
13.	60 inch x 46 inch x 10 foot planer.
14.	48 inch x 48 inch x 10 foot planer.
15.	26-inch traveling head shaper.
16.	17-inch traveling head shaper.
17.	51-inch vertical boring mill.
18.	8-inch boring and turning mill.
19.	18-inch slotting machine.
20.	Wet emery grinder, 20x3-inch wheels.
21.	Dry Emery Grinder.
22.	48-inch grindstone and frame.
23.	Dudgeon crank pin press.
24.	Hartz flue-welding machine.
25.	Fergusson flue furnace.
26.	Double punch and shear.
27.	Flange punch, 8-inch throat.
28.	12-foot bending rolls.
29.	12-foot flange clamps.
30.	Dry emery grinder.
31.	Buffalo blower.
32.	Buffalo exhauster.
33.	2,500-pound steam hammer.
34.	Post air hammer.
35.	18-inch engine lathe, 8-foot bed.
36.	Mortiser—Greenlee hollow chisel.
37.	Resaw.
38.	Cut-off machine, automatic.
39.	Band saw.
40.	Dimension planer.
41.	Bench grinder.
42.	36-inch x 36-inch x 9-foot planer.
43.	Horizontal boring mill.
44.	42-inch drill press.
45.	15-inch shaper.
46.	18-inch engine lathe.
47.	Turret lathe.
48.	18-inch engine lathe.
49.	Fox lathe.
50.	30-inch engine lathe.
51.	36-inch engine lathe.
52.	90-inch driving wheel lathe.
53.	36-inch x 36-inch x 10-foot planer.
54.	48-inch radial drill.
55.	15-inch slotter.
56.	Hydraulic press.
57.	Hydraulic car wheel press.
58.	Car wheel lathe.
59.	Axle lathe.
60.	Car wheel boring mill.
61.	Punch and shear.
62.	Flue rattler.

are also of steel and glass construction, and it is roofed with four-ply gravel.

The double doors leading to the transfer table are of heavy wooden construction, swing outward and are in three panels, the upper two of which are glass. There are also two similar doors on the other side of the shop, one opposite the wheel pit, and one into the blacksmith shop, and also one in each end of the building.

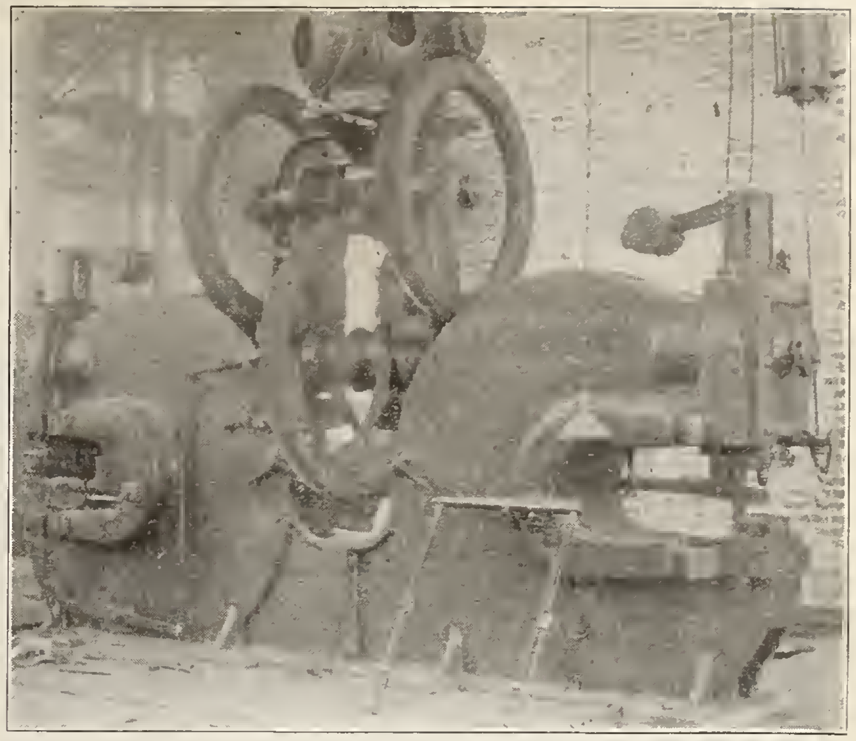


Fig. 5—Long & Allstatter Double Punch and Shear, Pere Marquette Shops.

There are 10 pits and three tracks for boiler work in the erecting shop. One of the erecting shop pits is to be used for wheeling and unwheeling and light repairs, leaving nine pits for general erecting-shop work. The space over both the erecting and boiler shop tracks is covered by a 10-ton Niles electric traveling crane with a 70-ft. span.

The pits are constructed of concrete. Between them are large benches with vises, in the center of which is a post supporting two universal adjustable electric light fixtures, and also plug receptacles for four portable lights.

Most of the larger machine tools are located slightly inside of the steel columns so they may be served by the crane. The smaller tools are located back under the bay and are grouped so that work on different parts can all be done without much transferring. The wood shop tools are located at one end of the shop, and then follows a space of air-brake and rod work. Then comes the link work with the small machines used on this class of work grouped near by. The larger engine lathes, shapers, etc., are grouped along the material track, running the full length of the shop. The boiler work is all collected in the opposite end of the shop with the heavier tools where they can be served by the crane. The tool room and wash rooms are located centrally against the outside wall.

The blacksmith shop contains a 2,500-lb. steam hammer and seven forges with space for four more when they are needed. There is also a post hammer. Two

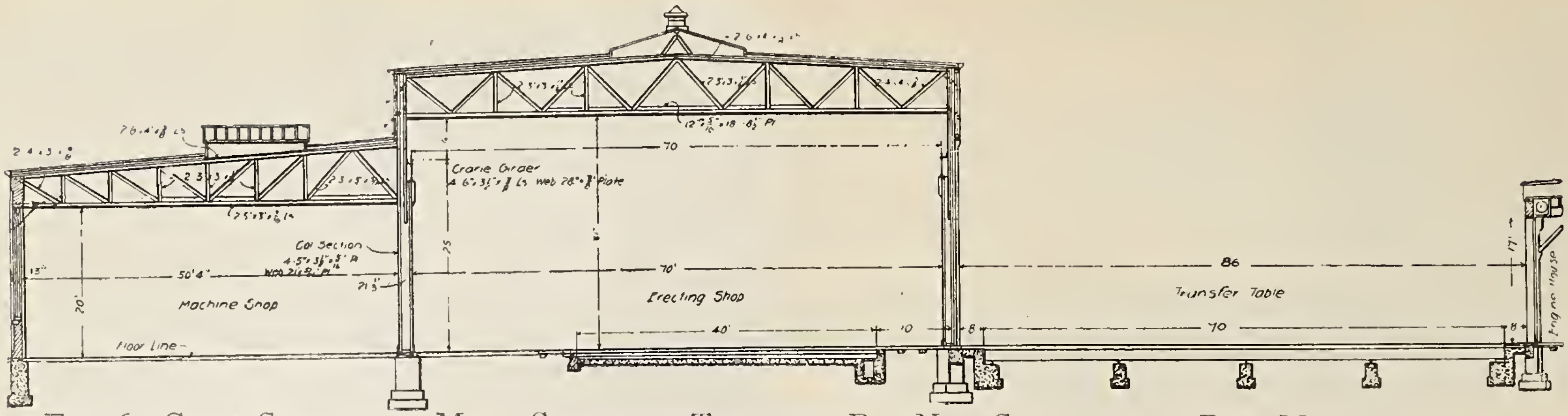


FIG. 6—CROSS SECTION OF MAIN SHOP AND TRANSFER PIT, NEW SHOPS OF THE PERE MARQUETTE AT GRAND RAPIDS, MICH.

large swinging cranes serve the steam hammer from six of the forges.

All the flue work is done in one end of the blacksmith shop, the flue rattler being outside the building.

The heating is by hot air, the coils and fans being in the small addition between the machine shop and power house, and the air carried overhead through a large pipe, which gradually branches out and reduces as it gets farther away from the source. Outlets are brought down on the iron columns, and in other places as desired, opening about 12 ft. from the floor, throwing the draft downward and outward in two directions.

The Power House.

This is a brick structure containing a main section 61 ft. by 64 ft. 10 ins. and a bay for the engine room 32 ft. by 64 ft. 10 ins. The main section is 38 ft. 2 ins. high at its highest point, which height was made necessary by the vertical type boilers in use. A space of 16 ft. between the boiler and engine room is walled off from both by brick walls and has a basement 7 ft. below the level of the engine room floor. This basement also extends a distance of 6 ft. on each side under the engine and boiler room floors. In this center compartment are located the pumps, heaters and all piping. Storage for coal is arranged for by an addition 7 ft. wide and 11 ft. 7 ins. high across the end of the building adjoining the boiler room. This has numerous openings with adjustable doors into the boiler room and also doors for filling at a higher level in the outside walls. The construction throughout is fireproof, the roof girders being of 18-in. I-beams and the floor

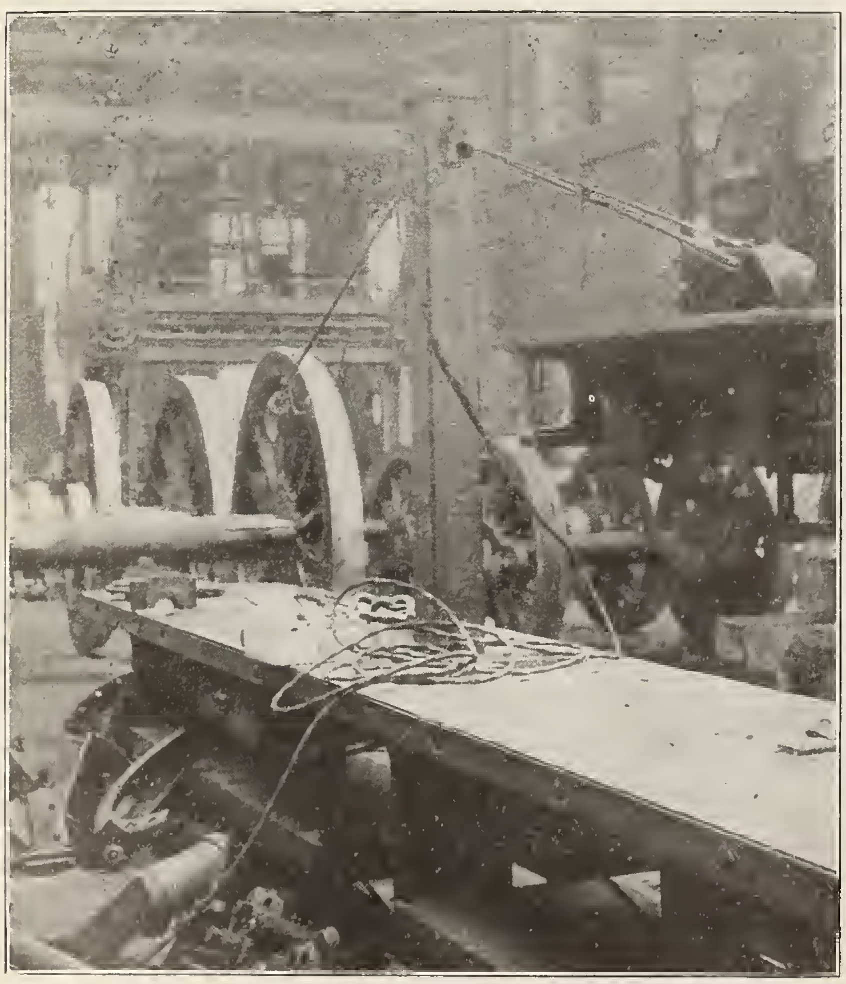


FIG. 7—BENCHES AND LIGHTS, MAIN SHOP, PERE MARQUETTE SHOPS.

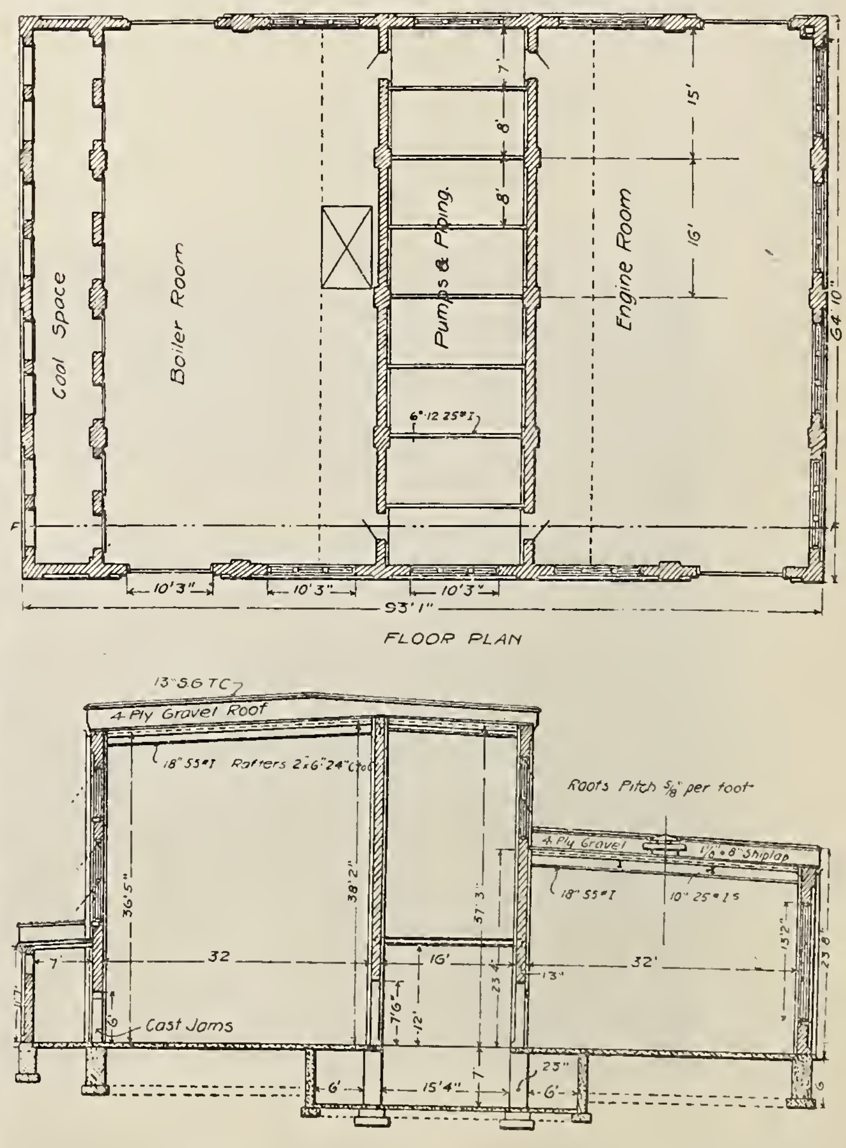


FIG. 8—PLAN AND SECTION OF POWER HOUSE, PERE MARQUETTE SHOPS.

Fig. 9—Transfer Table, Pere Marquette Shops.

of concrete. The general construction is seen in the illustrations.

In the boiler room are three Wicks vertical boilers of 200 h. p. each, which furnish steam for all purposes. They have a grate area of 36 sq. ft. and a heating surface of 2,014 sq. ft. They have water tubes connecting with a steam drum at the top. The hot gases from the firebox travel up one side through half of the tubes and down the other side, escaping to the stack at the bottom of the boiler.

The steel stack is 54 ins. diameter by 114 ft. high and rests on a concrete foundation supported on steel rails forming a portion of the basement.

The ashes are handled by a small steel car, having a V-shaped hopper, running on a narrow guage track from in front of the boilers out over the cars in the depressed track near by. The track is carried over the top of the cars, being supported by old rails laid across the pit at a height sufficient to clear the car. By this means it is possible to load a car without moving it.

All pumps, piping, heater, hot well, etc., are located in the basement below and between the engine and boiler room. There is a 500 gal. pump for keeping the 100,000 gal. elevated steel tank supplied. This pump draws its supply from a cistern near the tank, which in turn is supplied by syphoning from a number of wells, driven in the vicinity. Another 500 gal. pump supplies the condenser water and a 1,000 gal. Underwriters fire pump furnishes the high pressure fire system. A 300 gal. high pressure pump takes hot water from the heater and supplies the system in the engine house for washing out and changing water. The condensation from heating system is returned to the heater by a small "Marsh" pump.

The main steam header is a 10-in. pipe supported in pump room by I-beams and connects to the boilers through 6-in. 90-deg. bends, the leads being taken from the top of the header. There is an automatic stop check valve at the boiler end and a gate valve at the header on each connection. The connections to the engine and air compressor are made from the top of the headers and each contains a separator and a valve at both header and engine. All pump and live steam supply for steam hammer, blower engines, testing, etc., are made from an auxiliary header below the main. All condensation from the live steam header is returned to the boilers.

The exhaust line runs below the engine room floor the full width of the power house and then rises at both ends. One one end is an atmosphere exhaust head and on the other the syphon condenser. The connections are made opposite each engine and pump in the most direct manner possible. The connection to the heater coils in the shops is taken from the end of the exhaust line and runs through a tunnel to each set of coils. The condensation from the heating system is returned by gravity and pumped into the feed water system.

There are two generators in the engine room, one of 50 k. w. capacity direct connected to a 75 h. p. simplex Erie engine having 12x12-in. cylinders and the other of 100 k. w. capacity connected to a 150 h. p. cross compound Erie engine. The air compressor, also located in the engine room, in an Ingersoll-Sergeant of a capacity of 950 ft. of free air per minute.

The generators themselves are compound wound direct-current machines, but by the Westinghouse Electric Company and give a pressure of 230 volts.

(To be continued.)

*Interurban Electric Traction Systems--Alternating Current Versus Direct Current.**

ELECTRIC traction has found its widest application in American communities and has been developed chiefly by American engineers. In America practically all traction work has been done by direct current. The alternating current traction system has not until recently been favorably thought of by Americans. On the other hand the alternating current traction problem has received much attention in Europe. The polyphase induction motor has been developed by European engineers for traction purposes. American engineers have consistently refused to adopt the polyphase induction motor for traction purposes on the ground that it is not suitable for these purposes. The principal reasons for this stand are two in number:

1. The polyphase induction motor is inherently a constant speed motor and, therefore, not adapted to traction purposes. Continual change of speed is one of the characteristics of traction work. The direct-current series motor is peculiarly adapted to this class of work because it is inherently a variable-speed

---

*Abstract of paper by Paul M. Lincoln before the Electrical Section of the Canadian Society of Civil Engineers.

motor. At one definite speed the polyphase motor is an efficient machine while at all other speeds the efficiency can not be greater than the ratio of the actual speed to the synchronous speed. For instance, if the actual speed at which a given induction motor is working is 10 per cent of its synchronous speed, the power utilized is at most only 10 per cent of the power put in. In traction work a large part of the work done is necessarily at speeds below the maximum attained and at those speeds the maximum economy that can be obtained from induction motors is necessarily small.

One expedient used by European engineers to reduce this source of loss is the use of motors in contatenation or in tandem; that is the secondary of one motor is fed into the primary of another on the same car. This is equivalent in direct-current practice to throwing two shunt motors in series.

In order to secure the advantages of concatenation, however, it is necessary to add largely to the weight of the electrical apparatus. European practice has been to equip cars with four motors, two main motors and two others which are used only while the car is below half speed. Above half speed the motors are running idle. The energy required to take care of the additional weight is an offset against the energy which is saved by concatenating the motors.

2. The second reason against the use of polyphase induction motors for traction purpose is the necessity for providing at least two overhead conductors. If the track is not used as one of the conductors, then the necessity arises of using at least three overhead conductors.

American engineers, instead of endeavoring to adopt the unsuitable induction motor to traction purposes, have devoted their energies to the development of a suitable alternating current motor. The only alternating-current single-phase motors which have a charactertistic suitable for electric traction purposes are those of the commutator type. In no other type of motor are the speed and torque characteristics such as to be suitable for traction purposes. In the commutator type alternating-current motor the speed and torque charactertistics are practically identical with the corresponding characteristics in the direct-current series motor.

As early as 1893, extensive experiments were made by the Westinghouse Electric & Manufacturing Company on this class of motors. These early motors were considerably smaller in capacity, and the controlling voltage less than the modern motor of this type; but the frequency and voltage were practically the same as the more recent ones.

Although the early motors were successful as motors, the alternating current system was not thought of sufficient importance to continue the development on account of interurban electric traction work, as exists today, did not exist at that time.

The principal advantages of the alternating-current electric traction over the direct-current are:

1. Limits to trolley voltage are removed.
2. Avoidance of rheostatic losses.
3. No necessity for rotary convertor sub-stations.
4. Manual attendance at the sub-stations is done away with.
5. Danger of electrolysis by return current avoided.

Let us take up these points more in detail:

1. Voltage Limit Removed.—The greatest item of cost in the electrical equipment of interurban traction systems as they exist today is that of secondary distribution. This item of cost usually varies somewhere between 25 and 50 per cent of the total for electrical equipment, and is usually much nearer the latter than the former. Six hundred volts at the motor in a direct-current traction system are practically the limit at which present designers and manufacturers are willing to guarantee their operation, except in some special cases. This necessarily limits the voltage fed into the secondary distribution system to, say 700 as a maximum. The consequence of this comparatively low voltage is naturally a high cost for conductors of this secondary distribution. The alternating-current system, providing as it does, the possibility of greatly increasing the voltage of the distributing system, thus largely cuts down the cost of the latter. Another point with the direct-current is the fact that when

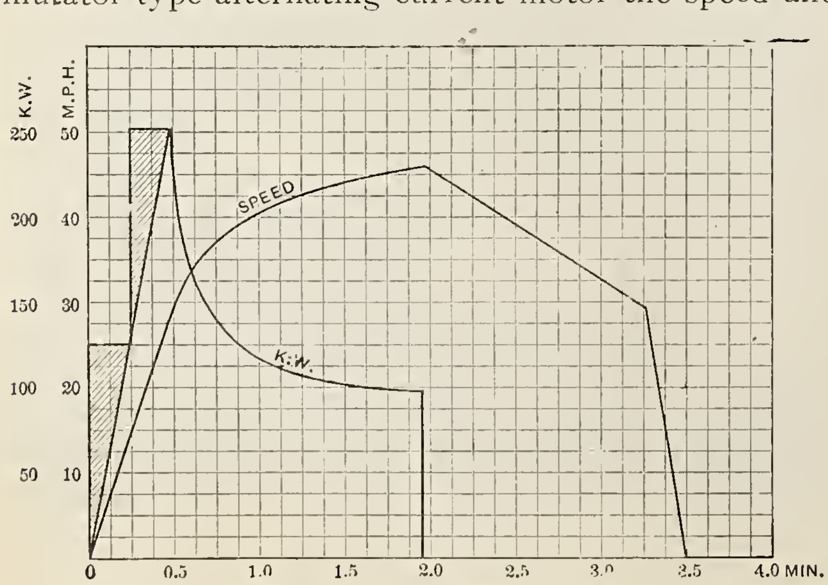


Fig. 1—Typical Run Curve for a Car Equipped with D. C. Motors.

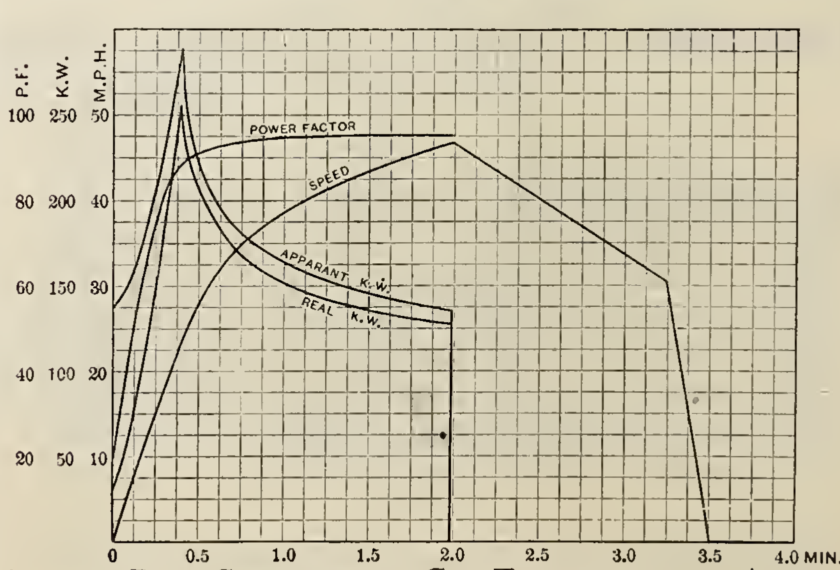


Fig. 2—Run Curves for a Car Equipped with Alternating Current Motors.

large units are used it is difficult to collect the large amount of current for their operation.

2. Rheostatic Losses Avoided.—In the direct-current system the voltage at the car is practically constant, and while the counter E. M. F. of the motors is building up, the excess voltage must be taken up by resistance. At the start, therefore, a comparatively large rheostatic loss occurs. With the alternating-current system on the other hand, the voltage at the car may be controlled by suitable means and the rheostatic loss thus avoided. When stops are few and consequently, runs are large, the rheostatic loss in the direct-current system is a small proportion of the total, and, therefore, under these conditions this advantage of the alternating current is not so greatly marked. With short runs, on the other hand, and consequently frequent starts, the rheostatic loss with the direct current system amounts to a considerably greater proportion of the total loss, and the alternating current system, therefore, has the greater advantage.

Figures 1 and 2 show K. W. curves for a car equipped in one case with direct current motors, and in the other with alternating current motors. The weight of the alternating current car is 18 per cent greater than the direct current, which weighs 35 tons. The length of run is two miles in each case, and the schedule speed 30 miles per hour. Were it not for the saving of rheostatic loss one would expect that the alternating current equipment would take 18 per cent more power. The actual difference in the areas under the curves shows 10 per cent more power for the alternating current, on account of avoiding rheostatic loss in the equipment. If the run were for about one mile, the consumption of power would be about equal, and for runs of less than one mile the alternating current power consumption would be less.

3. Necessity for Rotary Converters Avoided.—The cost of sub-station equipment constitutes one of the large items in the cost of the electrical equipment of an interurban road. Of this the rotary converter is by far the largest item. In the alternating current equipment the rotary converter is not used.

4. Attendance at Sub-Stations Done Away With.—The direct current rotary, being a piece of revolving machinery, requires manual attendance. Alternating current sub-stations consist of static transformers only, and therefore require attendance only for the purpose of operating switches. The switching devices are entirely automatic in their operation, which avoids the necessity of attendance for this purpose.

5. Electrolysis.—Electrolysis with the direct current system is recognized as a serious danger. With the alternating current system this is entirely avoided.

The disadvantages which necessarily accompany the use of the alternating current traction system are:

1. Additional weight.

2. Difficulty of operating on existing lines.

3. Increased rail loss.

4. The fact that an active E. M. F. exists between field turns.

5. Possible interference with telephones.

Taking these points up in detail:

1. Additional Weight.—An alternating current motor of a given capacity is somewhat heavier and more expensive than a direct current motor for the same capacity. In order to make use of the advantages of high trolley voltage the alternating current equipment should be provided with a step-down transformer on the car. Also, in order to obtain the advantages of avoiding the rheostatic losses, some provision must be made for controlling the voltage on the car. The transformer, the voltage control apparatus, and the greater weight of motors make the alternating current equipment heavier than the direct current.

One of the most attractive methods for controlling the voltage on the motors is the use of an induction regulator. The principal advantage over other forms is that it does not require the interruption of the current and is, therefore, of particular advantage in large equipments. It is this problem of breaking the current that forms not only the greatest difficulty with direct current equipments of large capacity, but also one of the largest items in the deterioration account.

The induction regulator has the disadvantage of adding considerably to the weight, and, in equipments of small size, where the difficulty of current interruption is not great, it will probably be replaced by some other method of voltage control.

2. Difficulty of Operating on Existing Lines.—Practically all interurban roads run in and through cities on existing tracks and, therefore, must use the existing sources of direct current power. To meet this condition the equipment for an alternating current interurban road must be so arranged as to operate on alternating current outside the city and on direct current inside.

This means the use of motors which can be operated from both kinds of current, which is possible with the series alternating current motor. It means that another system of control must be added to the car. Further, means will have to be provided for disconnecting all transformers when running from the direct current system and reconnecting them when running from the alternating system. All these things can be accomplished. The most important part of the equipment—the motors—can be operated from direct as well as alternating current.

3. Increased Rail Loss.—Experiments have shown that with alternating current of 2,000 to 3,000 alternations, the actual loss which takes place with a given current through the iron rail is from three to five times that which the same direct current would give. The higher ratios of loss hold for the higher fre-

quencies. This seems to be an important objection to the alternating current system. But when it is considered that in order to utilize the main benefit of the alternating current, a higher trolley voltage is used and therefore smaller currents in the return conductor, the elements of rail loss in an alternating current proposition may be made even a smaller proportion of the total than in the direct current. The rail loss with direct current is usually a small proportion of the total, and this with alternating current, at the trolley voltages which are usually considered, namely, 2,000 to 5,000, becomes a much smaller proportion.

4. Active E. M. F. Between Field Turns.—In the matter of E. M. F. between field turns, the alternating current and direct current motors are quite different. The E. M. F. between the field turns of a direct current motor is due simply to ohmic resistance, and a short circuit between turns simply throws out of action the turns so short circuited, and, if not too severe, does not interfere seriously with the motor's operation.

Between the field turns of the alternating current motor, on the other hand, there is an active E. M. F. similar to that between the turns of a transformer winding. A short circuit between field turns in an alternating current motor, therefore, means a destructive short circuit and an immediate interruption of service from that motor. In other words, the effect of a short circuit between field turns in an alternating current motor has the same effect that a short circuit between armature turns would have in either the alternating or direct current motors.

Roasting out of field coils is one of the most frequent causes of trouble in direct current motor equipments, and it is readily realized that the matter of turns in the alternating current motor is a serious one. As an offset against this disadvantage of an active E. M. F. between field turns, the alternating current motor possesses the advantage of being capable of operation at low voltage, thereby reducing the number of turns on the series field and increasing the proportionate space for insulation. This existence of an active E. M. F between the field turns is the most serious obstacle to the use of a high voltage on the motor. Even with low voltage, the alternating current motor is laboring against the handicap of occupying more space than an equivalent direct current motor, and the use of high voltage still further increases this handicap.

This limitation of available space for the motor and the existence of an active E. M. F. between field turns makes it seem probable that the alternating current railway motor of the future will be operated at low voltage and will receive its current from a transformer situated on the car.

5. Interference With Telephones.—It is a question whether alternating current in the rails will interfere with telephones and similar instruments more than the direct current, with which they have to contend at present. In any event, the amount of current in the rails can be reduced by the use of higher voltages so that this source of interference can be made less than it is with the present direct current system.

In order to compare the two systems, we shall assume a certain typical interurban road, ascertain the first cost, and the cost of operating by both systems. Suppose this road to be as follows:

Length, 60 miles; schedule speed, 30 miles per hour; cars running half hour apart; number of stops, 30; weight of direct current car complete, 35 tons; weight of alternating current car, complete, 41.3 tons. This is not the minimum difference in weight that can be obtained.

Figure 1 shows the speed, time and K. W. hours curve of the direct current car over a typical run of two miles. Figure 2 shows the same for the alternating current run, and in addition gives the apparent K .W. and power factor. It will be noticed that the difference in power at the car is only 10 per cent in favor of the direct current equipment, in spite of the fact that the difference in weight is 18 per cent.

The location of the power house is assumed in both cases to be on the line of the road, midway between the termini. In each case, also, one of the sub-stations is located in the power house. In the alternating current proposition the generators are wound for trolley voltage (3,000 volts) and feed directly into the trolley wire. In each case also there are supposed to be four feeding points beside the power house, thus making the sub-stations twelve miles apart.

Further, in both cases the secondary system is a single network, thus gaining the advantage of two feeding points except beyond the end sub-stations. In neither system are secondary feeders figured on, the alternating current being simply a No. 0000 trolley wire throughout and the direct current a 60-pound conductor rail. In the direct current proposition the generators, transmission line, etc., are supposed to be three phase.

The figures give complete comparisons of power consumption, the loses in various transmission and transformations, the first cost of the apparatus used and estimate of the operating expenses. The conditions are taken as nearly as possible like those in the typical road.

In the first cost of the two systems no allowance is made for the fact that the alternating current system requires less energy at the power house and therefore will economize to a considerable extent in both engines and boilers. So far as transformers are concerned, the alternating current system has the advantage, because it allows the use of larger units than the direct current, with which three phase transmission is necessary. The alternating current switchboards also have the advantage in that two switches per panel are required instead of three.

More copper is required for single phase transmission than for three-phase, which makes the cost of copper for the alternating current system somewhat more expensive. The largest difference in the high tension lines comes from the fact that the poles for the alternating current system are spaced sufficiently close to allow the trolley brackets to be supported from the same poles.

So far as sub-station transformers are concerned, the alternating current system has the advantage of single phase over three phase, in that larger units are used. By far the largest item of saving in sub-station equipment between the two systems is of course in the omission of rotary converters in the alternating current system.

The greatest difference in the first cost of the two systems is, of course, the great difference in the cost of the secondary network. A glance at the comparative values will show that this difference in the case considered amounts to nearly $100,000, and is therefore nearly 30 per cent of the total cost of the direct current system.

In first cost the alternating current car equipment are, of course, considerably higher than the direct current equipments. This is due to the fact that the costs are figured to include an induction regulator. If some other style of regulator had been figured on, the cost of the alternating current car equipments might have been diminished by about $6,000.

In operating expenses the amount saved in labor is due to the fact that sub-station attendance is avoided.

The matter of inspection of the alternating current sub-stations is taken care of by allowing 6 per cent in the case of the alternating current sub-stations instead of 4 per cent as in the direct current sub-stations.

The alternating current motors being lower in voltage, and being protected against direct lightning discharges by the intervention of a transformer, ought to have at least no higher maintenance bill than the direct current motors. The alternating current system, however, will require a certain amount of attention for the transformers and regulators. This item, though not based on experience, is estimated to represent the comparative conditions as closely as it is possible at this time.

POWER REQUIREMENTS.

DIRECT-CURRENT RAILWAY SYSTEM.

Average K.W. at car in typical 8-mile run (Fig. 1) .. 67.2 K.W.
No. cars running at one time 8
No. sub-stations 5
Average No. cars per sub-station 1.6
Mean ² amps. per car 165.5
Mean ² amps. per sub-station = m 279.0
With sub-stations 12 miles apart, 80-lb. track rail and 60-lb. third rail resistance between adjacent stations is = r, 0.2 ohms

D. C. line loss per sub-station, $\frac{r\ m^2}{6}$ = 16.1 K.W.

Average K.W. per sub-station at cars = 67.2 x 1.6 = 107.5
Average K. W. per sub-station at sub-station .... 123.6 K.W.

Per cent loss in third rail 15.5%

Per cent loss in step-down transformers 3.5%
Per cent loss in rotaries .... 10 %
Per cent loss in high-tension line 2.5%
Per cent loss in step-up transformers 3.5%
Total percentage loss from cars to P. H. 38.5%
Average K.W. consumed by 8 cars at the cars .... 537 K.W.
Average K.W. at power house for 8 cars .... 750 K.W.
Max. load per sub-station—worst condition 2 cars starting .... 560 K.W.
One 400 K.W. rotary will take care of this 40 per cent overload.
Average load on rotary .... 30 %
Rotary sub-stations are of sufficient size so that one can be cut out temporarily.
Max. load on power house, say .... 1,200 K.W.
Can be taken care of with three 400 K.W. generators—one for spare

ALTERNATING-CURRENT RAILWAY SYSTEM.

Average real K.W. at car in typical 8-mile run (Fig. 2) .... 73.3 K.W.
No. cars running at one time 8
No. sub-stations 5
Average No. cars per sub-station 1.6
Mean ² apparent K.W. per car 139.6
Mean ² amps. per car (3,000 volts) 46.6
Mean ² amps. per sub-station = m 55.8
With sub-stations 12 miles apart 80 lbs. track rail and No. 0000 trolley resistance between sub-stations, allowing for increased rail resistance. 4.2 ohms
Trolley and rail loss per sub-station.

$= \frac{r\ m^2}{6} =$ 3.32 K.W.

Average real K.W. per sub-station at cars = 73.3 x 1.6 = ... 113.0
Average real K.W. per sub-station at sub-station .... 121.5 K.W.
Per cent loss in regulator and car transformer 5.0%
Per cent loss in trolley and rails 2.8%
Per cent loss in step-down transformers 3.5%
Per cent loss in high-tension line 2.5%
Per cent loss in step-up transformers 3.5%
Total percentage loss 16.4%
Average real K.W. consumed by 8 cars at the cars .591 K.W.
Average real K.W. at power house for 8 cars .... 700 K.W.
Average apparent K.W. at power house, about .. 825 K.W.
Max. load per sub-station—worst condition, 2 cars starting (say 275 apparent K.W. each) .... 550 K.W.
One 350-K.W. transformer will take care of this with 50 per cent overload.
Average load on sub-station, about 40%
These transformers are sufficiently large to take care of road if one is cut out.
Max. load on power house in apparent K.W., say 1400 K.W.
Can be taken care of with three 450-K.W. Generators—one for spare.

STEP-UP TRANSFORMERS.

Seven 150-K.W. transformers — 1 for spare.

Three 400-K.W. transformers—Load can be carried by 2 in case of emergency.

HIGH-TENSION LINE.

One No. 6 B. & S. gauge line each way from power house 20,000-volt, 3-ph.	One No. 3 B. & S. gauge line each way from power house, 20,000-volt, 1-ph.
Max. loss, about ... 8.25%	Max. loss, about ... 8.2%
Aver. loss, about ... 2.50%	Aver. loss, about ... 2.7%

SUB-STATION EQUIPMENT.

Five sub-stations in all—one in power house.	Four sub-stations—power house feeds directly into 300-volt trolley.
Each of four sub-stations to contain:	Each sub-station to contain:
Three 135-K.W. step-down transformers.	One 350-K.W. transformer.
One 400-K.W. rotary converter.	Switchboard.
Switchboard.	
Step-down transformers omitted in power house sub-station.	

LOW-TENSION DISTRIBUTING SYSTEM.

Entire length of track equipped with 60-lb. conductor rail.	Entire length of track equipped with No. 0000 B. & S. gauge trolley.

CAR EQUIPMENTS.

Each car equipped with two 150-H.P., D.C. railway motors and multiple-control apparatus complete.	Each car equipped with two 165-H.P., A.C. railway motors and multiple-control apparatus complete.

ESTIMATED FIRST COST OF ELECTRICAL EQUIPMENT.

POWER STATION.

Three 400-K.W., 25-cycle, 360-volt, 3-ph., A.C. gens., at $6,500 each	$19,500	Three 450-K.W., 25-cycle, 3000-volt, 1-ph., 2000-alt. gens., at $7,000 each	$21,000
Seven 150-K.W., 350 to 20,000 volt, self-cooling, oil-insulated trans., 25-cycle, at $1,225	8,575	Three 400-K.W., 17-cycle, 3000 to 20,000 volt, O.I.S.C. trans., at $2,500	7,500
Switchboard	4,500	Switchboard	3,800
	$32,575		$32,300

HIGH-TENSION LINE.

Forty-eight miles of 20,000-volt, 3-ph. transmission line—No. 6 B. & S. gauge conductors, at $900 per mile	$43,200	Forty-eight miles of 20,000-volt, 1-ph. transmission line—No. 3 B. & S. gauge conductors, at $1,200 per mile	$57,600
Lightning protection	2,500	Lightning protection	2,000
	$45,700		$59,600

SUB-STATIONS.

Twelve 135-K.W., 20,000 and 360-volt, 25-cycle, O.I. S.C. transformers, at $1,175 each	$14,100	Four 350-K.W., 2000-alt., 2000 to 3000-volt, O.I.S.C. transformers, at $2,200 each	$8,800
Five 400-K.W., 600-volt, 25-cycle rotary converters, at $5,200 each	26,000	Five switchboards, at $1,500 each	7,500
Five switchboards at $2,800 each	14,000	Auxiliary signaling lines for operating sub-station switches	7,500
	$54,100		$23,800

LOW-TENSION DISTRIBUTION SYSTEM.

Sixty-three miles of 60-lb. conducting rail, at $2,500 per mile, installed	$157,500	Sixty-three miles of No. 0000 trolley wire in place at $900 per mile	$56,700
Bonding main track—63 miles at $400 per mile	25,200	Bonding main track 63 miles, at $400 per mile	25,200
	$182,700	Fifteen miles of pole construction, not including H.P. lines, at $630 per mile	9,400
			$91,300

CAR EQUIPMENT.

Twelve D.C. car equipments complete, consisting of 2 No. 50-C.motors, with multiple-control outfit heaters and contact shoes, at $5,217 each	$62,604	Twelve A.C. car equipments complete, consisting of 2 165-H.P. motors, with multiple control outfit, heaters and trolley, at $8,482 each	$101,774
Total first cost electrical equipment	$377,179	Total first cost electrical equipment	$308,774

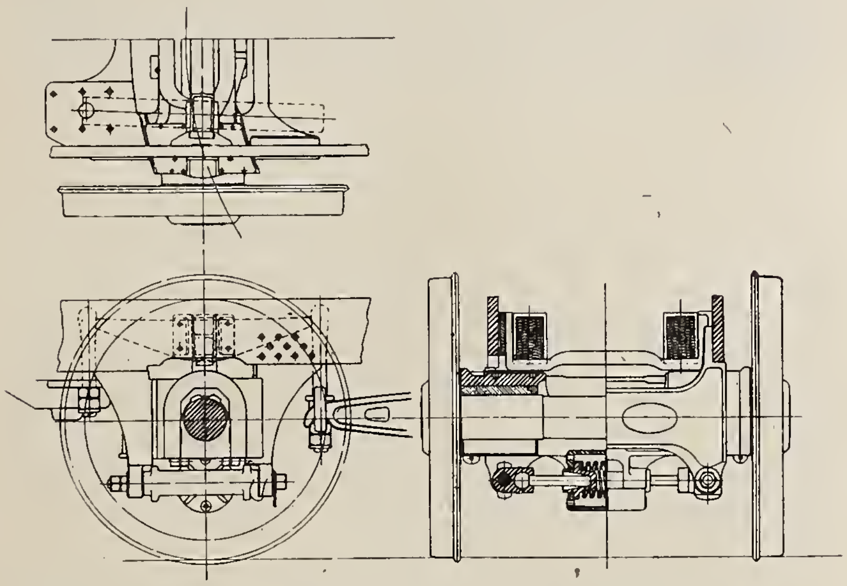
ESTIMATE OF YEARLY OPERATING EXPENSES.

Five men at power house—2 shifts, average wage $900 per year	$9,000	Five men at power house—2 shifts, average wage $900 per year	$9,000
One man at each of 4 sub-stations—2 shifts—at $900 per year	7,200	Fuel, water, oil, etc., at ½c per K.W.-hour	23,050
Fuel, water, oil, etc., at ½c per K.W.-hour, 4,890,000 K.W. hour	24,450	Repairs and maintenance of power house (3 per cent of cost)	969
Repairs and maintenance of power house (3 per cent of cost per year)	971	Repairs and maintenance of H.T. lines (5 per cent per year)	2,980
Repairs and maintenance of H.T. line (5 per cent of cost per year)	2,285	Repairs and maintenance of trolley (4 per cent per year)	3,652
Repairs and maintenance of 3d rail (1 per cent of of cost per year)	1,822	Repairs and maintenance of car equipments (10 per cent)	10,177
Repairs and maintenance of car equipments (12 per cent of cost per year)	7,512		
Total yearly operating expenses	$55,404	Total yearly operating expenses	$51,256

Trailing Trucks

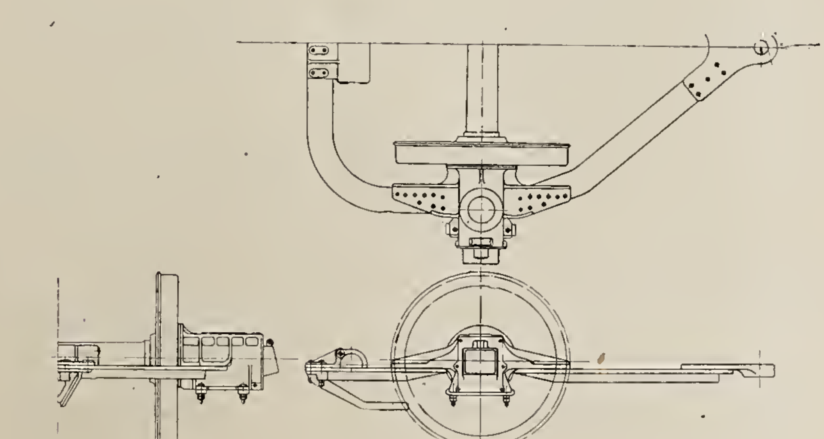
THE Rigid Trailing Truck consists of a pair of wheels mounted on an axle having outside journals, which are carried in journal boxes working in pedestals attached to secondary or external frames. A limited amount of lateral motion is provided in the bearings. This type of trailing truck is used with engines of a moderate wheel base intended to run on roads of light curvature.

The Radial Truck with inside bearings has a continuous axle box, with suitable journal bearings at either end, and formed at the frame pedestals with front and back wearing surfaces struck to the arcs of concentric



Radial Truck, Inside Bearings.

circles of proper radius. To the lower side of the continuous axle box is attached a spring housing fitted with transverse coil springs, with suitable followers, and with horizontal thrust rods extending to the pedestal tie bars, these thrust rods having ball and socket connections at either end. This combination of spring and thrust rods permits the truck to travel in its circular path, and also permits the continuous axle box to rise and fall relatively to the frames. The circular arc motion is limited by suitable stops at the central spring casing, and when the engine is running on a tangent the springs tend to bring the truck to its



Radial Truck, Outside Bearings.

proper central position. The load is transmitted to the continuous axle box from a cradle on which the necessary springs and equalizers bear, hardened steel sliding plates being interposed immediately over the journal bearings. The cradle is guided vertically by guides attached to the engine frames.

The Radial Truck with outside bearings has journal boxes which are rigidly attached to the back ends of a radius bar V form, the front or apex end of which is centered on a pivot pin in a cross brace inserted between the engine frames. These journal boxes are also connected at the rear by a U-bar, at the center of which is mounted a spring housing containing springs, followers, etc., which perform the same functions as in the case of the radial truck with inside bearings. The load is transmitted to the journal boxes by a cradle, which is vertically guided, but in this case the sliding surfaces of the two are circular in plan and show inclined planes in section. They may be used either with or without interposed hardened rollers, but when the truck is displaced laterally (as on a curve) the mutual action of these inclined planes is to furnish a yielding resistance to such displacement, but to constantly tend to restore the truck to its normal or central position.

We are indebted to Mr. F. J. Cole, mechanical engineer of the American Locomotive Company, for the above information.

Railroad Transportation at the World's Fair

THE Railway and Engineering Review, in its issue of Dec. 31, 1904, has given a most exhaustive and complete description of the railroad transportation exhibits at the recent world's fair at St. Louis. This number as an example of modern trade journalism is a monumental work, being one of the largest single issues ever published of any trade paper. Its value is of a permanent nature, and its usefulness as a work of reference is most apparent. Its two hundred and four pages of reading matter contained about 500,000 words; 619 illustrations. The subject is treated topically under the following chapters: The Transportation Building and General Arrangement of Exhibits, Earthwork and Ballast, Track Construction, Track Tools, Historic Track, Railroad Bridges, Tunnel Construction, Buildings, Plants and Fixtures, Railway Water Service, Signals and Interlocking, Railroad Terminals, Miscellaneous Construction and Appliances, General Improvements and Reconstruction, Tie and Timber Preservation and Timber Testing, Cement and Concrete, Locomotive Exhibits, Historic Locomotives, Locomotive Testing Plant, Electric

Railway Tests, Coal Testing, Passenger Cars, Freight Cars, Locomotive Appliances, Car Appliances, Shop Tools, Machine Tool Drives, Power Installations, Traffic Exhibits and Statistics, Passenger Travel to the Exposition, St. Louis Terminals, their Reconstruction and Working, Awards of Diplomas and Medals.

The foregoing brief reference to the matter contained in this issue gives only the barest outlines of a description of the largest and most complete railway transportation exhibits ever gathered together under one roof. It has been, of course, impossible for the Railway Master Mechanic, owing to its limited space, to more than briefly refer to some of the more important features of the transportation exhibits.

The credit for the planning and carrying to successful completion the transportation exhibits is due in most part to the chief of the department, Mr. Willard A. Smith, publisher of the Railway and Engineering Review, whose wide knowledge of railway affairs in general, and his experience as chief of this same department at the Chicago world's fair, and his connection with the Paris exposition, made him eminently fitted for this position.

We quote somewhat at length from an editorial in the world's fair issue of the Railway and Engineering Review that which refers especially to the mechanical department, and so, of course, is of particular interest to our readers:

"* * * World's fairs are made possible by modern transportation—the 'unconsidered miracle.' At the first one, in London, in 1851, as well as at all subsequent universal expositions, vehicles and boats and locomotives and cars were shown with other apparatus and machinery. It was not until the World's Columbian Exposition of 1893 that the subject was dignified by making it a great exhibit department. * * * The stages of engineering progress pass by almost as rapidly as the fashions of the day. Of the two most advanced types of locomotives shown at Chicago, one, which held the record as the fastest passenger locomotive in the world, is now hauling a milk train; and the other has retired to museum shades. 'What has a decade wrought?' was the question to be answered by the contemporaneous exhibit at St. Louis. * * * At the Chicago exposition, omitting narrow-gage, switching and light foreign locomotives, there were 29 engines having an average weight of 128,588 lbs. At the St. Louis exposition there were the same number (29) having an average weight of 195,239 lbs. This average was greater than the weight of the heaviest at Chicago, which was 195,000. The tremendous weight of this locomotive was severely criticised in the discussion of the technical societies in 1893 and 1894. It was believed that the limit had been reached and that no more locomotives of such 'excessive' weight would be built. The prophets were wrong again, for the 'St. Louis' is over twice as heavy—weighing light, engine and tender, 393,012 lbs. This, however, is a mountain climber and still an experiment, and does not represent really the practice of to-day as properly as the ponderous Santa Fe with its 287,580 lbs. There were six others weighing over 200,000 lbs. each. The heaviest engine at Chicago was exceptional, weighing 26,000 lbs. more than the next heaviest, which in turn weighed 13,000 lbs. more than the next. Perhaps it would be fairer to omit the heaviest at St. Louis as being entirely exceptional—a sporadic case. We would then have the average weight at St. Louis of 188,176 lbs., as against an average of 128,588 in Chicago—an increase of about 46½ per cent. If the Mallet compound is included in the comparison, the increase has been over 50 per cent.

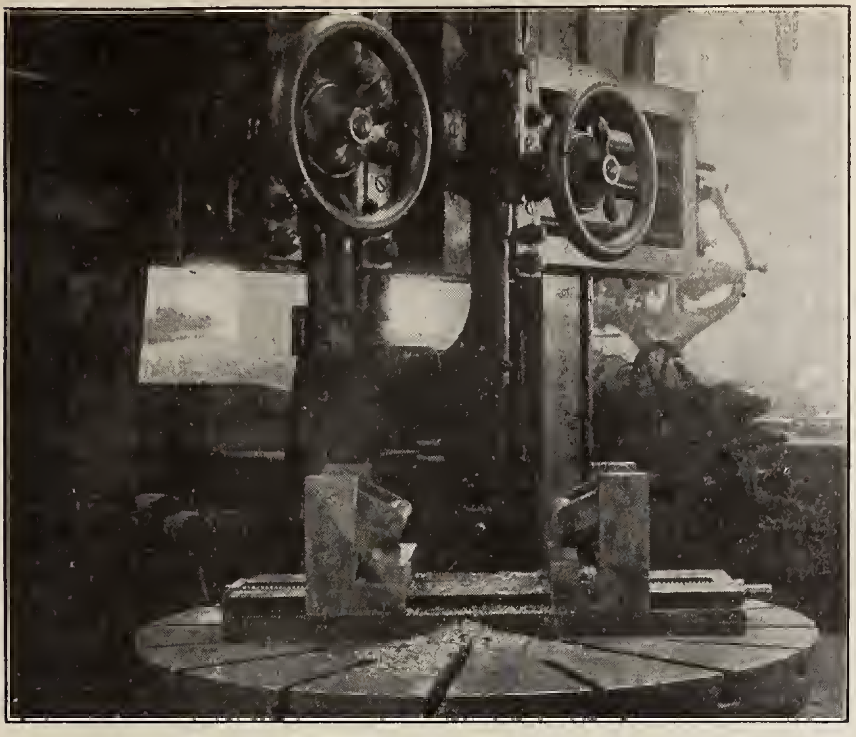
"The most recent trend of locomotive improvement on both sides of the Atlantic is toward the balanced compound and the use of superheaters. There were four balanced compounds, representing the most advanced practice; one from Germany, one from France, and one each from the two principal locomotive building establishments of this country. Germany has shown more interest in superheating than any other country; but exhibited only one device, and that not the one in most extensive use. The latter was to have been represented on a locomotive for testing, which, however, it was impossible to provide for in the final program. This interesting field of experiment and investigation is evidently just beginning to attract the attention of American engineers.

"In 1893 the use of steel for the parts of cars hitherto built of wood made its first appearance. It was then hardly more than an indication of coming things. So far has the use of steel advanced in eleven years that it hardly appeared to the manufacturers to be worth while to exhibit wooden freight cars at St. Louis—the only exception being refrigerator cars. Steel freight cars for every kind of service and steel parts for cars constituted an important and impressive exhibit of the new things which have come to stay. In passenger equipment steel underframing also made its appearance. The passenger cars exhibited marked improvement in design; and in some respects a new era was marked. The ornamentation and architectural features showed a simpler and nobler taste. The meretricious has largely disappeared, and, together with an improved taste which is abreast of the best in home and public architecture, there was evident care for sanitary considerations. * * *"

Device for Centering and Boring Driving Wheel Boxes.

THE accompanying cut shows a centering device and clamp for boring driving wheel boxes. This is applied to a boring machine and saves the laying out of the brass for boring.

It consists of two movable arms mounted on carriages. These carriages are mounted on a bed and at-



Device for Centering and Boring Driving Wheel Boxes

tached to a long screw, one end having a right hand and the other a left hand thread. By turning the screw the carriages and movable arms either come together or separate. The box is placed with the two movable arms resting against the bottom flanges of the box. When the screw is tightened the arms come together equally on both sides, pressing down and toward the center. This centers and holds the box like a vise. In the middle of the cut towards the back part of the table a set screw is shown which is used to regulate the depth of cut.

The whole device is fastened on a boring mill table and after being centered once can be used for boring any number of boxes without going through the tedious operation of laying all of them out.

We are indebted to Mr. Willard Kells, master mechanic of the Lehigh Valley Railroad at Sayre, for the above information.

*The Employment and Preparation of Firemen**

By Mr. E. W. Pratt, M. M. C. & N. W. Ry.

NOTWITHSTANDING the acknowledged value of the "personal equation" in railroading today, the modern times have thrown around the heads of departments of our large railways such manifold duties and responsibilities and such unavoidable minutia in technical details that he is an exception who can summon the courage necessary to leave details upon subordinates, place technicalities in the hands of the mechanical engineer, and delegate himself as chief employ officer and regulator of discipline of his men of every class, and particularly so of locomotive engineers and firemen.

Where a railroad system is very extensive, the division master mechanics should be the final employing officers for firemen, and at least such shopmen as are to be considered prospective firemen, instead of leaving this duty entirely in the hands of the division foremen or traveling engineer.

Practically all locomotive engineers of this country have received their early training as firemen; if not on the same railroad, yet it is so in most cases. Many firemen come from minor positions in the roundhouse or shops. Hence it is seen how important is the duty of employing firemen and shopmen, and their training after suitable men are employed. Although the obtaining and filing of applications can be intrusted to clerks or minor officers, I believe that the final employing officer of a railroad, no matter how large the system, should be an officer of as high rank as possible and in passing upon the applicant the latter should be present. The influence thereby imparted to a prospective tmploye is very great. The application blank should include all available information and attached thereto letters of reference obtained direct from former employers or business men whom the candidate has givn as references of his education and character. The application blank should show name, home address, nationality, where born, age, height, weight, school advantages, if married or single and those dependent upon him for support; a list of those employers for whom he has worked, his occupation with them and dates; whether his general health has been good and if he is addicted to the use of intoxicating liquors. He should be questioned particularly on these last two matters, as robust health is esential to his future success; he should be asked if he thinks that an employe in the engine or train service of today should drink at all, either on or off duty, and no effort made to conceal your own views thereon. Do not employ all men of the same nationality—mix them judiciously.

There is not a railroad company in this country whose business fluctuates that does not prepare locomotives and cars for their expected busy season, yet how many are there who as carefully prepare for the obtaining of suitable men for firemen with which to meet such increased business? Is it not quite often the case that during the duller seasons of the year a letter or personal applicant receives no reply, or else the mere information is conveyed that "we are not hiring men now"? Why not take a lesson from the world powers, and "in time of peace prepare for war"? Before the period of business increase, the employing officer should have on file a list of applications with as full particulars as possible. This work, being properly outlined, can be carried out by a clerk, the use of perhaps five or six letters of inquiry in each case, the thought being to always keep in touch with any change in the address of applicants and to advise them from time to time as to the probable date they may expect to be called for. Last fall, before hiring some seventy-five firemen, the writer had a list of over one hundred applicants, many of them experienced men, and a large number of the remainder had taken up and completed some correspondence course on combustion and locomotive firing. In this way a rapid increase in business can be cared for without the delay to traffic due to shortage of men

*Paper presented before the Western Railway Club, January meeting.

and without the demoralizing necessity of dropping all other urgent business at such time in order to obtain the men needed.

Have a series of blank forms, and number them so that you can briefly refer to them in that way. When you receive a letter from an applicant, send him form No. 100. When you want more applications than you have on file, send form No. 107 to the station agents and roadmasters along your line. Form 103 sends an employed man to some division foreman for a fireman and obtains in reply his record of starting work. Form No. 102 starts a man in roundhouse or shop work as a training for firing, etc. These several forms are shown at the end of this paper merely as suggestions in the way of carrying out a policy with as little labor as possible.

There are perhaps five classes of young men from which we may obtain our future enginemen:

First, the farmer boy, whose training usually results in producing an industrious man, but whose school advantages are generally limited to the country school accomplishments of "the three R.'s."

Second, the country lad, who may or may not have spent much of his time on the farm, but who has lived in or near a small town and had school training up to or better than the eighth grade or entrance to high school. Either of these two classes may have followed threshing outfits and perhaps fired or run a portable boiler.

Third, the city chap, who has more assurance than industry, more education than application; who needs more watching than the former classes, yet in exceptional cases make a most competent and efficient employe.

Fourth, the sons of older railway employes, who enter the service with greater aptitude on account of their general knowledge of its requirements and hardships, and whose parents, themselves often deficient in early school advantages, have seen to it that their sons are better prepared therein to enter their life work. This class of men are more likely to stick to their "jobs" and carry out their undertakings, as they are acquainted with the fact that the fireman on a modern locomotive has something else to do besides sit on the seat and flirt with the passing country girls, or at least he combines that with his other duties.

Fifth, the technical school graduate, with whom I must confess to have had very limited experience, and whose success or failure as a fireman I will have to leave to others to describe; for the few that I have had work for me as firemen have evidently taken up the work awaiting some more congenial employment rather than as a life work. However, I believe that in future years many members of the college football team will be found first on the left, then on the right side of the locomotive, and my gravest concern is that they will, when that time comes, be more contented and not get "off-side."

While a few months roundhouse experience is of advantage to boys of all these classes, I believe it should be required of any who have never fired even a stationary boiler. In the roundhouse they should not be kept at cleaning and sweeping until they become discouraged and quit, but effort should be made to employ them cleaning fires, hoeing ashpans, calling, firing stationary boilers, helping the engine hostlers and firing up locomotives. I call this training most valuable because a young man learns something of the details of railroading, such as the importance of promptness in the service, the results of good and poor firing as seen in the shape of fires in engines at terminals; he also learns the uses of the various parts of the boiler, he learns the signals, and above all else gains the confidence necessary to fire an engine properly. If he can help a roundhouse machinist or help the boiler-washer, it will also be of advantage; he may even have an occasional chance to fire a switching engine for a few hours in an emergency. The foreman should arrange to permit such boys as he judges will be recommended for firemen to deadhead over the road two or three trips on an engine with a first-class fireman.

In the case of men starting in the shops and with others shortly before the probable rush period, send applicants to the company's examining surgeons so that they will be immediately available in case of necessity for firing. The foreman of each terminal shop should have working under him few of such men and the authority to use them as firemen whenever needed. This is of great advantage, besides saving considerable expense in deadhead time.

In so far as possible all experienced firemen should start work on yard or way freight engines, where there is apt to be less delay to traffic from lack of steam while they are learning the rudiments of stoking. If the company does not furnish a book of instructions on locomotive firing and combustion, keep some good but inexpensive book or correspondence curse on hand, recommend it to all inexperienced men and even sell it to them at cost if necessary. What you are after is results, so, if you believe in a thing, carry it into execution.

Avoid, if possible, hiring men who are "broke." New men do not understand that their first pay does not come for over a month, and some small sum on hand to start with may prevent garnishment of their first wages and their consequent discouragement. Some of the best firemen that I ever had gave up the work on this account.

It is my opinion that new firemen should not be regularly listed and given rank for the first six months of their service. The older man should be given the preference in work at his terminal by the foreman, but not the privilege of going to some distant part of the division to displace a man who is a few days younger in the service. During this six months' period they should also understand that they are on probation. To gain full advantage in this respect, it is necessary to obtain such reports from division foremen, road foremen, and traveling firemen (see form No. 104) as will enable you to intelligently (drop from the service inside of the six months, regardless of their relative age in employment, such men as seem the least adapted to the work or appear likely to become "disturbers of the peace." Treat such unfortunates with courtesy and consideration, explaining to them their weak points and probable inaptitude which makes them less desirable than others. Give them passes home, if within reason to do so, and wish them well in their future occupations. The reputation of a fine gentleman, now a railroad president, but then the manager of a small road, is worthy of imitation:

An engineer, old in the service, had become involved in serious trouble, and was called to the manager's office and the gravest discipline accorded. The "boys," waiting outside, accosted the engineer, who, though serious, was anything but depressed.

"Well, they said, "what did the old man have to say?"

"There," he replied, "is the finest gentleman I ever met."

"Why," they said, "did he put you back to work?"

"No, indeed; he discharged me, but he talked to me like a father and explained things to me as I had never understood them before. I would rather be discharged by that man than to be put back to work by any other man I ever met."

It is needless to say that, with discipline so effectively received, he was not long out of the service.

After dismissing all undesirable men, if necessary to further reduce the list in times of slack business, have a "lay-off" list on which you place the youngest men first. Men on this list are given to understand that they will be re-employed, the oldest first, provided they keep you advised of their address. On the railway with which I am connected, for many of the men we find temporary employment on other divisions, where they serve without rank until recalled.

Both in hiring and in dismissing men one should bear in mind the future as well as the immediate needs, and endeavor to make a reputation that will be of growing benefit to himself and to his company. The company's attitude will, whether you wish it or not, be considerably advertised, and ultimately result in the securing of better men in the years to follow.

As is quite generally known, the Chicago & Northwestern Railway, as one of the first to adopt it, have a system of first, second and third years' progressive mechanical examinations. Each fireman is given the first year's book of questions, together with the Book of Rules and time card immediately he is employed. As soon as convenient after the expiration of his first year's service, he is given a written examination thereon by the traveling engineer or traveling fireman, who also examines him orally. If successful in passing this, he is given the second year's book of questions, upon which he is examined a year hence in the same manner. At the end of his third year the fireman is examined by a joint board of examiners appointed for the whole system, which board sits in Chicago each spring and fall. Some of the traveling engineers and the air-brake intsructor compose this board, and their favorable report makes the man eligible to promotion to an engineer whenever needed as such on his own division thereafter.

The failure to pass any one of these progressive examinations results in a second trial six months later; two successive failures drop a man from the locomotive service at once, as no men are permitted to waive their right to promotion.

When firemen have passed their mechanical examinations for promotion to engineers, they should, as soon as possible, be sent to the train department for time card and Book of Rules examination so as to be eligible for use as engineers at any time.

Just previous to the expected busy season, such firemen should be required to fire on runs where they can readily be had for running and a new fireman put in their place; for, if they are permitted to take work where their lay-over is at outlying points, too much delay is occasioned in relieving them and getting them to the main terminals where needed.

If it happens that on any division promotion is so slow that a fireman has to fire for considerable more than three years, it should be required that he fire in freight service at least three months immediately previous to being promoted, this because a long period of firing in passenger service is not good experience immediately preceding promotion to an engineer, where he will begin work in extra freight service.

During one busy season it was required as an experiment that each inexperienced man employed should take a certain course on firing and combustion; the cost of which was very small. That fall, among the seventy-five men hired, there was not a single instance of burned-out locomotive grates, and compared with the year previous, on the ton-mileage basis, a saving of over $60,000 in coal was effected, besides considerable in running repairs; for much of the boiler repairs to locomotives results from poor firing—usually too heavy firing.

I believe that the time is not far distant when the leading railroads of the country will demand a knowledge of combustion and at least the theory of firing, and have an examination covering those subjects which an applicant must pass before employing him for a locomotive fireman; also that he should know the signals and flagging rules. When we consider that a few weeks' study and a small tuition will give a young man this information, there is nothing unreasonable in demanding this previous preparation for a position that pays from seventy to one hundred dollars per month; but there is a practical difficulty today, namely, with less rigid requirements, many roads find it impossible to obtain enough men who can stand the service, due to the advent of modern coal-burning locomotives of such great size. Nor can we look for marked change in condition until mechanical stokers of successful design are inaugurated and extensively used. When we have to hire "coal heavers," we cannot expect to be paying for much brains; hence I believe the railroads of the country are not paying sufficient attention to the use and develpoment of these labor-saving devices for the fireman, for several of them are as efficient as some other apparatus when first applied to the locomotive, and it would not be unreasonable to expect great improvement therein were sufficient inducement offered.

Form E. W. P. No. 100.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY.
NEBRASKA AND WYOMING DIVISION.
Office of the Master Mechanic.

MISSOURI VALLEY, IOWA, ..., 190...

Mr. ....

....

....

Dear Sir:—
Replying to your letter of application, would say we are likely to need more locomotive firemen on short notice about .... or thereafter, so you must keep us posted as to any change of address and also notify us at any time if conditions should change so that you could not come at any time we might send for you.

You will please fill out the first 1½ pages of enclosed application Form No. ...., paying particular attention to answering all questions fully and carefully filling out each column of question 8 so that it will show your exact history for the past five years. You will also please write me a letter stating your weight, height and just what school advantages you have had, also giving the names and business occupation of three men as references, whom we can write as to your habits, character and reliability. If you would desire work about the roundhouse or shops until such time as we need more firemen or until we find you to be a man advantageous for us to continue in our employe, please state so in your reply and if we can find a place for you, you will be duly advised.

If you have not already advised me, I should be pleased to know if you have studied the subjects of COMBUSTION and LOCOMOTIVE FIRING or intend taking up such a course.

Yours truly,
E. W. PRATT,
Master Mechanic.

Form E. W. P. No. 102.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY.
Office of the Master Mechanic.

MISSOURI VALLEY, IOWA................., 190...

Mr. ....

Div. Foreman, ...

Dear Sir:—
This will introduce to you Mr......................................
who goes to you for any and all kinds of round house work.

If you find him capable, his habits good, and think that he will make us a good fireman, you may put him to firing when needed, filling out the blank below and returning the same to this office.

I have his application complete and he has passed examination of the Company's surgeon.

Yours truly,
Master Mechanic.

MR. E. W. PRATT, M. M.,
Missouri Valley, Iowa.

Dear Sir:—
The above named man began work as a fireman on (date)............. ...... 190...., at (hour)...... M., on Engine No. ...... with engineer .... on train No. ......; or switching............

(Signed) ....
Division Foreman.

Form E. W. P No. 103.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY.
Office of the Master Mechanic N. & W. Div.

MISSOURI VALLEY, IOWA, ..., 190...

Mr. ....

Foreman ....

Dear Sir:—
The bearer, Mr. .... is a fireman whom you will place on your list and put at work he is able to perform, advising this office on blank lines below, the date, hour and trip that he starts work.

Yours truly,
.... *M. M.*

MR. E. W. PRATT. M. M.,
Missouri Valley, Iowa.

Dear Sir:—
The above man began work as a fireman on (date)................. .... 19......, at (hour) ....M., on Engine No. .... with engineeman .... on train No......, or switching ....

(Signed) ....
Foreman.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY.
NEBRASKA AND WYOMING DIVISION.

E. W. P. Form 101.

MISSOURI VALLEY, IOWA, ..., 190...

Mr. ....

....

....

Dear Sir:—
You will please come here at once and report to this office.

If your application is approved by the doctor we have use for a few firemen at once. Hence advise me by return mail if anything should prevent your immediate coming.

Yours truly,
E. W. PRATT,
Master Mechanic.

Form E. W. P. No. 107.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY.
NEBRASKA AND WYOMING DIVISION.
Office of the Master Mechanic.

MISSOURI VALLEY, IOWA, ..., 190...

Mr. ....

Agent..............................

Dear Sir:—
About (date) ....and thereafter we are likely to need more firemen on short notice. If you know of any young men of good character, reliable habits and at least an 8th grade school education, I would be glad to entertain their application. Please have any such as you can recommend write to me, giving their age, weight, height and school advantages and I will communicate with them, if satisfactory.

It is desirable that those not familiar with service in the Mechanical Department should, for a few months, work at any and all kinds of roundhouse and shop work. To that intent, we find places for as many prospective firemen as possible at our various division points.

Yours truly,
E. W. PRATT,
Master Mechanic.

Form E. W. P. No. 104.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY
Office of the Master Mechanic.

MISSOURI VALLEY, IOWA, ..., 190...

To the Road Foreman of Engines and the Traveling Fireman:—

Gentlemen:—
Mr. .... has been employed as a fireman on this division and started work at ...., date ....

He claims to have had .... experience. You will please become acquainted with him, ride with him on the road and criticize his work as soon as possible and as often as your other duties will permit, advising me as to your estimate of him within four months from date, using blank below.

Yours truly,
E. W. PRATT,
Master Mechanic.

MR. E. W. PRATT, M. M.,
Missouri Valley, Iowa.
(Date) .... 190....

Dear Sir:—
I have ridden with the above named fireman ...... times and taking all points into consideration I would consider him to be a.................. (Good, Fair, or Poor) man.

His good points are ....
His undesirable points are ....
The engineers and division foremen for whom he has worked think him a ....fireman, and......desirable to retain in the service

(Signed) ....
Road Foreman of Engs. Trav. Fireman.

Form E. W. P. No. 106.

CHICAGO AND NORTHWESTERN RAILWAY COMPANY.
NEBRASKA AND WYOMING DIVISION.

(Place) .... (date) ....190....

MR. E. W. PRATT, M. M.,
Missouri Valley, Iowa.

Dear Sir:—
During the past month of .... I have fired principally as follows:

Engine No.	Engineer.	Did Engine Steam Well?	Was Engine Light on Coal?	Were You Able to Have Fires Light and in Good Shape at Terminals?

Have you improved and gained greater skill in firing the past month?......
Are you able to stand the hard work of firing heavy engines?.........
Do you make it a practice to obtain good rest and sleep when off duty?

Yours truly,
(Signed) ....
Fireman.

....

The above blank is to be filled out by each fireman for the first six months of his service. Division Foremen please check up and send in.

Railway Mechanical Training as Viewed by a Technical Graduate

ON page 489 of our December issue we published a letter signed by "Q." on the above subject. The following is in answer to "Q.'s" letter:

Editor Railway Master Mechanic:

The discussions of the "special apprentice" question recently appearing in the Master Mechanic have been very interesting to me as a former special apprentice, and I think several points have been brought out which will be of benefit to others entering these same lines.

The question has several times been asked, "Why do so many special apprentices leave railroad work?"

The correct answer to this question has, in my opinion, the elements of the whole special apprentice question. I believe the reason so many special apprentices leave railroad work is due to the fact that they enter the work because their future in railroad work has been to a certain degree misrepresented and painted overbright by their college professor, and not because they have any special preference or ability for the work. It is usually impressed on the student by his professor that the heads of the mechanical department are anxiously awaiting the egress of the student into railroad work, and at the first opportunity after serving his apprenticeship the said mechanical department will place the newly fledged "railroad man" into a position of trust and responsibility, regardless of his ability, from which he will quickly reach the top of the ladder and the large salaries attached thereto.

It is safe to say that the rapid rise is in most instances a dream and the high salaries to be gained in the mechanical department a nightmare of huge proportions, as any railway mechanical man knows to his sorrow.

Consequently, as soon as the embryo would-be superintendent of motive power awakens to these facts he immediately gets into other lines, and leaves behind only those who are really in love with the railway work.

All who remain in the service cannot expect to become superintendent of motive power, for their natural abilities do not permit them to advance as fast as some more fortunate individual, who has had less education, but is endowed with much more natural ability; consequently the few technical mechanics who do remain in the service will advance as much faster in proportion to their fellow workmen as they possess the two chief requisites of a railroad career—the ability to handle men and business.

By handling men I not only mean to so manipulate and organize the forces at command that the work in hand may be turned out in the quickest time and at the cheapest cost, while keeping the men so organized in a healthy and friendly state of mind; but the successful railroad man must develop the ability to read men, not only to be able to place the right man in the positions best suited for him, but also to understand the characters of his superiors and be able to make personal friends of them, which latter accomplishment is one of the most important adjuncts and one for which no little credit is due the individual.

By ability to handle business I mean that besides the ability to grasp the details of cost and expenditure, and so get the best service out of the equipment under charge at least expenditure, while maintaining the standard of good equipment, the higher officials must have a grasp of general market conditions and ability to master the intricacies of a vast organization, so that the whole may run smoothly with itself and the other departments with which it comes in contact.

Most of the above mentioned qualities can be largely developed, provided the natural abilities are present, and the young man who looks forward to becoming a superintendent of motive power should remember that the heads of the mechanical departments of our large railways have attained that goal only through a life time of hard work and application to the service, combined with the exercise of their great natural talents.

However, to the young man who likes the work, who is prepared to give long hours to the service at comparatively small pay, and who has the right ingredients, the railway field presents a very bright future, and the way is sure to lead up from machinist to foreman, general foreman, master mechanic, and perhaps superintendent of motive power, or higher yet. My own opinion is that the years spent in the railway service were the most profitable of my life, as far as gaining knowledge and experience goes, and the fundamental principles gained therein have been very useful to me since.

Yours truly,

"C."

Personals

Mr. H. H. Harvey has been appointed general car inspector of the Chicago, Burlington & Quincy at Chicago.

Mr. R. Wharton, general foreman in the car department of the Chicago & Northwestern, died the latter part of December. Mr. Wharton was well known in car work in Chicago.

Mr. C. J. Nash has resigned as mechanical engineer of the Pullman Company, to accept the position of superintendent of the Standard Car Co.

Mr. W. C. Smith has been appointed division master mechanic of the Missouri Pacific, with headquarters at Fort Scott, Kan.

Mr. W. L. Kellogg has been appointed master mechanic of the Pere Marquette, in charge of motive power and equipment, with headquarters at Grand Rapids, Mich.

Mr. Samuel L. Hawks, superintendent of air brakes of the Chicago & Alton, died at Bloomington, Ill., on Jan. 2, aged 73.

Mr. F. A. Deckert has been appointed master mechanic of the Riverside shops of the Louisville & Nashville at Knoxville, Tenn.

Mr. J. P. Young has been appointed master car-builder of the Missouri Pacific at St. Louis, Mo., in place of Mr. W. D. Lowry, resigned.

Mr. J. F. Sheahan, master mechanic of the Southern Railway at Columbia, S. C., has been transferred to Spencer, N. C., in a similar position, to succeed Mr. G. R. Richards, resigned.

Mr. J. W. Marden, formerly general foreman of the car department of the Boston & Maine, has been appointed assistant master car builder, with headquarters at Boston, Mass.

Mr. R. A. Billingham, formerly general master mechanic of the Pittsburg, Shawmut & Northern, has been appointed superintendent of motive power, with office at St. Marys, Pa., and the former office has been abolished.

Mr. W. D. Lowey, who has been general foreman of the car department of the Missouri Pacific, has resigned that position, to become master car builder of the Pere Marquette.

Mr. D. J. Timbin has been appointed master mechanic of the Rio Grande, Sierra Madre & Pacific, with headquarters at El Paso, Tex., succeeding Mr. M. D. Stewart.

Mr. William Bowden, formerly general foreman of the Chicago, Burlington & Quincy at North St. Louis, Mo., has been appointed master mechanic of the Terminal Railroad Association of St. Louis, to succeed Mr. William Miller, resigned.

Mr. David Anderson, formerly division master mechanic of the Lake Erie & Western at Muncie, Ind., has been appointed superintendent of equipment of the Chicago, Indiana & Eastern, with headquarters at Muncie.

Mr. William Miller, formerly master mechanic of the Terminal Railroad Association of St. Louis, has been appointed assistant superintendent of motive power of the Denver & Rio Grande, with headquarters at Denver, Colo.

Mr. J. B. Phillips, general foreman of the locomotive department of the Atchison, Topeka & Santa Fe Coast Lines at Albuquerque, N. M., has been transferred to San Bernardino, Cal., as general foreman, succeeding Mr. A. H. Gavins, resigned. Mr. J. A. Conley, roundhouse foreman at Albuquerque, has been appointed general foreman in place of Mr. Phillips.

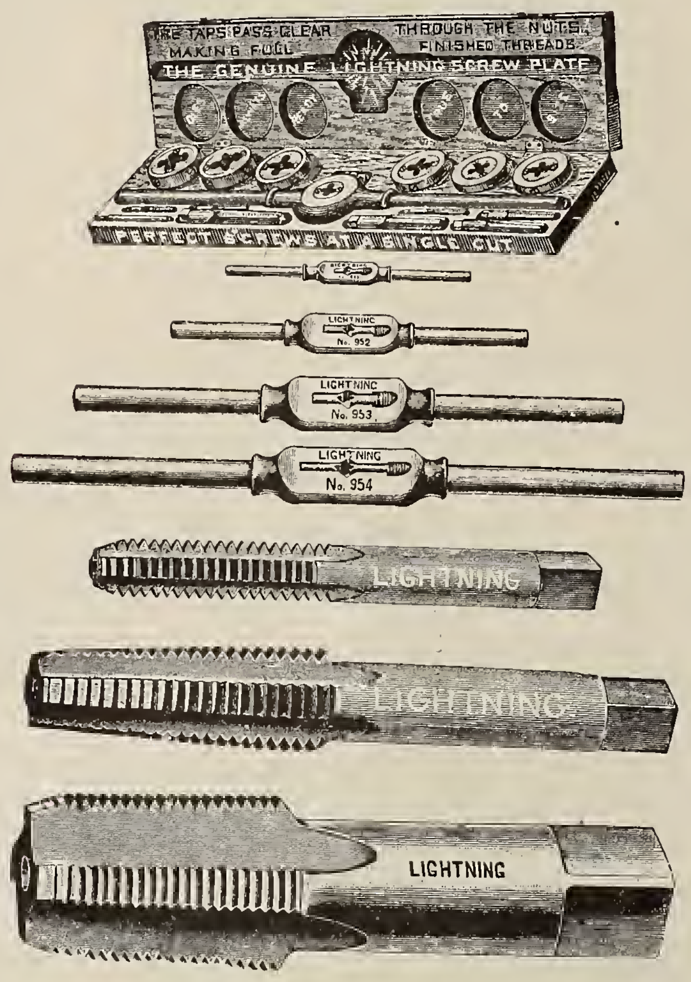
Mr. George W. Cooper has been appointed master mechanic of the Mexican Central at Monterey, Mex., to succeed Mr. T. H. Ogden, transferred.

Taps and Dies.

The accompanying illustration represents some of the taps, dies and tap wrenches of the Wiley & Russel Mfg. Co., Greenfield, Mass. These taps and dies are made for accurate and fast work. The work accomplished is done better and faster than with adjustable cutters of the old style.

The adjustable wrenches will be found to be well fitted and tedserviceable. The stocks are drop forged and the jaws milled out of the best tool steel, so as to grip the squares of the taps evenly and firmly.

The handles are made of bicycle tubing and firmly fixed. The motion to the jaw is given by means of the knurled thumb nut through differential screws.



WILEY & RUSSELL TAPS AND DIES.

The "R. A." or "Ajax" Vestibule Diaphrams

The "Ajax" or "R. A., canvas belting riveter diaphragm contains the best and most durable material and embodies the best features known to modern practice.

The A. C. & F. and Pullman types are made of especially selected quality of three-ply cotton belting, 11 in. in width and is folded in center and riveted, enclosing steel stiffening rods, avoiding any sewed seams on inside edge and removing a great element of weakness. They are riveted at the folds with brass rivets which are heavily black japanned, preventing rust, corrosion or tarnishing. By the use of these rivets there are no threads exposed to the weather to rot away, and no rubber coating canvas or cemented joints to crack. These diaphragms are further reinforced by a galvanized steel rod, which runs entirely around the diaphragm inside the inner folds. This rod supports and effectually prevents sagging at the corners or top, buckling or getting out of shape; thus they are kept in perfect alignment and always present a neat appearance.

All edges and joints are bound with leather cloth in order to give the greatest neatness and enduring service. Extensive experience has shown that leather cloth is superior in wearing qualities to leather or any other form of binding. The diaphragms have a top shield or hood made of heavy enameled duck for shedding cinders and moisture of all kinds.

These diaphragms are handsome in appearance, being stained a deep black, neatly bound, and fit perfectly at the foot.

The Gould type of Ajax diaphragm is made of a continuous strip of belting reinforced with a galvanized steel rod extending around the inner edge on inside diaphragm and around outer edge of outer diaphragm to support and keep it in alignment. This style is made in narrow folds and from one piece with no corners. There are two diaphragms to each vestibule and four per car.

These diaphragms are sold by the Railway Appliances Co., Old Colony Building, Chicago, Ill.

Notes of the Month

The Pittsburg & Lake Erie Railroad will install a compressed air plant in its freight classification yards at Hazelton, Pa., for changing and testing air brake systems of all trains made up in those yards.

The American Locomotive Company has presented to Purdue University, Lafayette, Indiana, the full-sized model locomotive cylinders sectioned to show the piston valve construction, which formed a part of its exhibit at the Louisiana Purchase Exposition.

The New York Board of Trade and Transportation, on December 28, unanimously adopted the report of a committee in opposition to the Quarlers-Cooper bill in Congress, which proposes to confer on the Interstate Commerce Commission the power to fix rates to be charged in lieu of any rates of which it may disapprove.

The Pennsylvania R. R. Co. has recently completed a large power plant near its passenger yards in Pittsburg, Pa., which is to furnish steam for heating the cars in the yards, compressed air for testing the brakes and other purposes, as well as electricity for charging the storage batteries of electrically lighted cars.

The great merit of the celebrated Moncrieff Scotch gauge glasses has been strikingly brought out in the fact that these glasses were the only ones awarded a gold medal at the recent St. Louis Exposition. They received th highest possible award. The H. H. Rogers Company, of New York, sole agents in the United States, report a large and steadily increasing demand for these well-known goods.

The Union Pacific road has successfully welded a broken frame on a Pacific type engine by the alumino-thermit process. This is one of a few attempts to be recorded of the use of thermit to weld a broken locomotive frame. The saving effected by welding a frame in position, making dismantling unnecessary, will be the force that will push thermit welding to a front place in locomotive repairs.

The Hancock Inspirator Co. of 85 to 89 Liberty street, New York, have issued a miniature of their large catalogue for pocket purposes. This booklet contains a description of their factory, the history of the Hancock inspirator, methods of selecting the proper size of inspirator, together with illustrations of the various kinds of Hancock inspirators, specifications, dimensions, directions, repair parts and price lists.

Arrangements are being made for the installation of wireless telegraphy on the New York Central and Lake Shore railroads. It is proposed to equip the Twentieth Century limited, so that passengers may send or receive messages at any time, whether the train is standing still or running at a high rate of speed. Another object in installing wireless system of telegraphy is to avoid loss of communication when the wires are down.

The Falls Hollow Staybolt Co., of Cuyahoga Falls, Ohio, are in receipt of an order for several thousand feet of double refined charcoal hollow iron bars, to be used in a number of locomotives that the Baldwin Locomotive Works are building for a railroad in Brazil. During the year the Falls Hollow Staybolt Company made a number of improvements in their plant, so as to increase the output. This was necessitated on account of doubling the amount of iron sold.

The extent and cost of the work of track elevation, which has been carried on in the city of Chicago by various railway companies during the last few years, are not generally realized. Already 82.8 miles of main lines and 425 miles, including all tracks, have been elevated on solid earth embankments or steel viaducts, at an expenditure of nearly $30,000,000 and work is progressing, or is proposed, which will cost over $18,000,000 more.

The Hayden & Derby Mfg. Co., of No. 85 to 89 Liberty street, New York, has issued a miniature of their large catalogue. This miniature is made for pocket purposes and contains illustrations of the Metropolitan automatic injectors, Metropolitan "1898" injectors, Metropolitan double-tube injectors, H-D ejectors and jet apparatus. It also has tables of dimensions, directions for connecting up, reasons why injectors do not work, and skeleton injectors with names of repair parts.

Mr. Harry W. Frost desires to announce to the railway trade the organization of the Monarch Railway Supply Company to handle railway specialties, with headquarters in Detroit, Mich. In addition to several other manufactures, they have made arrangements with the Pressed Steel Car Company for the sale of the following specialties manufactured by them: Trucks, bolsters, brake beams and steel carlines. The temporary offices of the company are at 614-618 Majestic Building, Detroit, and permanent offices will be located in the Penobscot building, Detroit, after May 1, 1905.

It may be of interest to have the facts of the starting of the firm of Manning, Maxwell & Moore of New York recalled. In 1873 the firm of H. S. Manning & Company was started which was succeeded by the firm of Manning, Maxwell & Moore in 1881. The growth of the business was steady and the firm now has branch offices in Chicago, Cleveland, St. Louis, Pittsburg, Boston and Philadelphia. The various manufacturing interests have been acquired so that today the firm is interested in the manufacturing industries of the Ashcroft Mfg. Co., manufacturing steam gauges, indicators, pipe fitting tools, etc. The Consolidated Safety Valve Company, manufacturing safety valves, the Hayden & Derby Mfg. Co., manufacturing Metropolitan injectors and ejectors; the Hancock Inspirator Company, manufacturing Hancock inspirators and valves of various kinds and the Shaw Electric Crane Company, manufacturing electric traveling cranes. On January 9, 1905, Mr. Henry S. Manning sold his entire interest in the firm of Manning, Maxwell & Moore together with his interest in the various manufacturing concerns to Mr. C. A. Moore. There will be no change in the name or character of the firm and its business will be conducted in the future by Mr. Moore and the men who have been associated with him. The reason of Mr. Manning's retiring from the firm is due to his desire to retire from business and be relieved of business cares and problems.

The Pennsylvania Railroad system were awarded the following awards by the juries of the Louisiana Purchase Exposition: A special commemorative grand prize for its original series of scientific investigations of locomotive performance; a grand prize for the model of the terminal passenger station in New York City; a grand prize for the locomotive testing plant and laboratory; a grand prize for the railway postal and mail car; a grand prize for the model of the West Philadelphia terminal; a grand prize for the model of the

New York and Long Island railroad tunnels; a grand prize for the full-sized section of the tunnel under the North river; a grand prize for exhibits of maps and drawings illustrating the following improvements, viz.: change of line at Irwin, Pa.; Brilliant branch through the city of Pittsburg; change of line at Coatesville, Pa., and stone arch bridge over Brandywine creek; change of line east of Duncannon; change of line from Wiltmore to Summerhill; change of line from Lilly to Portage; change of line at Trenton and Morrisville; track elevations at Wilmington; stone arch bridge at Silver Lake; stone arch bridge at New Brunswick, N. J., and Rockville bridge over the Susquehanna river. A grand prize to the Société Alsacienne de Construction Mécaniques for the De Glehn four-cylinder compound; a gold medal for the exhibit of the pension, relief and saving fund department, and a gold medal for the exhibit of the Y. M. C. A.

Negotiations have been completed whereby Purdue University is to receive from the New York, New Haven & Hartford Railroad, through the courtesy of Mr. Samuel Higgins, general manager, the historic locomotive "Daniel Nelson." A few years ago the University interested itself in securing from railways, samples of such classes of locomotives as are now being superceded by machines of more modern construction, its purpose being to preserve as museum exhibits types of design which were in danger of becoming extinct. As a result of this plan, a number of valuable relics are already upon its grounds. From the beginning of this movement, an effort has been made to secure a representative of a type which was common throughout New England thirty years ago, namely, an 8-wheeled engine having cylinders inside the frames connecting with the crank axle. This effort has now been crowned with success. The "Daniel Nelson" is said to have been built in 1858. It was exhibited in Chicago in 1893 and has since been held as a relic at Roxbury, Mass. The engine weighs about twenty-five tons, is complete with its tender and will be shipped to the University at Lafayette, Indiana, upon its own wheels.

In the year 1874 Mr. J. D. Cox, in a very modest way, established himself in Cleveland for the manufacture of tools. Five years later Mr. F. F. Prentiss joined him as partner. For twenty-five years this partnership went on uninterrupted and was known to the business world as "Cleveland Twist Drill Co." During this period by careful management and with constant vigil for producing tools of the highest quality, the business prospered, until today its product is found wherever civilization exists. The immense factory, built up as increased business demanded, and equipped with special and modern machinery and appliances, further attests the result of successful business methods. After thirty years of constant activity, Mr. Cox has decided that he has earned a little rest and relief from responsibility, which was further emphasized by his health demanding a change, and with this in view, the partnership was merged into a stock company, Dec. 31, 1904, and hereafter will be known as "The Cleveland Twist Drill Co." Before transferring the partnership affairs to the stock company, several of the old employees were invited to take stock. This opportunity was readily accepted by all to whom the privilege was accorded. While Mr. Cox will be relieved of active duties, he will still retain his large holdings and also serve in the capacity of vice-president and director. The other officers of the company are: Mr. F. F. Prentiss, president and general manager; Mr. E. G. Buckwell, secretary; Mr. Geo. F. Kast, treasurer. Notwithstanding that this change has taken place, the personnel of the company remains intact, and the same guiding spirit of the past will be maintained in the future. The office and factory are located at Cleveland, O.

Technical Publications.

Proceedings of the Twelfth Annual Convention of the Traveling Engineers' Association.

These proceedings are nicely bound and have 285 pages of reading matter. The papers presented and discussed at the convention are the future engineer, the water tube, the high speed brakes, headlights, location, type, operation and care, valve motion, the use of grease on locomotive bearings, and progressive examination of firemen and new men.

"Illustrated Points for Men on the Head End." By W. G. Wallace, Supt. M. P. of the D. M. & N. Pocket size; bound in leather, gilt edges; 71 pages; 36 illustrations. Published by The World Railway Publishing Co., Chicago. Price, $1.

This is a handy reference book for all connected with locomotive service. The illustrations are all clear and described in the language of the roundhouse. It contains information on instructions to firemen; how to make an engine steam; care of rods, wedges, driving boxes; getting over the road; lubrication, emergencies, etc. It also teaches how to figure tractive power, train resistance due to curves, grade, speed and many other things.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of Master Car and Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

Paint Burners Versus Paint Removers.

We are not yet convinced of the practicability of paint removers of any sort in place of the gas flame for removing paint from the exterior of cars, a matter which our esteemed Mr. Pitard calls our attention to in the last issue, taking rather an affirmative and hopeful view of the question and situation. Some whose shops have been destroyed during the past year, by having a flame in too close proximity with a varnish remover they were using, have seized one horn of the dilemma and thrown out the varnish remover—a good servant; now Mr. Pitárd has got hold of the other horn and proceeds to throw out the flame—another good servant—on the hypothesis that it is a hard master. Now for our part we cannot see any necessity for throwing out either. Keep them at a proper distance from each other and they will not quarrel but produce good work and plenty of it. We are using both right along in a shop of ten-car capacity and have for a year or two. When we learned the inflammable nature of varnish removers we began to exercise due care and caution.. That is all that is necessary in their safe use. Burning off a car outside at the same time that varnish remover is being used inside, or near enough to have its fumes take fire, is where the trouble originates. In short days, where lighting up with other than electric lights is necessary, let the varnish removing rest until daylight can be substituted for the artificial light, and then pitch in and do the varnish removing and quit when lighting up time comes. If a car must be burned off at the same time the varnish remover is being used, separate the two jobs to different points in the shop and there will be no trouble. This is not half the scare-crow that some try to make it out to be when looked at rationally. Instil into the men the same knowledge of these things that the foreman has himself, and they will all turn loyal guards against trouble of this character, because they will see their bread and butter and have a care to keep the premises from burning down, and thus be thrown out of employment indefinitely.

On the face of it the invention of a successful paint remover, which is not yet upon the market, that will, when applied with a brush, remove the many coats of paint and varnish from a car "as slick as grease" from not only the plain surface but from all beads of sheathing and corners and crevices, appears to be a great desideratum; but whether it will ever be done remains to be seen. We know that a paste of lime and soda can be made very cheaply to remove at one operation, no matter how many coats of paint and varnish, from a car; but its use would be hazardous from the after effects of the alkali that might work out of cracks and crevices, no matter how thoroughly the car was washed off with water, and attack the newly applied paint and varnish. Whether other chemicals can be employed whose high cost would not be prohibitive for this work, in comparison with the low cost of the gas flame to do this work successfully, remains to be seen. It is up to the chemist. Personally we are "a doubting Thomas" in this regard. The health of the men who use these chemicals will also have to be taken into account. Already some of the varnish removers in use are very bad in this respect and their makers and consumers would seem to be well nigh indictable for putting such things into the hands of men who are ignorant of their nature. It would seem that a company would have to answer for the carelessness and negligence of the person in authority who is responsible for the use of some of these things whose nature can be revealed by a simple test. It would be better to run a little risk of burning a shop in the use of a flame than to ruin the health of even one man by the use of questionable chemicals, if not to kill him, whose nature he does not understand, and if he did he would not use them. Many of them that are comparatively harmless to a man's constitution are injurious to the skin of his hands, rendering it necessary to wear while working in them some sort of gloves as a protection. When the paint can be removed from a 60-foot vestibuled coach exterior for $12 worth of labor, and the little additional cost of compressed air and gas, somebody has a job on their hands to devise a chemical compound that will displace this practice, all things considered. Still, our watchword has never been, "it cannot be done." We'll wait and watch, and work.

Maintaining Car Interiors.

The exterior of passenger equipment is almost religiously maintained with its annual cleaning, cutting-in and varnishing, until this course of treatment is no longer considered the thing—in about seven or eight years from painting—when it is burned off and repainted again from the wood; and so the battle goes on merrily from year to year against the elements as the years and the cars come and go. But as to the interiors—well, they largely shift for themselves, as it were. Too often it is the case that they are sponged and mopped out hurriedly at a piece-work gait with dirty water, as it costs the workman money to bring clean water from a distance, and so they rapidly accumulate the grime of age in corners and crevices, if not all over their surface, only to be varnished-in when they need it(?). And then what? A drastic measure will have to be resorted to to get down to that beautiful wood that has become buried. No wonder varnish removers are becoming popular. One is led to suggest by way of illustration, however, that if a white man will only wash his face clean regualrly he need not resemble a negro, nor resort to a chemical to skin the cuticle from it to again look white. In other words, if car interiors are properly scrubbed with soap and pumice and washed with plenty of clean water, being particular at each washing to see that all corners and crevices are "stuck out" clean, there need be no trouble in keeping car interiors presentable a reasonable length of time, varnishing occasionally when required. Concerning this last item we would urge that it be done as sparingly as possible, probably not oftener than once in five years for coaches and three years for smokers, if a durable article for varnish is used, to avoid as long as possible unseemly accumulation of needless material and its consequent cracking. Still, if the surface is dead and dry it must be enlivened with a coat of varnish now and then to avoid the disintegration and perishing of the surface which has been obtained at so great cost. If there is any part of a coach that should be kept in good order it is the interior where people accustomed to well-kept homes must ride all day long and view it in its neatness or slovenliness, as the case may be.

To return to the matter of cleaning, it is an apt saying that "what's everybody's business is nobody's business," and this illustrates the difficulties encountered on a road with a half dozen or more shops for the annual shopping of its equipment where the cars are shifted around on the various divisions and mixed up so that John Smith of the so-and-so shop never sees the same car twice, and Tom Brown of another shop doesn't care whether he does or not. And it will take an omnipresent, omniscient Master Painter, always on the wing, to see and correct all these evils of interior negligence. They may have existed before his day. At any rate they exist, and to correct them is the awful hill he has to climb and against great odds. Nothing but a liberal use of elbow grease and varnish remover will do it now and the refinishing of the entire surface; and for this men, material and outlay must be made, and here he will have difficulty in convincing his superiors of its needs. They have only been looking at the cost of putting on material, hardly dreaming that it has got to come off some day.

Sometimes the interiors of cars have been gotten into a bad state by the use of ill-advised renovators and oil cleaners for cleaning, when they should have had soap and water and pumice stone. If this is the case the cost of its use has got to be again paid for in eradication and putting back into right shape. No material of this kind that will dry as a film on the surface should be used, as it will only gum up corners and produce bad results and likely get varnished-in into the bargain. An oil cleaner or renovator that has an evaporating quality but no drying propensity will do to enliven a surface that has had a previous proper cleaning where a coat of varnish is not necessary; and this is about the extent of its use on car interiors that have had a year or more of service running after smoke and steam.

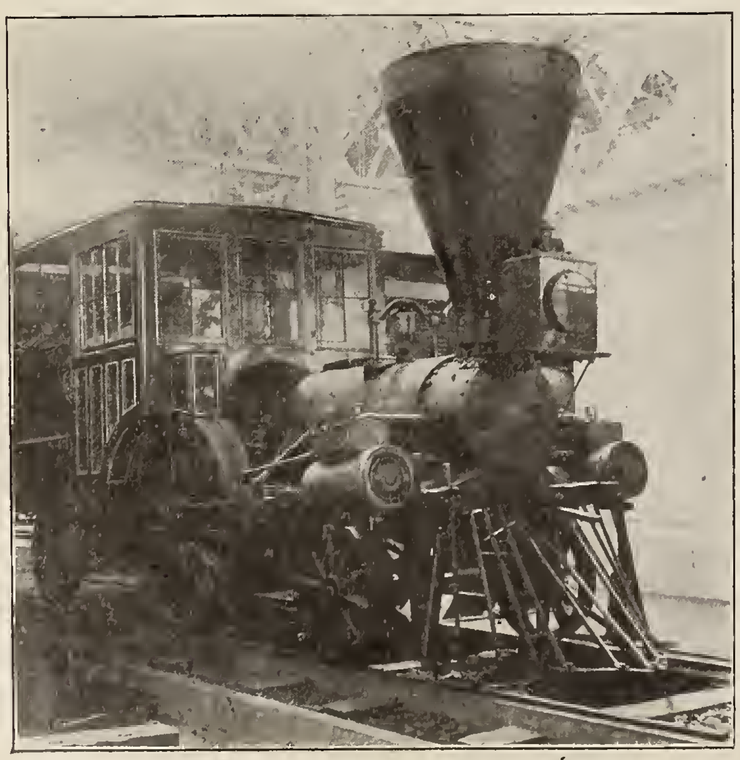
Wooden headlinings, with tilting deck-sash to allow the sulphurous acid of smoke, etc., to course across them, will have to be especially looked after in the matter of cleaning and to see that they have an extra coat of varnish now and then, above what the rest of the interior gets, in order to keep them in the right condition. And as to toilet rooms, where urine literally cuts a figure, everyone knows that much care and labor must be expended here to make them and keep them presentable. Also window-seats, where cinders and smoke grind off the varnish and grind in the dirt, which are directly under the eye of the passenger—these, like "our liberties," must be preserved.

An Interesting Relic

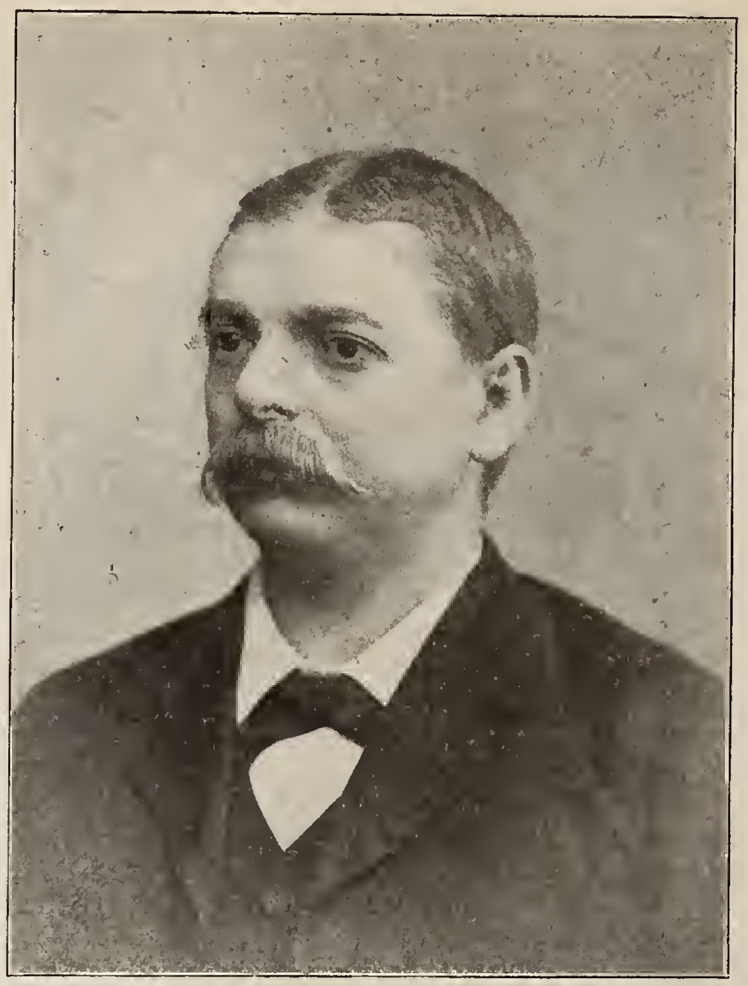
Herewith is a cut of an engine that was exhibited at the late St. Louis Exposition that has a history of interest to our readers. "It was built by Seth Wilmarth, who was an engine builder of some note in the early fifties. His shops were situated at South Boston and he built many engines for the Boston & Worcester, the Hudson River, the Eastern of Massachusetts and the Old Colony R. Rs. His designs were generally patterned after the Hinckley engine of those days; but they had some points of originality, as for instance, leading and trailing four-wheel trucks, he being, probably, the first to design this wheel arrangement which was repeated by later builders," says the Railroad Gazette of Dec. 16, from which we take the cut.

"The 'Pioneer' has cylinders 9 inches diameter by 14 inches stroke, driving wheels 54 inches diameter, weight 13 tons. It is a tank engine and has a single pair of driving wheels—types of the locomotive that are not, and never were, so common in the United States as in Great Britain. The boiler has a wagon top and the steam and exhaust pipes come outside the smokebox, where they enter the valve chest at the back side. The valve chest cover is on the front side of the chest instead of the top, and neither the pipes nor chests have any lagging. The sand boxes are on the driving wheel guards, but side elevations of the engine which have been published show a sand dome on the boiler barrel, which was probably its original position. The engine has link motion. The connecting rods and other working parts are very light, but the engine was probably never used for heavy work. It was built for the Cumberland Valley Railroad in 1851, and is said to have never been changed or remodeled. As the engine ran for forty years, this is a remarkable record."

Our associate, Mr. D. A. Little, of the Pennsylvania R. R. at Altoona, was at the St. Louis Fair and saw this engine and writes as follows concerning it: "I enclose clipping from Railroad Gazette with cut of the 'Pioneer,' a locomotive that was on exhibition at St. Louis, and built in your town of Boston and hauled trains of two cars, one combination and one coach 74 miles from Harrisburg to Hagerstown, Md., up to about the year 1868, and afterward used for a yard engine. This is John Houser's engine and we have both ridden behind her on her regular runs. I thought it might interest you inasmuch as it is a Yankee-built engine, besides having hauled your two good friends."



AN INTERESTING RELIC.



HENRY LAIDLER.

Obituary

HENRY LAIDLER.

Mr. Henry Laidler was born and reared in Rochester, N. Y., and learned his trade there of Mr. John Bond at general work. From there he moved to Jamestown, N. Y., and some years later to Northumberland, Pa., and from there to Sunbury, Pa., to work for the Pennsylvania R. R., where he worked in the shop for two years, when he was promoted to the position of foreman painter, which was twenty-five years ago; and he held this position until his death, December 11, 1904. He leaves a wife, daughter and son to mourn their loss.

I worked with him for Mr. Bond when he served his apprenticeship, and a better boy could not be wanted in a shop. All the members of our association who had the pleasure of his acquaintance at our conventions and elsewhere, will agree that he was as good a man as a boy. Mrs. Laing and myself attended the funeral at Sunbury, December 14th.

Eugene Laing,
Northern Central Ry., Elmira, N. Y.

Treatment of Round-Top Cars

The Boston & Maine railroad has of its own and leased lines, upwards of one hundred what are termed "round-top" passenger cars, that is, circular roofs without any decks or decklights, but with two rows of globe ventilators on top opening to registers within. These cars, finished in mahogany throughout, including the ceiling, or headlining, were all right when new and the mahogany was light in color, but now that they are getting old and the peculiarity of that wood is to grow darker with age, it is becoming a problem what to do with them to relieve them of their gloom. They appeared to be the coming car fifteen years ago, but they soon became unpopular and none have been constructed since Mr. J. T. Chamberlain became Master Car Builder early in 1890. We have seen in some railway publication some scheme of a western man for putting in "eye-winkers," or side roof-lights into this kind of a car, but with what success we never learned. Mr. Chamberlain had a regular monitor roof put on to one of these cars some years ago, but why he stopped the good work with that car we never knew, but surmised that it was too expensive to adopt for the whole, or else there was too much other more necessary work demanding attention. A year or more ago he sent the writer to the Boston & Albany shops at Allston to see what they were doing with this kind of car and to paint the ceiling of one like theirs; which he did and, by permission, has done others until seven in all have been so treated. This consists in painting the mahogany ceiling a tint off from white, leaving the two longitudinal mouldings that run the length of the car to cover the joints of the ceiling pieces, and also some of the cross mouldings the natural wood color. A border is stenciled on either side above the crown-moulding above the hat racks the entire length of car, and all is given a light coat of varnish. This experiment has so pleased the patrons of the road that favorable comment has been made and we clip the following editorial from a recent issue of the Boston Herald under the title of "Train Illumination":

"With excellent results the Boston & Maine has acted upon the suggestion made in these columns a few months ago to the effect that it would be a great improvement in lighting passenger coaches if the ceiling and the interior finish in general were made as light colored as possible. In one of the arched-roofed coaches the ceiling has been painted white. It may have seemed a pity to sacrifice the beautiful cherry finish and to paint over the natural wood. The transformed ceiling, however, not only looks handsome, with its clean white surface, but the reflection from white is so much greater than it was from red that the illumination in the car seems to be fully doubled. The improvement is thoroughly appreciated by the passengers, for it enables them to read in comfort. Previously, the strain upon their eyes was altogether too great. It seems strange that a method for increased illumination so simple, so efficacious and so cheap should not have been adopted years ago. It deserves to be made use of universally."

It would need a good deal of argument, however, to convince Mr. Chamberlain that the volume of light in a car of whatever name or nature can be increased by any color of paint or system of reflection. He is, however, willing to admit, of course, that some colors absorb light, as well as heat, while others of light tint reflect it and so make the car interior appear to be much lighter than it would be otherwise. The amount of actual light in a car is that of course which is produced by the flames of the lamps within it. Reflected light is that which is taken from it by a proper surface and so its reflection can be multiplied indefinitely. There is no more light in the sun for what the moon and other orbs "borrow" and give us by night. There was no more volume to the preacher's voice for what the "sounding board" erected above him did in the old churches in the colonial days in New England.

Among the Supply Men.

W. P. Mellon.

There have been two words woven together, using the letters of one to help spell out the other, for so long in advertisements and elsewhere that they have become familiar to all. We refer to "Valentine's Varnishes;" and had we the type here we would reproduce them as they appear. At any rate, we will reproduce the picture of one of their representatives, Mr. W. P. Mellon, whom many will remember as attending our recent conventions. Mr. Mellon says he can't conceive

WM. P. MELLON.

why we should want his picture in the February issue, unless it is because it is "Valentine's Day," as melons cannot be expected to be ripe yet.

Coming from a railroading family, he says, his gravitation seemed natural, so he made his bow to the railroad trade in October, 1900, having made his advent into the varnish business about fifteen years ago when he was twenty-four years of age, thus he has not yet reached forty and may reasonably be expected to visit our conventions for thirty-five or forty years more. Consequently there is much in store for him and others who will have the pleasure of his company. About a year ago he took charge of Valentine & Company's western railroad interests and makes his headquarters at the Dearborn street office of that company, where "Charley" Morrill, who used to call on this scribe in the East "drumming" varnish thirty-two years ago, holds forth as president. Long life to him and his husky western representative.

Notes and Comments.

The marriage is announced of Mr. Thomas J. Hutchinson to Augusta E., daughter of Mrs. Amelia Moore, which happy event took place at London, Ontario, December 31, 1904. We wish them not only "a happy new year" but all the joy in the world and as few of its sorrows as are good for them. Mr. Hutchinson is the successful and honored foreman painter of the Grand Trunk Ry. at that point and our fellow-associate in M. C. & L. P. A. work.

Steel car painting continues to be a live subject, both with makers and consumers of paints. The Detroit Graphite Mfg. Co. are just out with a little booklet on "D. G. M." Colors for Steel Cars, wherein they describe their specialties in this line, consisting of No. 125, primer; No. 126, brown; No. 127, red; No. 128, dark slate; No. 129, green, and No. 130, black, which they say "are the results of continued tests made to produce shades conforming to the standards in use, and, by reason of their tough, elastic quality and permanency of color, adapted to withstand the service and prevent corrosion."

We learn indirectly that our old friend and colleague Mr. Wm. J. Orr closed his labors as foreman painter with the Central Vermont R. R. at St. Albans Thursday, Dec. 29, and went to accept a similar position with the Erie at their Buffalo shops. "Billy" shouldn't have shaken the dust of New England off so unceremoniously. But for a friendly hint from a supply man we would be still ignorant of his whereabouts and perhaps have gone clear up there to see him to find the bird had flown! By the way, this is the third appointment to fill the vacancy caused by the resignation of our good friend "Dan" Vail a year or so ago. It would seem that "Dan's" shoes are hard to fill, but trust this appointment will be successful

In the absence of other interesting items which would be welcome from his associates regarding shop news, practice, etc., this scribe has to swell up and blow his own horn, as it were, very much to his dislike. If the reader does not like it the prettiest way to choke it off is to send in something better. Meanwhile we will say that the Boston & Maine passenger output from its paint shops for the month of December, 1904, was 209 cars, which covers all arrearages for two years, lacking only two cars, so that by the time the first month of the new year is completed we will be on "easy street," as it were, regarding this vexatious matter and thus "a happy new year" will begin.

Mr. J. W. Marden, heretofore general foreman of the car department of the Boston & Maine R. R. at Boston, is appointed assistant master car builder, effective January 1, 1905. At the time of the lease of the Fitchburg R. R. by the Boston & Maine, July 1, 1900, he was superintendent rolling stock of that road. He was then made general foreman of the Fitchburg division car department. Subsequently, at the retirement of Mr. John Hubbard, general foreman of the Somerville shop, his authority was extended over that shop, which is but a mile from the Boston Terminal. On the death of the late Mr. Jas. E. Pickering, general foreman of inspection, cleaning, light repairs, Pintsch gas plant, etc., which occurred a year ago last summer, he succeeded to his duties also. Car repairs and inspection at Mystic Junction, Mystic Wharf and East Boston were also sometime ago added to his duties, so that it may be said that all car repairs and inspection on the B. & M. within a radius of fifteen miles of Boston, are under his supervision, and he ought to be a valuable assistant to Mr. J. T. Chamberlain, the master car builder, which doubtless he is. He is an ex-president of the N. E. R. R. Club and of the M. C. B. Association.

In a brief call at the new big shops of the N. Y., N. H. & H. R. R. at Readville, January 19, we found the foreman painter, Samuel Pickford, very busy, with 200 men on his list, fourteen of whom are freight-car painters. Mr. E. F. Bigelow, son of E. L., formerly with the B. & O., and now assistant foreman at the Fitchburg shops of the B. & M., was on Monday, January 16, made assistant foreman for Mr. Pickford. The New Haven road has gone to the other extreme by abolishing its six stripes around their car bodies and putting on none at all. They have done one good thing, however; they have gone back to the use of gold leaf in place of paint for letters and numbers on all cars repainted. Such as are good enough to cut in and revarnish they of course leave the old painted letters. They stripe in gold all parlor, dining, sleeping, state room and private cars. They have returned to the use of the black letter formerly in use, abandoning the Roman. This was likely on account of making them correspond with the metallic letters on the copper cars which were made to that style. It is, however, much the more expensive letter to apply and maintain. With an equipment second only in size to that of the Pennsylvania R. R., and only one shop to do it in, it can be readily imagined that the Readville shop is a busy place, with scores of cars waiting to be shopped.

We clip the following interesting items from the January 1 issue of the "Boston & Maine" Messenger, a monthly publication issued by the passenger department of that road, regarding new equipment ordered: "The Boston & Maine Railroad has contracted with the Laconia Car Company for the construction of three hundred 36-foot box cars for delivery in the near future. These cars are to be similar in construction to those which were built some time ago at the Concord, N. H., and Fitchburg shops of the company, both as regards carrying capacity, which will be 60,000 pounds, and as to trucks, which are steel, as formerly. Twenty passenger coaches will also be purchased from the Pullman company, same to be delivered in July, 1905. These coaches will be uniform in construction with those which were delivered by the Pullman company during the past summer, that is to say, 60 feet in length, lighted by Pintsch gas, and otherwise of the most modern type.

"The motive power of the Boston & Maine is to be supplemented by eight more ten-wheelers from the Schenectady works of the American Locomotive Company, ten more moguls and ten more switching engines from the Manchester works of the American Locomotive Company. These engines are to be the same as those ordered earlier this year, mention of which was made in the Messenger at that time.

"The Concord, N. H., shops are now building four new sixty-foot baggage cars and two new mail cars, while the Lawrence shop is building one sixty-foot mule-end mail car with six wheel trucks."

We are in receipt of a clipping from an Altoona paper of over a column in length recording the sudden death of John W. Webber, of that city, January 13, with an interesting account of his long and useful life, having been one of Altoona's most prominent citizens. It appears that he was once the master painter at the Altoona car shops, and likely Mr. Ball's predecessor. We extract the following: "John W. Webber was the oldest son of Andrew and Sarah (Wilson) Webber, and was born May 22, 1829, in Venango county, Pa. He was reared in his native county and acquired a good common school education. After leaving school he learned the trade of house and sign painting, and shortly afterwards, in 1849, removed from Venango to Huntington county, where he worked at his trade until 1852. He then came to Altoona, where he has since resided. In the same year he entered the employ of the Pennsylvania Railroad Company in the paint department of the Altoona car shops, and a few years later was promoted to the position of master painter, which position he held until 1875, when he resigned. He then engaged in the contract painting business under the firm name of Webber & Darr, in Philadelphia. This partnership existed until 1886, when it was dissolved, Mr. Webber continuing the business. His contracts were mostly with the Pennsylvania Railroad Company along its lines between New York and Pittsburg, and consisted of painting stations, bridges, towers, etc. He prospered and was very successful in his business affairs. The past several years the business was managed by his son, James L. Webber, from Philadelphia. On January 1, 1903, Mr. Webber took his son into partnership with him and since then the business was conducted under the firm name of J. W. Webber & Son."

Established 1878

RAILWAY MASTER MECHANIC

ublished by the

BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 501 and 503 The Plymouth Building
305 Dearborn Street, Chicago

TELEPHONES - - { Harrison 3357
{ Automatic 7357

Eastern Office: Room 714, 132 Nassau Street, New York City.

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent.

Vol. XXIX. CHICAGO, MARCH, 1905. No.3

Contents.

BEGINNING with this issue we will publish in the advertising pages an index of the contents of trade catalogues. By referring to the index the name of the firm and number of their publication can be obtained, after which it is an easy matter to get the desired catalogue.

The Railway Mechanical Index has been of such benefit to the busy man that we are endeavoring to help him in more ways. One prominent motive power official writes us regarding the mechanical index, giving as his opinion that the "idea is a capital one" and that as a subscriber to a number of railway publications he frequently reads an item, and afterwards wants to refer to it, and more time is occupied in looking for the article than the average man can devote to it. This index, he thinks, ought to overcome this loss of time, and will be a great help to a busy man.

The same point comes up in catalogues every day. A man will glance through them when they arrive and later will try to remember where he saw the machine in question. By referring to the Index of Trade Catalogues, it can be found in a very short time.

IN our February issue we gave a general description of the buildings of the Lake Shore round-house, at Elkhart, Ind. The question of light in the building was not given the attention which is due it. The outside wall is nearly all windows, as can be seen by referring to the illustrations. Besides this the doors are provided with windows, making the light as good as in any machine shop.

This issue has a description of the sand house, oil house, electric wiring, washing out system and heating system. The washing out system is of interest on account of its simplicity, and using the heat in the old water for heating the washing water. This is accomplished without pumping hot water through pumps.

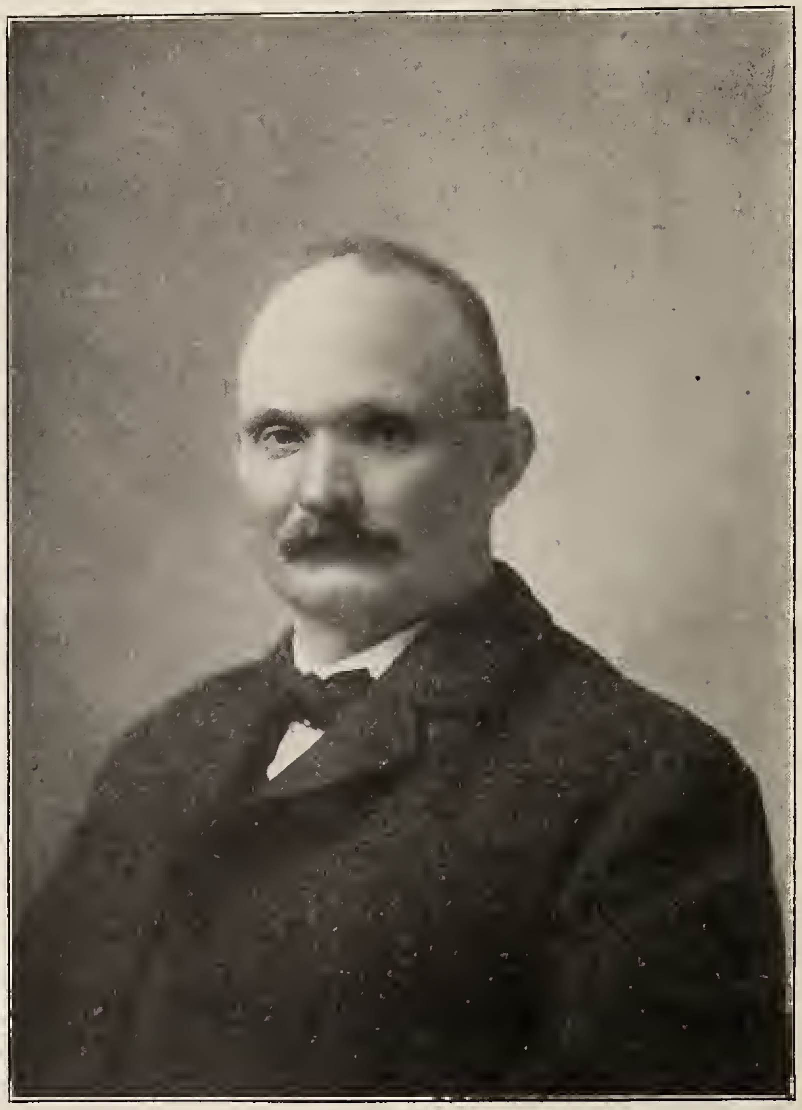
The system of heating has proved very efficient during the cold weather, as the temperature of the houses never fell below 50 degrees.

When these houses were first designed it was the intention to seal the inside of the roof with one inch hemlock in order to remove all obstruction to the free passage of smoke and gases that would enter the house when an engine is brought in or for other causes removed from under the jack. This plan was later abandoned on account of the gases having no occasion to pass any other way but up to the highest point of the house. Without the sealing these could pass over the cross-beam without any interference, while if the sealing were put in they would find this obstruction, which would force them down.

THE subject of making the shop men and especially the foreman familiar with the cost of material is continually brought to mind in passing through a shop. Workmen will not take care of the tools entrusted to them if they do not know their value. If a workman could be made to understand that the files given to him are worth from fifty cents to a dollar and a quarter he would take better care of them. Very few foremen and men have ideas as to the cost of any class of work. On this account a man will consume from seventy-five cents to a dollar's worth of time in repairing a valve that can be bought for twenty-five cents. Again, expensive material will be scrapped when the price of repairing seems too high to the man not familiar with the original cost. A good system of familiarizing the men with the cost of material is to put the original cost on all goods in the storehouse. In shops where material is manufactured to any extent the shop order plan works well. This consists of a lot order being taken out for any material manufactured, and the shop should charge all the time and draw the material for the order. When the order is completed the total cost is obtained from the time and material charged. The foreman should then be made familiar with these costs in order that he may devise some means to reduce the price. The figures should also be sent to the purchasing agent to ascertain whether he can buy the same material in the market at a smaller cost.

This is carried out to such an extent on one system that a man in the mechanical engineer's office receives the cost of all articles manufactured on the system. He enters these on a card index, taking into account the amount of material manufactured in the lot. If there is any great difference in the price of manufacturing the same article at different points, the subject is investigated. By this means the shops become competitors and many devices are made to manufacture material at less cost.

THE question of the special apprentice has been pretty thoroughly discussed within the last few years. In the December issue we published a communication from a technical graduate, who had served his time as a special apprentice. This communication, as well as those following in the January and February issues, dealt with the vital points in the special apprentice problem. There is however, another point in regard to the technical press. This is the college man, who works in the railroad repair and construction shops during his summer vacation es machinist's helper. If this man works his three summer vacations in as many different shops he gets more practical experience than the apprentice will get in twice that length of time. That is, he sees and does work as it is done in different places. This is the reason why a "tramp machinist" makes a better man than one who has always been in the same shop or on the same road. One railroad considered the experience gained in other shops of such value that an apprentice, after serving his time, was discharged and could not enter the service of the road again until he had had several years' experience in other shops.



MR. THOMAS FITZGERALD.

GENERAL MANAGER BALTIMORE AND OHIO RAILROAD.

Mr. Fitzgerald has been in the continuous service of the Baltimore & Ohio since 1867, when he began as water boy. He served successfully as telegraph messenger, telegraph operator at various points, train dispatcher, chief train dispatcher, superintendent of trains and train master until October 5, 1883, when he was appointed master of transportation of the Trans-Ohio division. On January 1, 1886, he was made superintendent of the Central Ohio, Lake Erie and Straitsville divisions, and on September 1st of the same year was transferred to the superintendency of the eastern division. On May 20, 1893, he was appointed superintendent of transportation, and on February 1, 1894, was also made general superintendent of the main system and branches and the Philadelphia division. He was general superintendent of the entire system from July 1, 1899, to March 1, 1900, and since the latter date has been general superintendent of the Philadelphia division, main line and branches. On February 1, 1905, Mr. Fitzgerald was appointed general manager.

A great many master mechanics do not care to take in a man for only three months, saying that when they are able to do the works satisfactorily that their time would be up and thus would be unprofitable. This is based simply on theory, prejudice, or possibly on one trial, in which the young man tried, proved to be one who would never make a railroad man. A prominent general superintendent of motive power, in expressing his views on this subject, said that he employed quite a number of college men in his shops during their vacation and found that in nearly all cases they were very valuable, and he considered it a good investment for the company, besides being of great advantage to the student.

There is no doubt that mixing theory and practice makes the best man. If a man works during his vacation he gets the practical end at a time when he needs it most. This is because he can see in practice what he is studying theoretically, and also in the latter part of his college life, when a large part of his work consists of practical research, he combines his knowledge of the shops with that acquired by books.

Why would it not be just as well to take a man as described and start him in the roundhouse as a machinist as soon as he graduates, to let him work up the ladder of responsibility in place of taking men with no experience and keeping them at special work for three or four years, after which it is an acknowledged fact that they are not fitted for any position.

New Roundhouse of the Lake Shore and Michigan Southern Railway at Elkhart, Ind.

(Continued from page 52.)

SAND HOUSE.

The sand is handled by Lake Shore standard apparatus. That is, after the sand goes through the drier it is forced by air pressure to the height of the bins, after which it is distributed on a belt conveyor to the separate bins.

OIL HOUSE.

The oil house, although small, is of interest. Tanks are placed in a basement so as to be easily filled from a tank car. The level of the floor above the tanks is the same height as the floor of a car so that when oil is received in barrels it can be rolled in and the barrels emptied into the tanks through holes in the floor. In the store room are a number of Bowser oil pumps connected to the corresponding tanks in the oil house. From these oil is pumped directly into the cans as required.

There is a suspended platform above the floor of the oil house for storing waste. The waste is elevated by means of a 4-inch air hoist to this platform.

ELECTRIC WIRING.

The electric power for the plant is at present bought from outside parties, but the wiring was laid out for the purpose of making the system perfectly balanced, so that if at any time the company decides to install its own power plant it can do so without any serious difficulty.

The power is delivered at 2,200 bolts, 2-phase, and a Shaw transformer reduces the voltage and divides it into three phases for the motors. For lighting 2-phase current is used.

There are six motors used in connection with the plant. Three of these are in the coal and sand house, while two are on the turn tables, and one is in the machine shop. These are all 3-phase, 400-volt induction motors. The feed wires for the turn-tables are run under ground

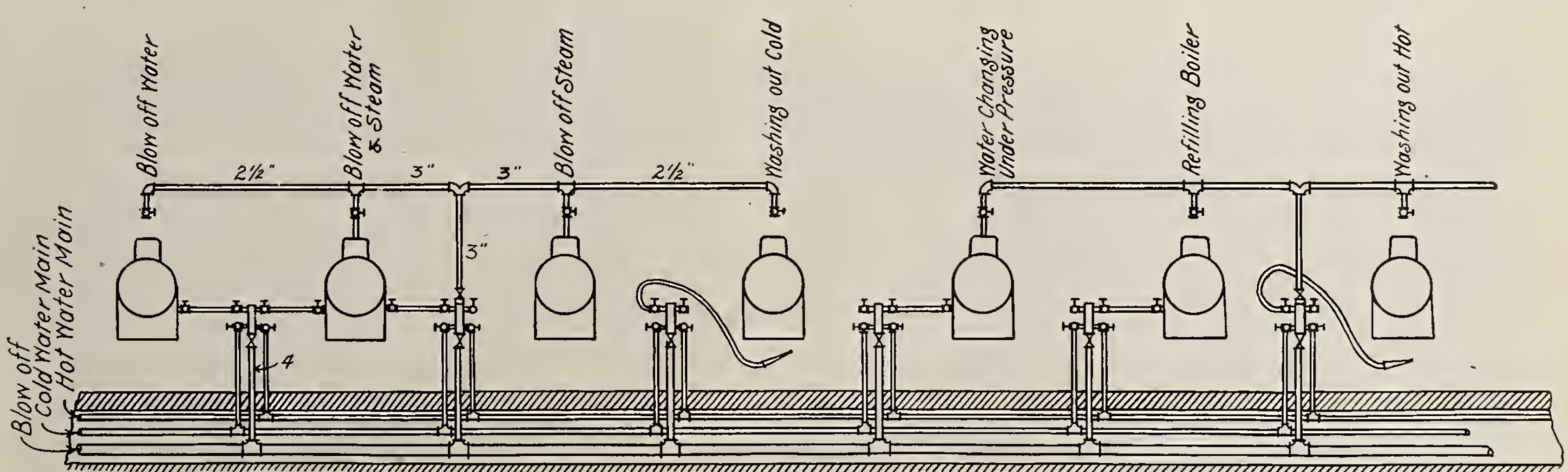


FIG. 1—SYSTEM OF BOILERWASHING, ELKHART ROUNDHOUSE.

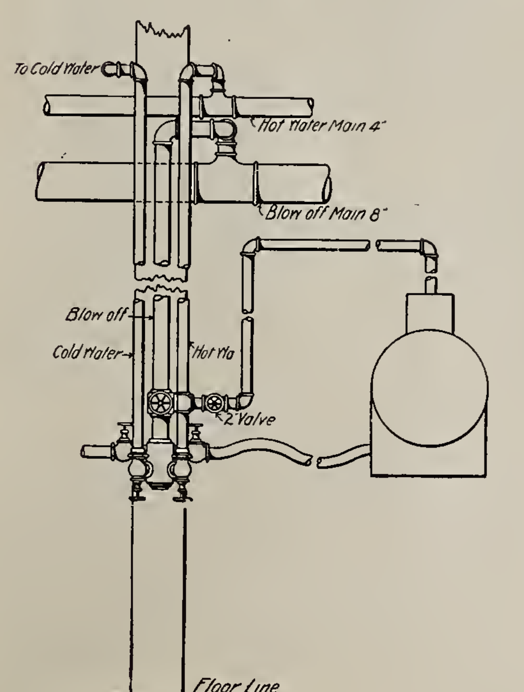


FIG. 2—SYSTEM OF BOILERWASHING, ELKHART ROUND HOUSE.

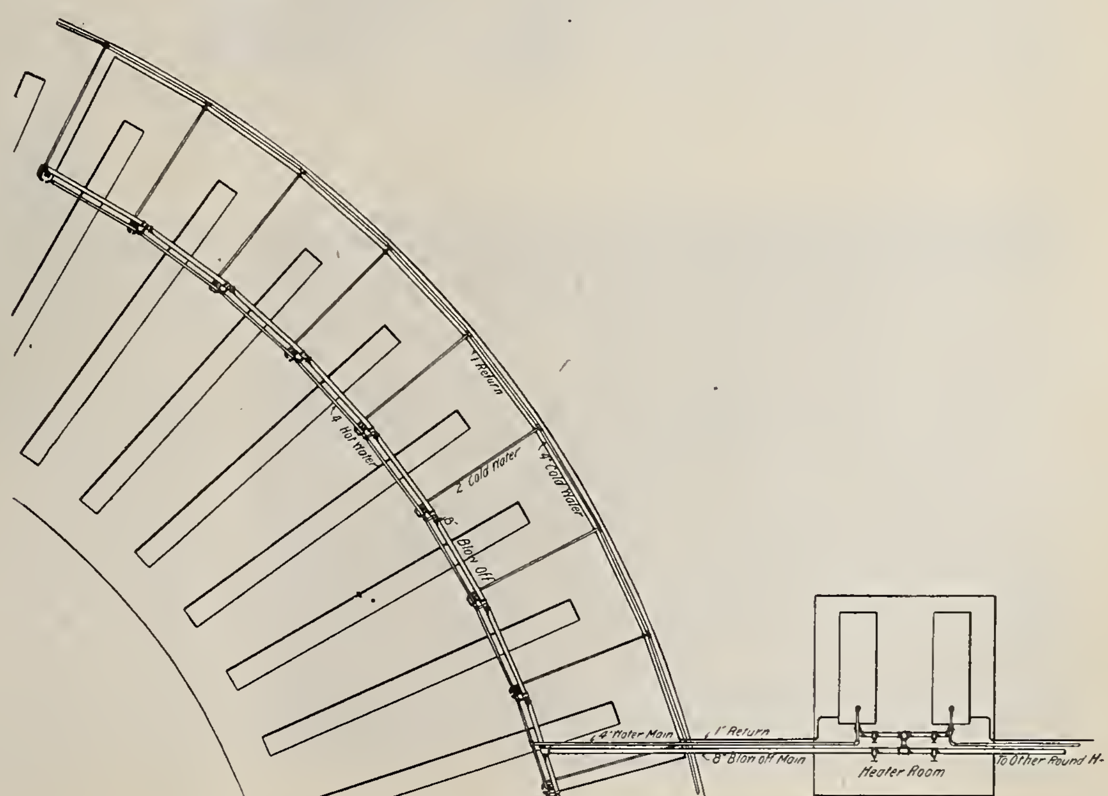


FIG. 3—SYSTEM OF BOILERWASHING, ELKHART ROUND HOUSE.

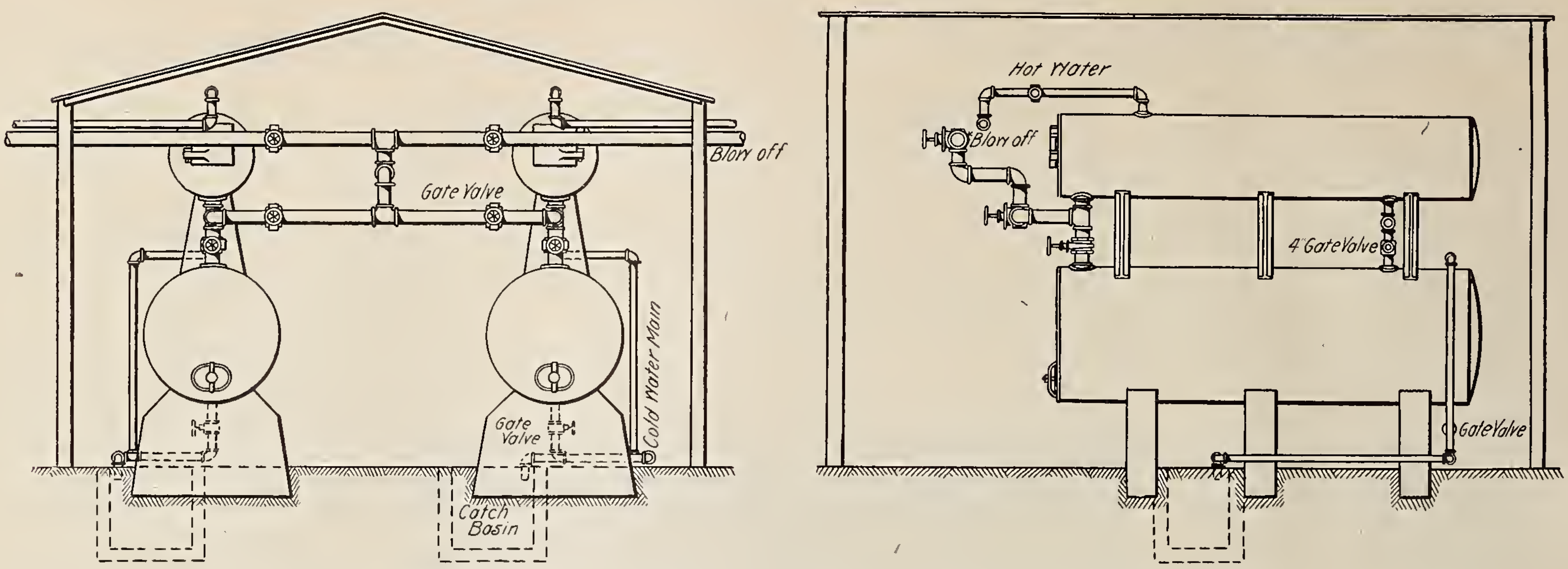


Fig. 4—Heater for Boiler Washing, Elkhart Roundhouse.

in a pipe, laid in asphalt, to the center of the table. The current is taken off of collector rings at this point for the motors.

The wiring for lighting is on the 2-phase, 3-wire system for 110-volt lamps. This makes a voltage of about 150 across the outside wires. This system was adopted to perfectly balance the power on the 2-phases. The wires are carried on posts on top of the house, where they are tapped between each stall for arc and incandescent lighting. They are brought down in loricated

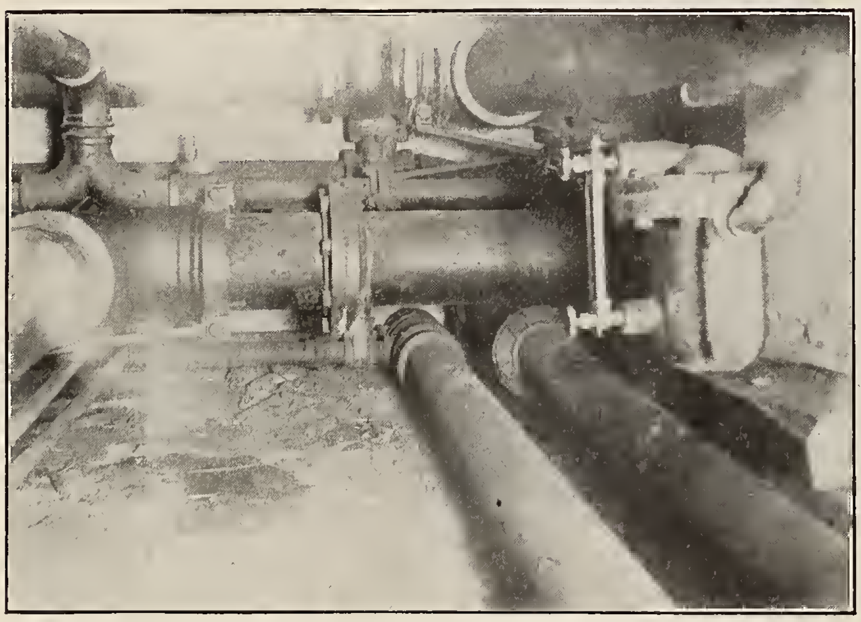


Fig. 5—View of Piping in Tunnels, Elkhart Roundhouse.

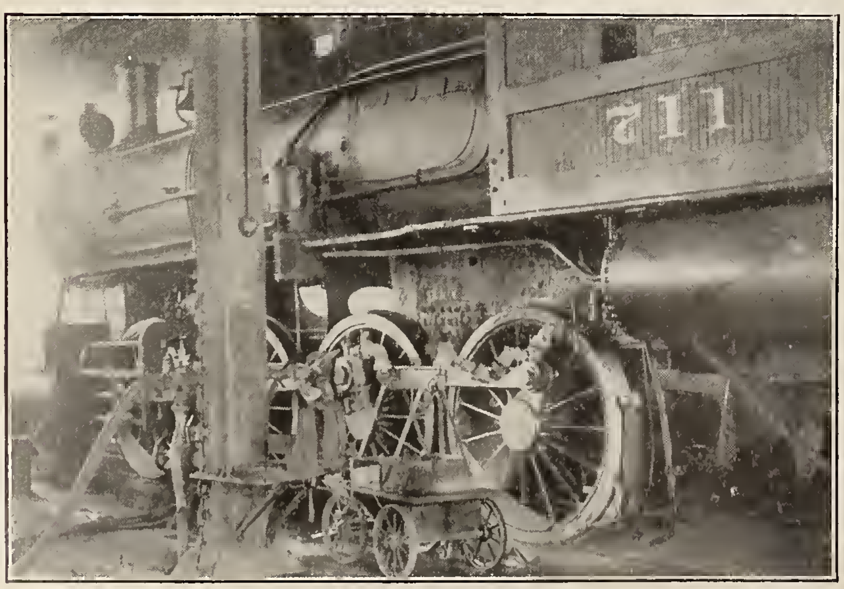


Fig. 6—Connection Between "Mixing Box" and Blow-off Cocks, Elkhart Roundhouse.

Fig. 7—"Mixing Box," Elkhart Roundhouse.

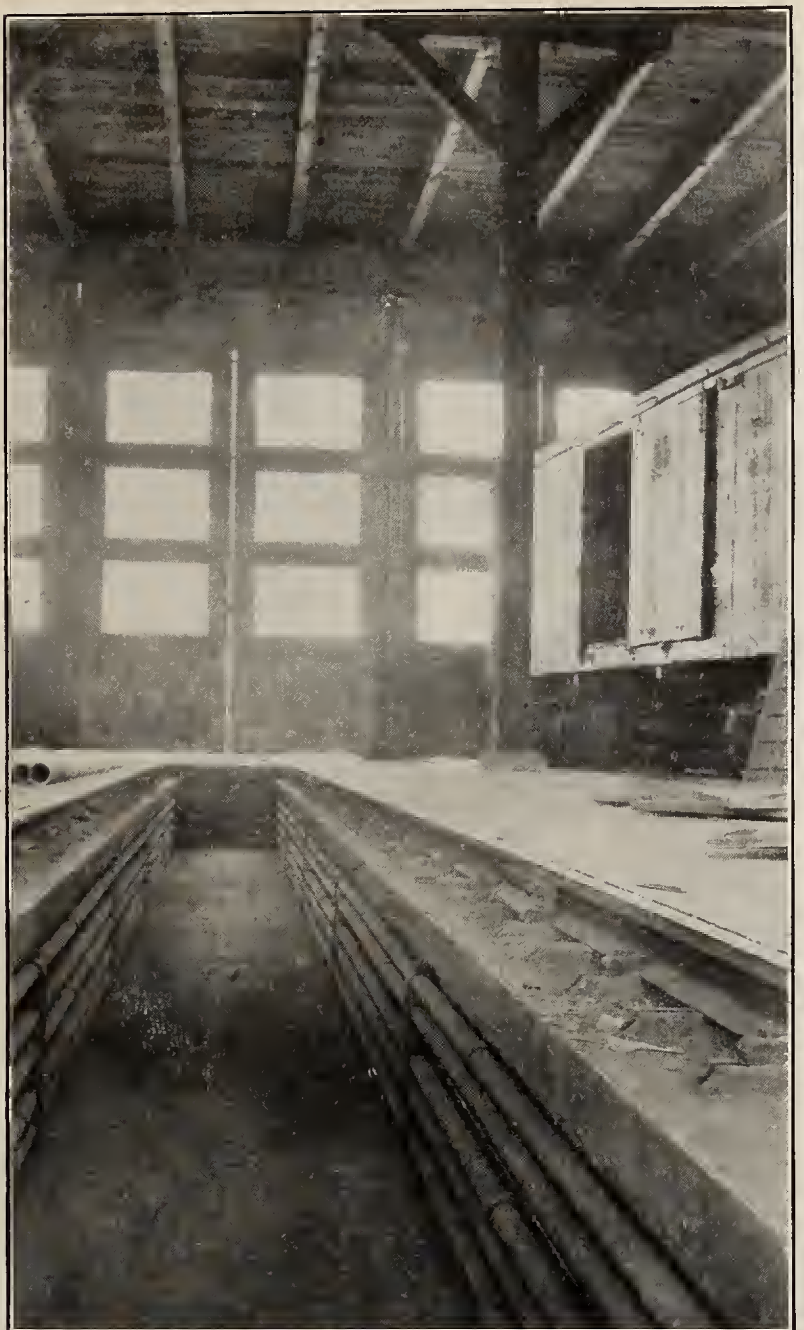


Fig. 8—Heating Pipes in Pit, Cast Iron Coping for Pipes and Windows in Doors, Elkhart Roundhouse.

pipes to a common fuse box located 14 feet above the floor. From this box another pipe leads to the arc lamps and one runs down the posts to a twin receptacle for incandescent lamps and plugs. All wires in the building are run in loricated pipe to protect them from gases, which injure the insulation.

WASHING OUT SYSTEM.

The system of washing out was installed by the Erie Heating Co. of Chicago. This is their patented system, with the exception of the "mixing boxes," located on the posts, which were designed by Mr. R. B. Kendig, M. E., of the Lake Shore.

There are three pipes in the tunnels leading from the power house around the outside of both houses, with taps between the pits. These taps join in the "mixing box," shown in the illustration. Every fourth post has another pipe leading from the "mixing box" to an overhead pipe for connection to the dome.

For washing boilers the dome connection is made first, and all the steam blown out through the blow-off pipe. Then the water is blown off through the blow-off cocks at the side of the fire box through the same pipe. Then either cold or hot water is pumped, either from the top, sides or both, for washing. The water pressure for this is 100 lbs. If it is desired to fill a boiler quickly three connections can be made, one on each side and one in the dome.

Figures 1, 2 and 3 represent diagramatic views of this system, with overhead piping, but which serve to

Fig. 9—View of Drop Pits, Elkhart Roundhouse.

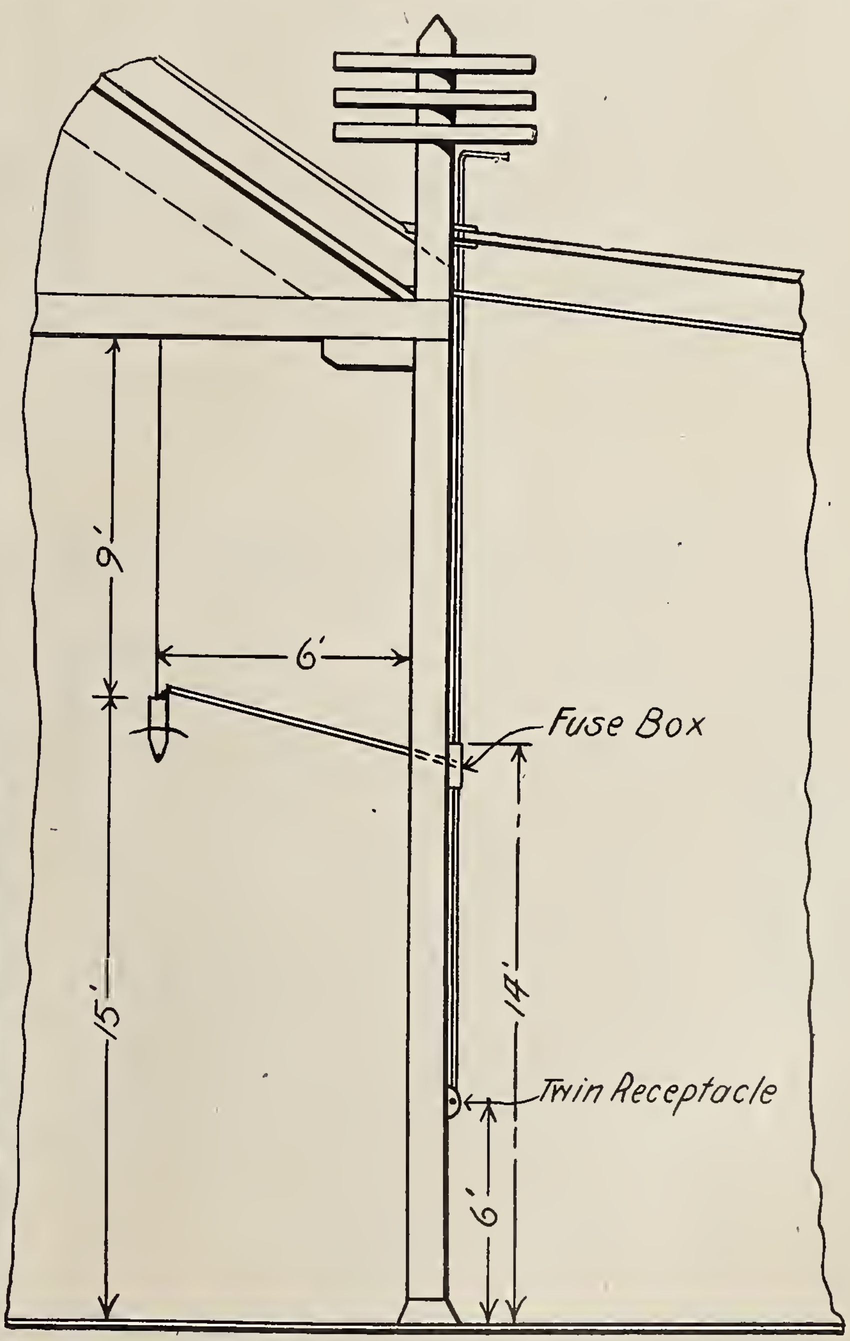


Fig. 10—System of Wiring, Elkhart Roundhouse.

Fig. 11—View of Wiring and Smoke Jacks on Roof Elkhart Roundhouse.

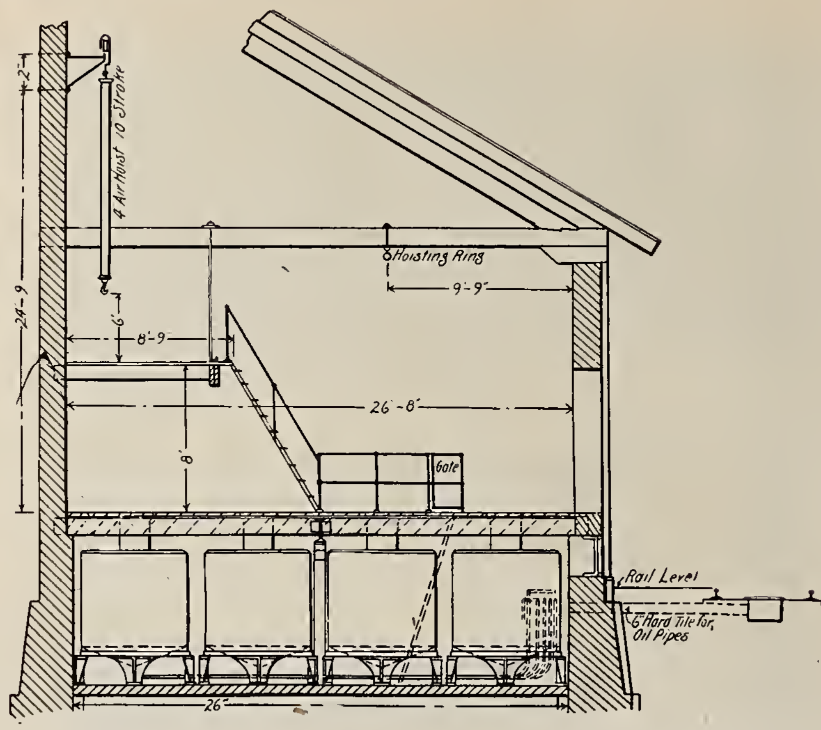


Fig. 12—Cross Section of Oil House, Elkhart Roundhouse.

illustrate the system. When steam or hot water are blown off they enter the heater through the blow-off pipe shown in Fig. 4. The steam will rise to the upper drums and the hot water will enter the lower dome. The inside of these drums are full of pipes, through which cold water is pumped for heating. This is the source of the hot water used for washing and filling the boilers. boilers.

At present twenty boilers are washed a day in these two houses, whose total number of stalls is fifty.

If it is desired to only change the water in the boiler without washing, the blow-off cocks at the side are connected up to the "mixing box," and the overhead pipe is connected to the dome. Hot or cold water can then be put in the top while the old water is removed through the bottom.

The connection between the "mixing box" and blow-off cocks consists of six McLaughlin joints mounted on a small truck. On the truck there is a tool box to carry all the wrenches needed for coupling or removing plugs from the engine.

HEATING.

The heating of the house is by direct radiation from steam pipes. The pipes in the pits are protected by an iron coping. This system was installed after a thorough trial of the hot air system.

The steam is supplied from the exhaust of the air compressor and pumps, with a small amount of live steam from the boilers.

2-6-2 *Type of Locomotive for the Chicago & Western Indiana*

THE Chicago & Western Indiana recently received three suburban locomotives from the Rogers Locomotive Works. These are to be made to handle the suburban passenger traffic formerly handled by the C. & E. I. This is quite a heavy service, as the engines will have to handle ten coaches, making fifteen stops in eleven miles.

The engines are provided with radial swing rear trucks. The side water tanks are connected with the water space under the floor of the coal pocket. A well extends above the coal which makes it possible to take water from the standpipe in the usual way.

The general dimensions are as follows:

Name of road	Chicago & Western Indiana
No. of engines built	3
Type	2-6-2 double ender
Fuel	Illinois bituminous coal
Cylinders	18 in.x26 in.
Driving wheels—number	3 pr.
Driving wheels—diameter	63 in.
Driving wheel centers—material	Cast steel
Driving wheel tires—size	3½ in.x5½ in.
Driving wheel axles—material	Steel
Driving wheel axles—journals	9 in.x12 in.
Driving wheel—wheel base	14 ft.
Total wheel base of engine	31 ft. 2 in.
Weight on drivers	130,000 lbs.
Weight on truck	20,000 lbs.
Weight on trailers	40,000 lbs.
Weight—total	190,000 lbs.
Heating surface—flues	1,694.9 sq. ft.
Heating surface—firebox	146.5 sq. ft.
Heating surface—total	1,841.4 sq. ft.
Grate area	46.8 sq. ft.
Boiler—type	straight top, radial stayed wide firebox
Boiler—diameter, inside 1st course	60 in.
Boiler—material	Flanged steel

Fig. 1—2-6-2 Type of Locomotive for the C. & W. I. Railroad.

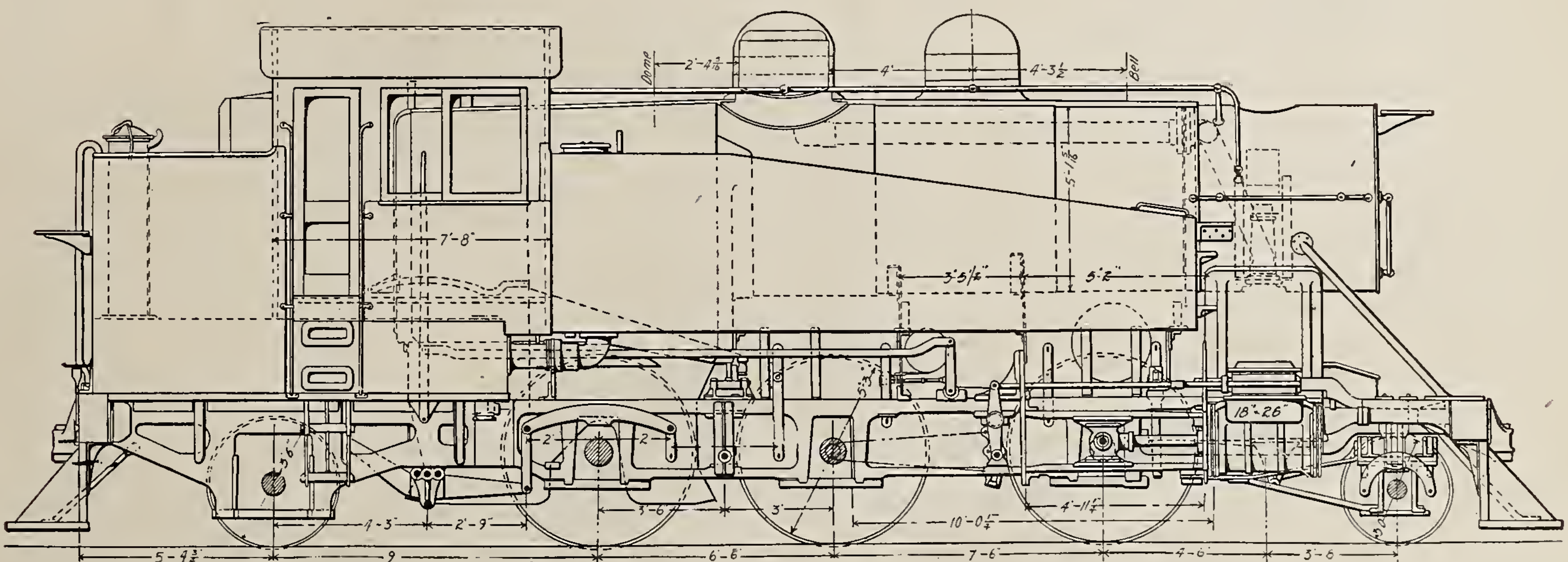
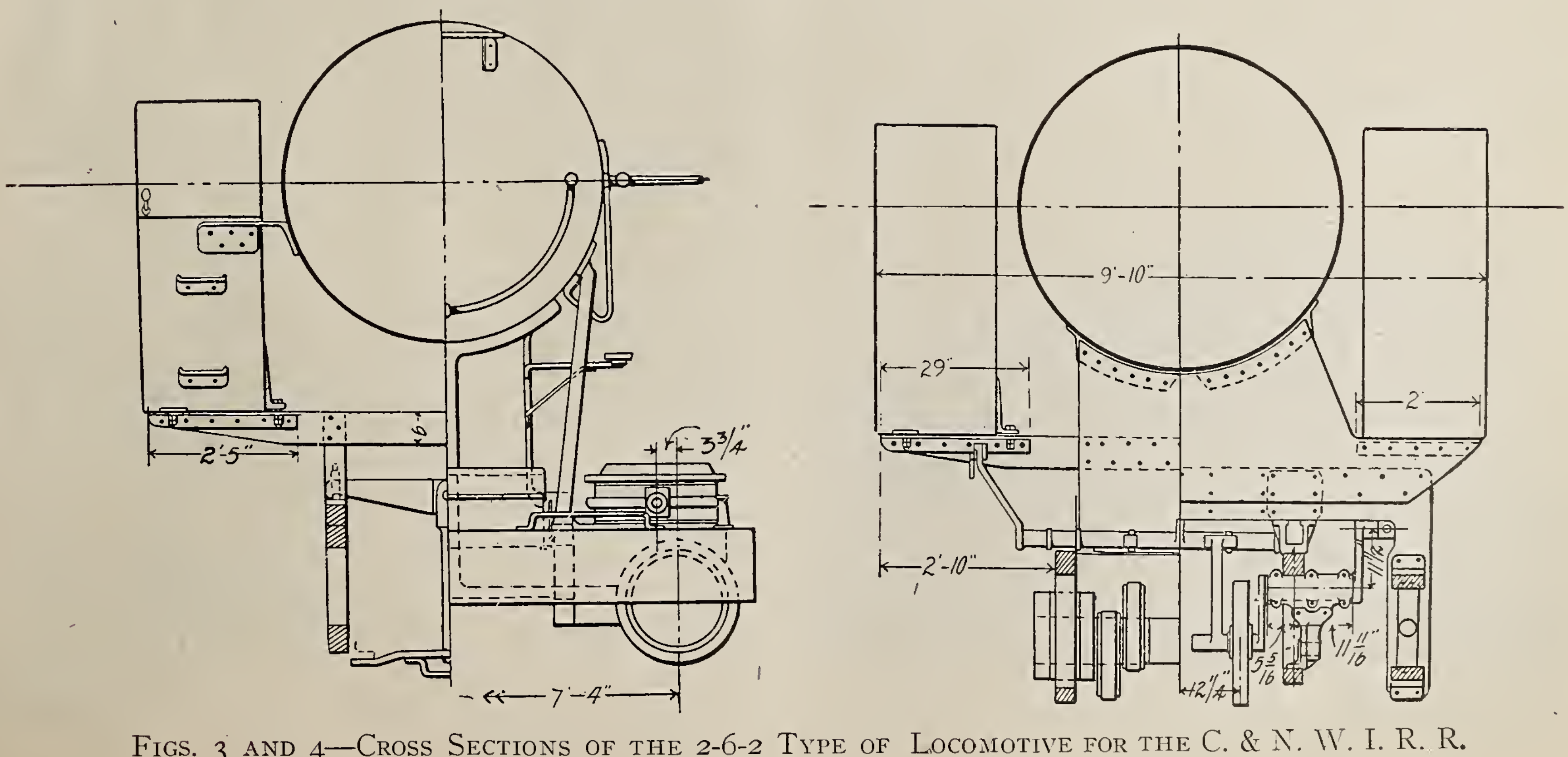


Fig. 2—Elevation of 2-6-2 Type of Locomotive for the C. & W. I. R. R.



Figs. 3 and 4—Cross Sections of the 2-6-2 Type of Locomotive for the C. & N. W. I. R. R.

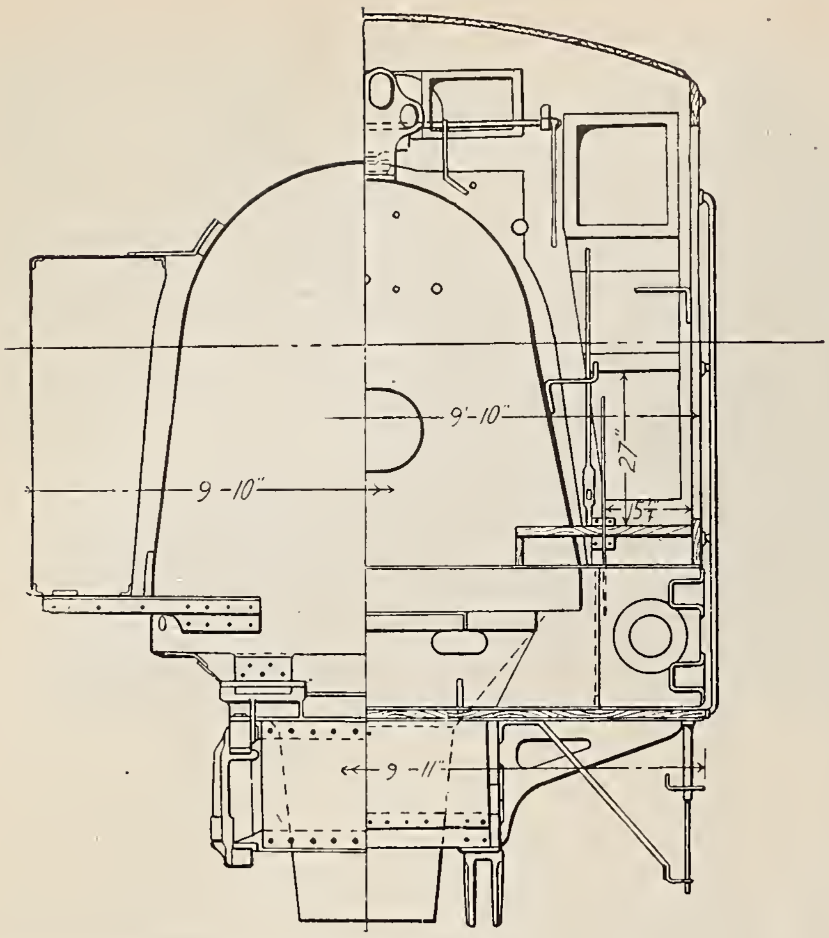


Fig. 5—Cross Section of the 2-6-2 Type of Locomotive for the C. & W. I. R. R.

Boiler—working pressure	200 lbs.
Boiler—thickness of barrel	21-32 in.
Boiler—thickness of dome course	21-32 in.
Fire box—thickness of crown	13-32 in.
Fire box—thickness, flue sheet	½ in.
Fire box—thickness sides	11-32 in.
Fire box—thickness back	⅜ in.
Grate—length	102 in.
Grate—width	66 in.
Flues—number	249
Flues—thickness	No. 11 B. W. G.
Flues—length	13 ft. 10 in.
Flues—diameter	2 in.
Flues—material	Charcoal iron
Engine truck—style	Radial swing bolster
Engine truck wheels—diameter	36 in.
Engine truck wheels—kind	Cast steel center, steel tired
Trailing wheels—diameter	42 in.
Trailing wheels—kind	Cast steel center
Trailing wheels—journals	8 in.x13½ in.
Tank—capacity, water	3,500 gal.
Tank—Capacity, coal	5 tons
Safety valves	two, 2½ in.
Lubricator	Triple sight feed
Headlight	16 in.
Brakes	Automatic air
Boiler covering	Sectional magnesia
Gauge	4 ft. 8½ in.
Valves	Balanced slide
Cab material	Ash
Tractive effort	22,700
Ratio weight on drivers to tractive effort	5.73
Ratio tractive effort to total heating surface	12.3
Ratio total heating surface to fire box heating surface	12.6
Ratio total heating surface to grate area	39.4
Ratio fire box heating surface to grate area	3.14
Ratio of total heating surface to volume of both cylinders	241
Ratio of total heating surface to weight of one cylinder full of steam at boiler pressure	1,023
Ratio of grate area to volume of both cylinders	6.11

New Shops for the Pere Marquette R. R. at Grand Rapids, Mich.

Storehouse.

This is a two-story building of brick walls and wooden roof and supporting structure. It rests on a foundation of the same style as the other buildings, and is of the same general type of architecture. The first floor is 4 ft. above the surrounding level and opens onto a large platform enclosing three sides of the building. This part is arranged for the storage of heavy material, and the second story is for lighter material and offices. A number of double rolling lift doors are arranged in one side of the building for unloading to and from cars, which are placed on the storehouse track, located close to the building. The main entrance to the offices is in the end nearest the shops, where there is an inclined way leading up to the platform. The floor plans and general construction are shown in the illustrations.

The Oil House.

This is a brick and steel building 41x49 ft., located near the store house to which it is connected by the platform. It is arranged with a basement, where the storage oil tanks are located, and a single story above containing the room for issuing oil and storing waste and cans. There are five storage tanks of which there are 7 ft. diameter by 26 ft. long and two are 7x8 ft. They are arranged for filling direct from tank cars, standing on an adjacent track, by gravity, and can also be filled from barrels through an opening in the floor above each tank. The oil is drawn off by gravity into an auxiliary tank from which it is forced by air pressure to the faucets above. By this means it is not necessary to have pressure on the large tanks at any time. Racks are provided for storing the engineer's cans. This makes it unnecessary to carry them to and from the engine house, as is the case at most terminals.

The building is heated by direct radiation from coils located on the side walls, and is so equipped with electric lamps that the use of oil lamps is avoided.

Cinder Pit.

The cinder pit is situated near the oil house and is of the usual type, built of concrete throughout. It is the standard pit of the Pere Marquette and has a wide shelf between the pit proper and the depressed track for convenience in shoveling. There is room to clinker two engines at once.

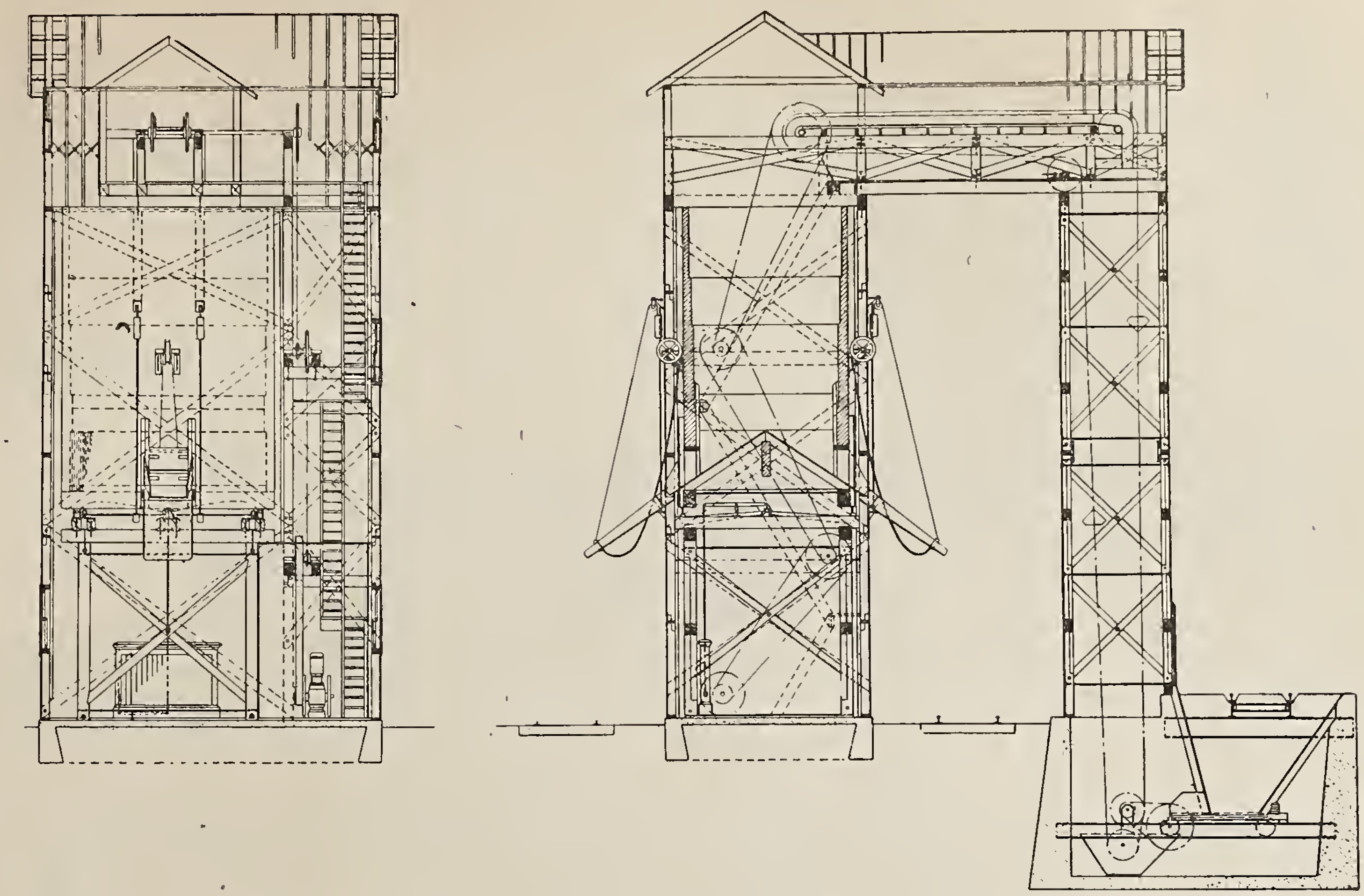


Fig. 1—Elevation of Coaling Plant, Pere Marquette Shops at Grand Rapids.

Coaling Plant.

This building is located on the odd leg of the "Y" near the classification yards. It is entirely automatic in operation and is one of twelve similar plants designed and erected by the Fairbanks, Morse & Co. for this railroad company. It is of wooden construction and covers two main tracks and a supply track. The accompanying line drawings outline the conveyor system and the general construction of the building. The coal is received on the supply track, which is elevated about two feet above the main track. It is dumped from the car into a 30-ft. receiving hopper below the track. From this it is carried by an automatic loader and delivered at a uniform rate to a boot, through which the conveyor buckets pass. This conveyor elevates the coal to the top of the building and carrying it across one of the main tracks, delivers it into the 100-ton storage pocket. The conveyor buckets are 30 ins. long and 24 ins. wide, built of heavy steel and mounted on two stands of heavy malleable chain. When moving at the rate of 100 ft. per minute, it has a capacity of delivering 80 tons of coal per hour.

The storage pocket is mounted on a scale, by means of which it is possible to determine accurately how much coal was delivered to a locomotive or how much is still in the pocket. The bottom of the pocket is hoppered so delivering is made directly to the locomotives on either main track through special drop gates and movable aprons.

The motive power for driving the conveyor is obtained from a 12 h. p. Fairbanks, Morse vertical gasoline engine located on the ground floor below the

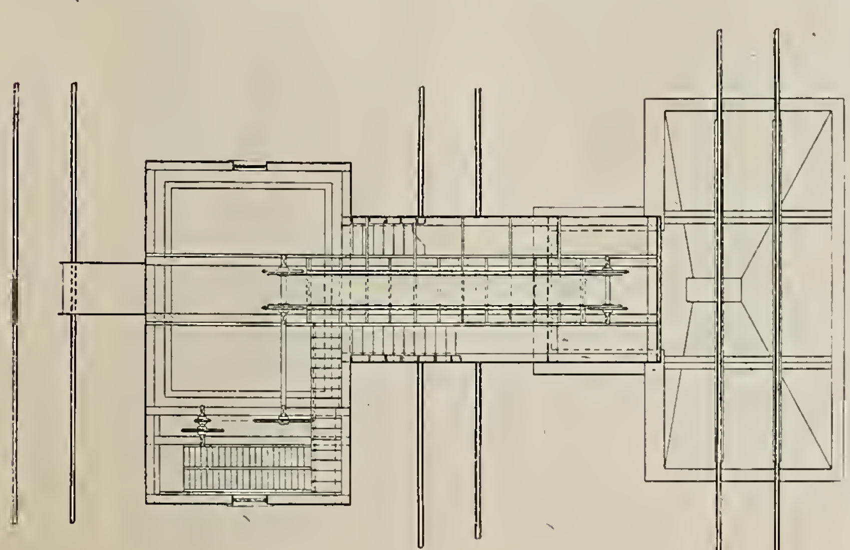


Fig. 2—Plan of the Coaling Plant, Pere Marquette Shops at Grand Rapids.

Fig. 3—View of Storehouse, Pere Marquette Shops at Grand Rapids.

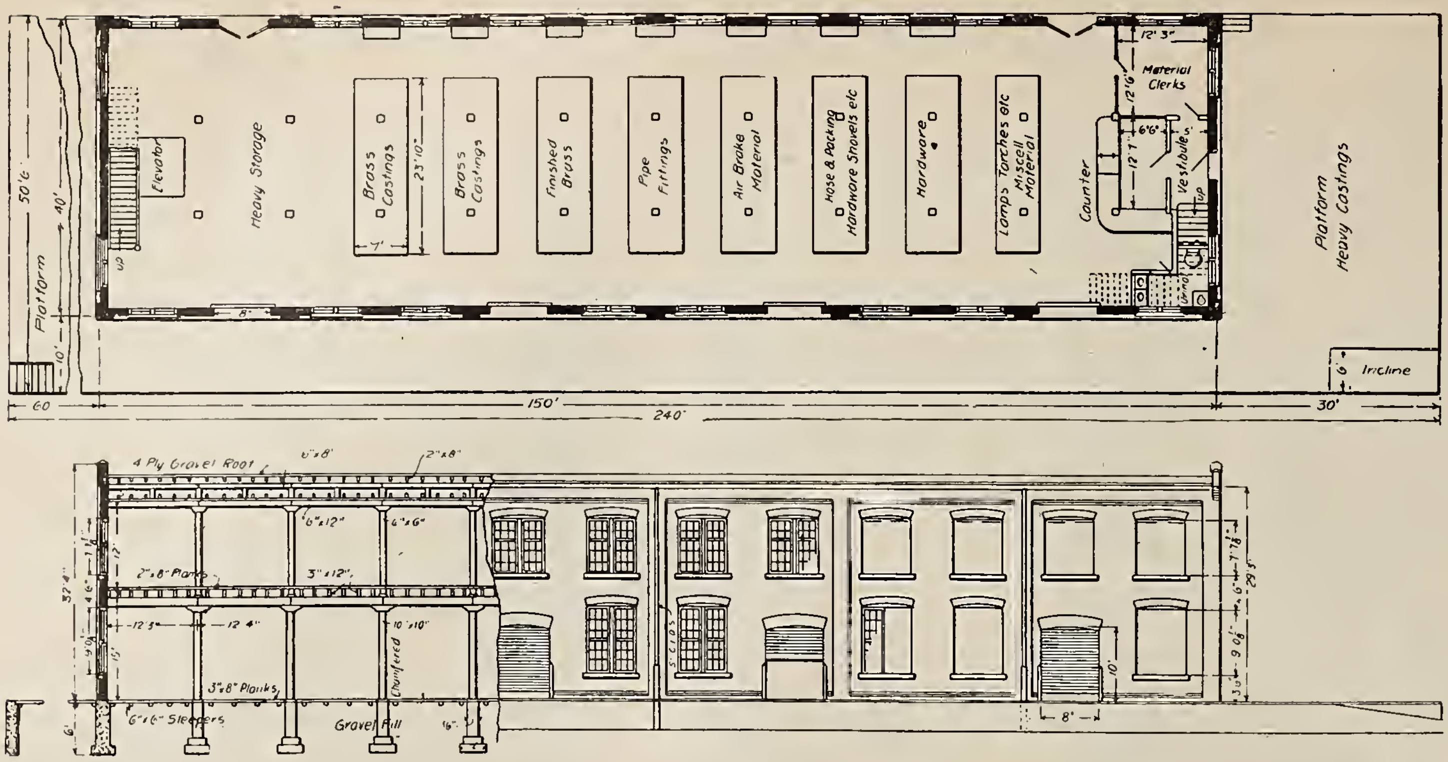


Fig. 4—Elevation, Plan and Section of Storehouse, Pere Marquette Shops at Grand Rapids.

storage pocket and driving the conveyor through a series of belts and cable drives with countershafts by means of which a speed reduction suitable for the conveyor is obtained.

The Engine House.

This is a rectangular building 433 ft. 9 ins. by 86 ft. 6 ins. in size, built of brick on a concrete foundation and covered with a composition roof of wooden construction. It is divided by brick walls into three separate rooms, each of which contains eight pits, giving a total capacity of 24 engines. By the use of rolling wood shutters it was possible to locate the building very near the transfer table pit, which will be covered when completed.

The roof slopes towards the outer wall from above the second post, at which point there is a vertical drop of about 6 ft. and then slopes towards the inner side. The roof is covered with four ply gavel laid on 1⅛-in. sheeting nailed to 2x10-in. joists.

There are two Dickinson cast iron smoke jacks over every alternate pit, and one over each of the intermediate pits, thus accommodating engines headed in either direction. There is a 30-in. cast iron ventilator over each pit and pivoted sash in the vertical skylights are arranged for clearing the house of smoke.

The doors are made of narrow strips of hard wood flexibly fastened together and are rolled upon a large roller which is operated through reduction gears from the floor by a pendant chain. The doors are provided with substantial girders anchored to the brick work on each side.

The pits are of the type now being installed in all the later engine houses, being made of solid concrete bottoms and sides with a catch basin located on the inner end towards which the pits drain. The rails are spiked to wooden timbers laid on top of the concrete. Arrangement has also been made for a solid support for the jacks to rest on along the sides at either end of the pit. The concrete has simply been carried out eight inches farther and 8x12-in. blocks 7 ft. long anchored on top. A drop pit serves three engine pits and can be used for either drivers or trucks. This is of simple concrete construction arranged to use a hydraulic jack on a carriage. The removable sections of the rails are spiked to large timbers resting on projections in the sides of the concrete drop pit and are simply moved to one side when it is desired to drop wheels.

The natural lighting is very good, the windows being spaced close together in the outside walls and two end walls as well as the continuous glass surface in the vertical section of the roof. The electric lighting is by means of enclosed arc lamps hanging between each pit and rows of incandescent lights along the cross walls. There is also a plug for portable lights on alternate posts.

The heating is by a hot blast entering through three 15-in. openings with dampers into each pit. The heating coils and fan are located in the small fan house at the outside near the center of the house, and the air is carried through a concrete duct just inside the outer foundation and below the surface of the floor. Connections are made to this duct between alternate pits by means of tiling which has three branches coming into the pits.

The boiler feed and hot water system has been worked out with much care in order to have as little steam escape into the engine room as possible and to save all possible heat. This system comprises a steam blow-off pipe running the full lnegth of the engine house along the roof trusses over the center of the pits and having a standard connection above the center of each pit, to which a standard connection to be placed on the domes of all engines, will be connected for blowing-off the steam. Beneath the pit is a larger pipe, also running the full length of the house,

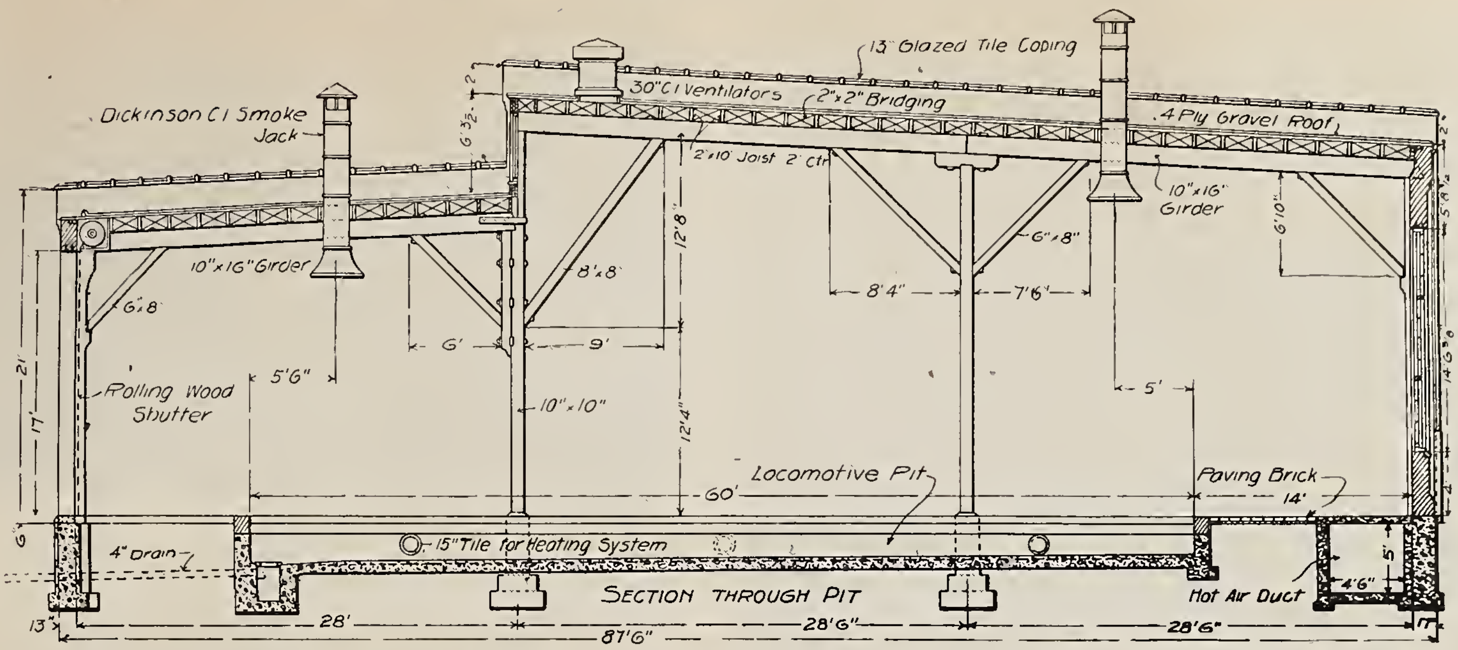


Fig. 5—Cross Section of Engine House, Pere Marquette Shops at Grand Rapids.

which has a connection between the pits to which a hose is connected for blowing off all hot water. At the end of the house these two pipes are connected together and pass underground through a conduit to a concrete, steel-lined tank just outside the power hose. This tank is divided into two parts by a brick wall rising from the bottom to near the top. The water; steam and sludge blown over from the engine house is discharged through a perforated tie near the bottom of one of these compartments. There is also a similar connection for blowing off the power house boilers. This half of the tank acts as a settling basin and the clear water rising to the top finally overflows the brick wall into the other compartment. At a point a little below the dividing wall an outlet from this compartment is located. This is provided with water seal and removable filter receptacle through which all water passes, flowing by gravity into the heater. There are connections to the sewer from the bottom of both compartments of the blow-off tanks, with valves inside the power house, through which the sediment can be blown out. The water, after passing through the filter, goes to a heater and then to the boilers. There is a connection from the hot well to the heater and also to the blow-off settling tank for use in conjunction with the supply from the engine house.

The Transfer Table.

The transfer table is equipped with both electric and gasoline power. This is to avoid any possible chance of the electric power giving out and for running the table when the rest of the plant is idle. The electric

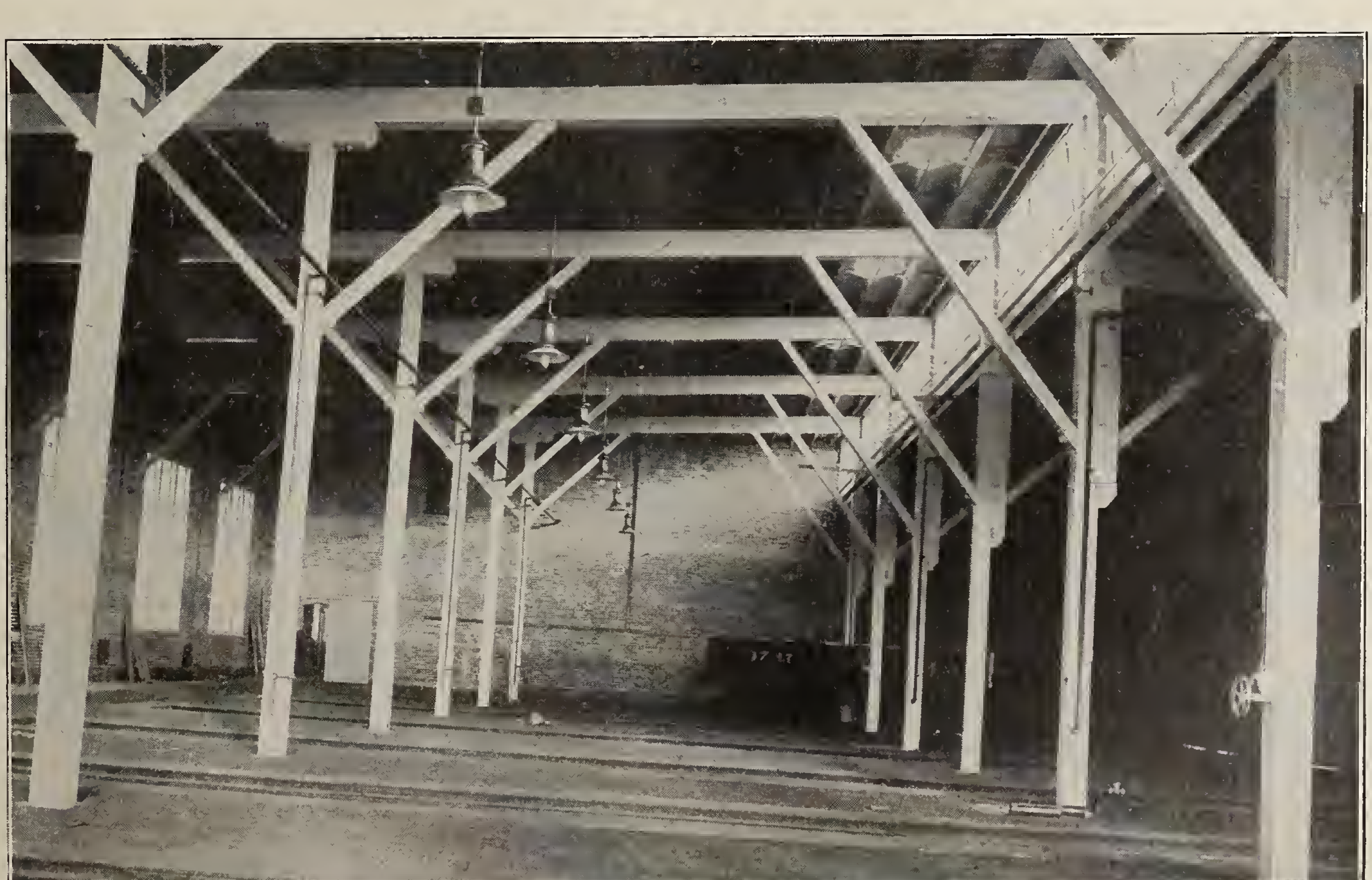


Fig. 6—Interior View of Engine House, Pere Marquette Shops at Grand Rapids.

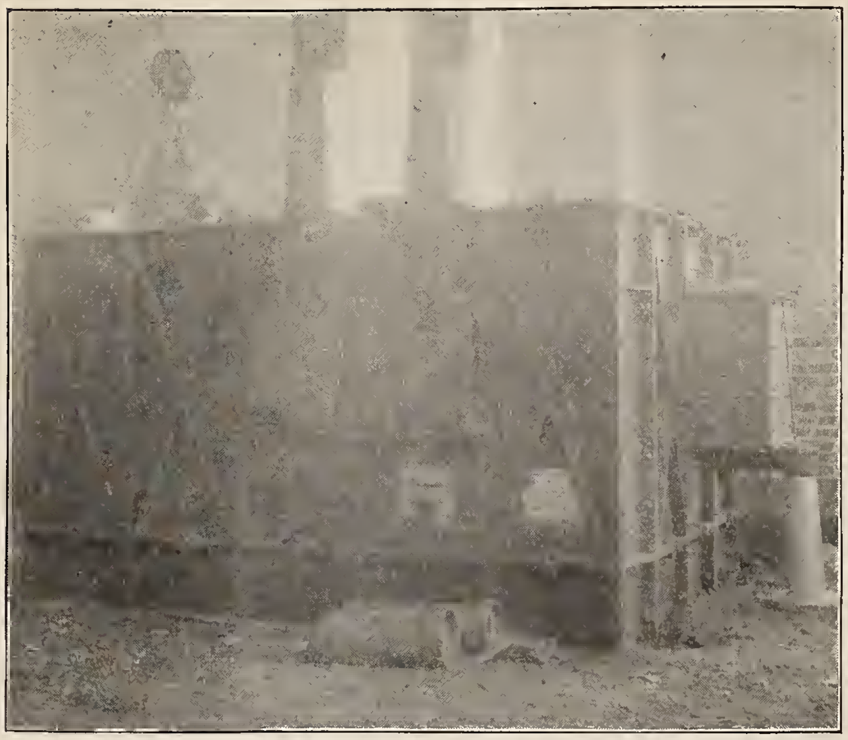


Fig. 7—Railway Materials Co. Combined Case Hardening and Spring Furnace, Pere Marquette Shops at Grand Rapids.

power consists of two 25 h. p. series wound street railway motors connected through a series parallel controller. The current is collected by two trolley wires supported by insulators in a recess in the side wall of the pit nearer the machine shop, where they are well protected from the weather. The gasoline engine is mounted on a rigid extension at one side of the table near the center. Both engine and motors drive the table through a set of gears which have an interlocking set of friction clutches, making it impossible to throw more than one gear into operation at the same time.

A large cab covers the machinery, with the exception of the motors, and contains the controller, levers and other operating mechanism. The engine and gears are readily accessible from the outside through doors provided for the purpose. The equipment also includes a winding drum and cable for moving dead engines and cars.

The frame work is built of steel in commercial shapes and is designed to give as shallow a pit as possible. There are two electric lights at the ends of the table arranged with reflectors for showing when the rails are lined up.

At present the pit is not covered, but it is the intention to entirely enclose it when the shop plans are completely carried out. The pit is walled with cement on the sides and the rails are laid on concrete stringers running the full length of the pit. This table was designed and built by the Geo. P. Nichols & Bros., of Chicago, under specifications of the railway company's engineers.

Power Distribution.

The electrical distribution of power and light from the generators is shown in the accompanying wiring diagram. It will be seen that the lights are all on a three-wire system, while the motors are on a 220-volt

Fig. 8—View of Flue Shop, Pere Marquette Shops at Grand Rapids.

two-wire circuit. The method of taking care of the unbalanced lighting load is as follows: At four equal distance points on the armature are taken off connections to four collector rings located beside the commutator on the generator shaft. Four brushes on these rings connect two-phase alternating current on switch to two transformers. The center of each coil is tapped and the common connection forms the neutral wire of the three-wire lighting system.

The connection of the generators to the main bus bars is made through circuit breakers, as indicated in the wiring diagram. From the main bus bars are carried two power circuits through tile pipe underground to a point near the center of the machine shop, where an accessible concrete box is located. At this point the main circuits split up into a number of separate circuits, each of which pass through a D. & W. service box located in the distributing box. Two power circuits for the machine shop pass upward and along the roof trusses in either direction, extending the full length of the shop. Connections to the motors and lighting circuits are made through D. & W. service boxes at the nearest convenient point. A separate circuit is taken from the main leads for the Crane motors, and also one for the transfer table. The circuit to the plug lights in the engine house is carried from the distributing box in the machine shop underground. All of the circuits supplying the motors in the vicinity of this main distributing center in the machine shop are tapped off through D. & W. boxes located in this concrete box. All of this wiring is carried underground through iron pipe to the machine.

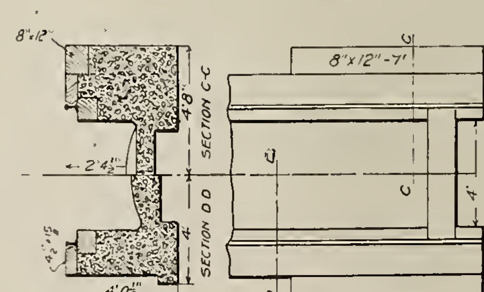


Fig. 9—Cross Section of Pit in Engine House, Pere Marquette Shops at Grand Rapids.

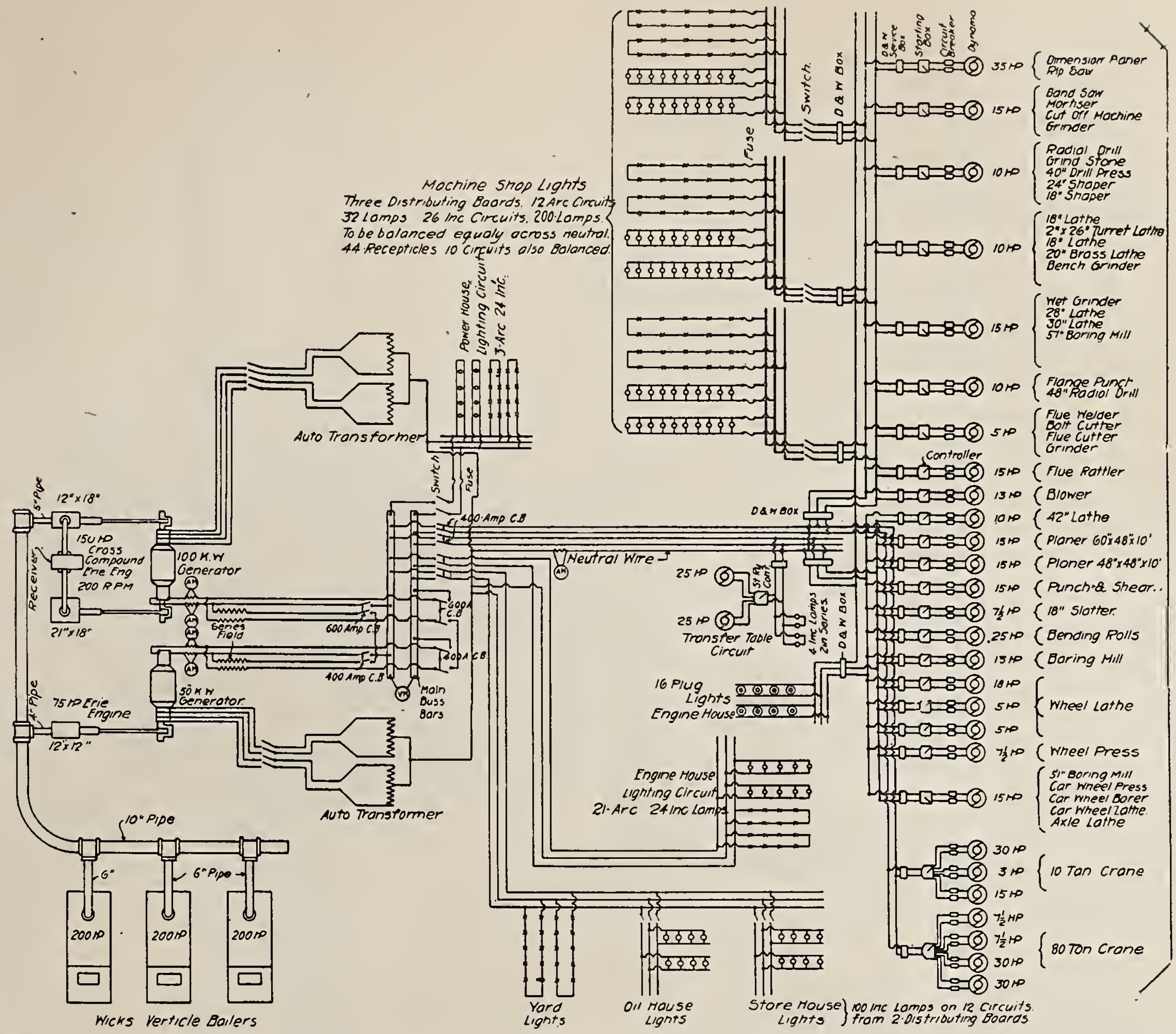


Fig. 10—Distribution of Power, Pere Marquette Shops at Grand Rapids.

The lighting is taken from a number of centrally located distributing panels which contain three copper bars on a marble board, from which the separate lighting circuits are taken off through fuse switches. These lights are so connected across the three bars that they will cause little or no unbalanced load under ordinary circumstances. A three-pole switch on each board controls that group of lights.

The lighting circuit for the engine house comes directly from the power house, where it is controlled by a switch on the main switchboard. The lighting circuit for the yards, oil house and storehouse also comes from the main power house, but those in the store and oil house will be controlled at their distribution boards. Lights for the power house have a small distributing board connected to the main bus base, as shown in the diagram.

The machines are driven in groups from a countershaft. The motors driving these countershafts are located on brackets fastened to the columns or to the shop wall and are belted to the countershafts. Circuit breakers are used in all cases in place of switches. The motors driving group machines have a starting box, and those on individual machines a controller, for giving variable speed.

In connection with the building of these shops two features are worthy of particular mention—the record time made in completing the enterprise and the evident economical expenditure of the appropriation available for the purpose. The plans for the shops were not started until late in March of last year, and power was turned on October 15, a period of less than seven months intervening, which is certainly a remarkable record.

The engineering work in connection with the planning of the entire plant was entrusted to the Arnold Electric Power Station Company, consulting engineers, Chicago, who drew plans and specifications for the complete light, heat, water, compressed air and electric power system, as well as buildings, including layout, structural steel work, cranes and transfer table.

The contract for the building was awarded to George B. Swift & Co., of Chicago, on account of their reputation for handling this class of work expeditiously. The structural steel work was furnished and erected by the Illinois Steel Company. The work of installing the power plant equipment, as well as heating system, piping work, and wiring, was taken care of by the Arnold company, being included in one construction contract.

All plans were developed under the supervision of Mr. Frank H. Alfred, chief engineer of the Pere Marquette Railroad Company, subject to the approval of Mr. M. J. Carpenter, vice-president and general manager, who has since resigned. The motive power department was efficiently represented by Mr. W. K. Christie, master mechanic.

Forging and Coupler Pocket Machine

THE accompanying illustrations show a machine for removing coupler pockets and forming heavy forgings. For removing pockets the coupler is placed as shown in Fig. 1 and the rivets are sheared by pressing the body of the coupler out from the pocket. In making forgings like followers this machine gives a heavy enough pressure to form iron which bulldozers of ordinary construction cannot accomplish. The pressure on the ram is 5,000 pounds per square inch, or a total of about 300,000 pounds. This is enough to put on lugs and round the corners of followers in one operation.

This machine is operated by means of oil under air pressure for quick stroke until the work is reached when the air pump attached to the machine is started, which pumps the oil into the cylinder at a pressure of 5,000 pounds per square inch.

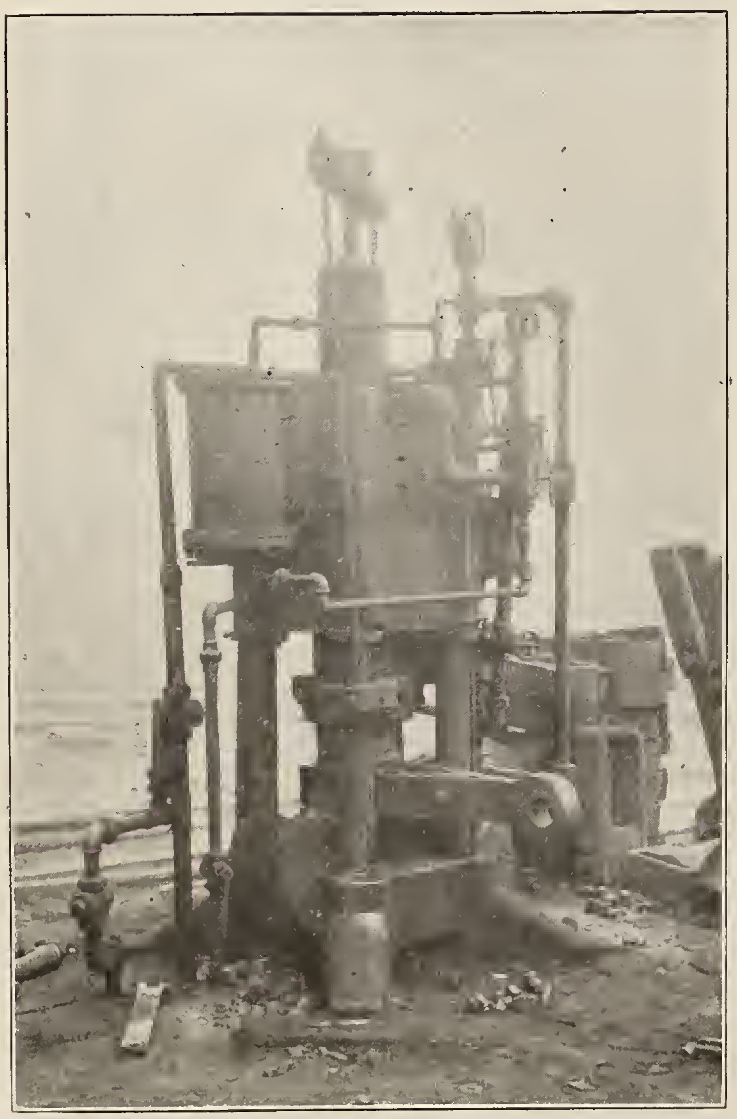


Fig. 1—Forging and Coupler Pocket Machine.

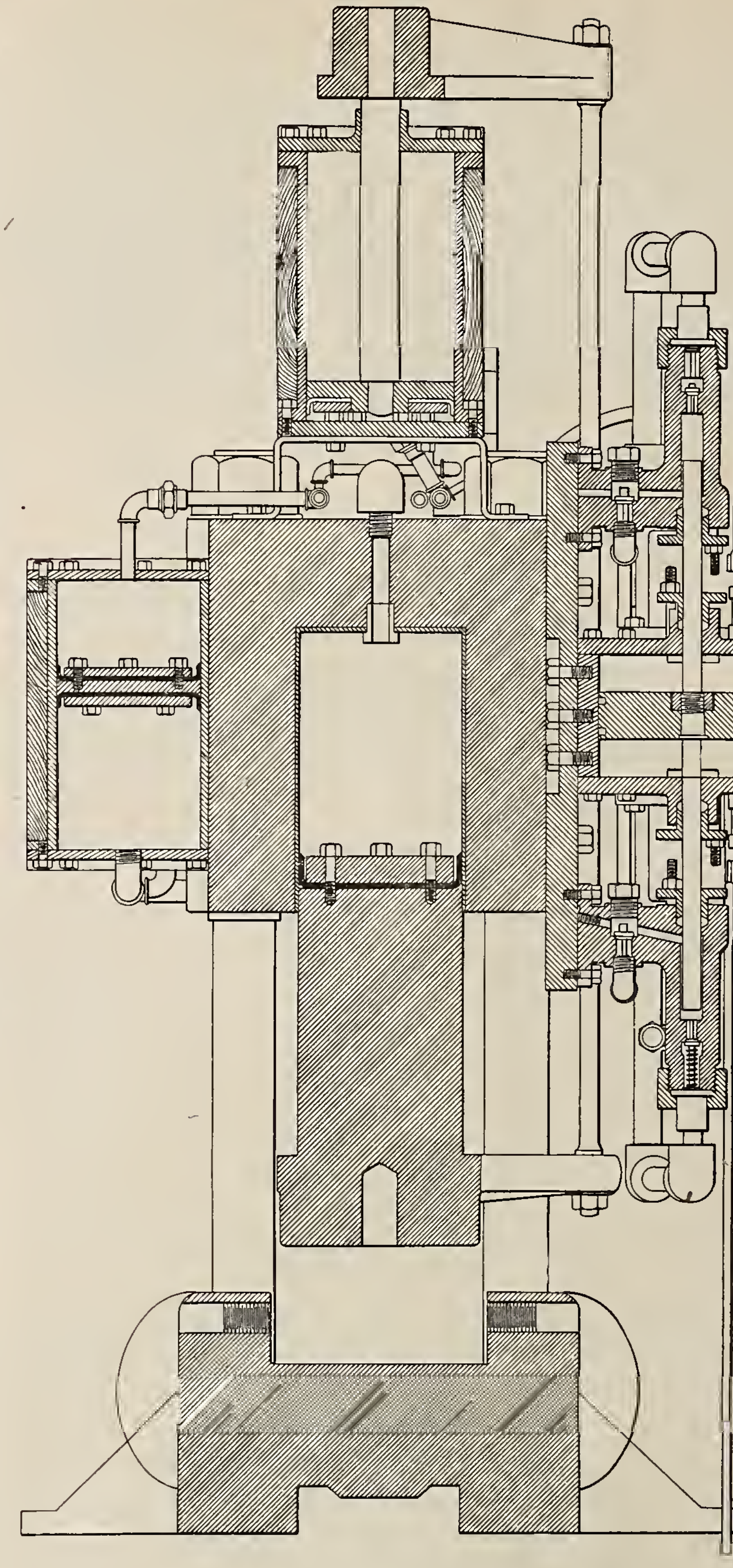


Fig. 2—Forging and Coupler Pocket Machine.

The pressure pump consists of two cylinders with their pistons as extensions of the piston rod of the air pump, located between them as shown in Figs. 2 and 3. In the air cylinder, Fig. 2, are seen little projections in the heads, which are attached to a small slide valve not shown on the drawings. This slide valve operates the piston valve shown in Fig. 3, which, in turn, operates the piston of the pump. This operation is similar to the air pump on a locomotive. The throttle valve of the pump is shown on the left side of Fig. 3. The oil is fed into the pump by air pressure, which makes it more positive feed than suction. The ram is controlled by the 3-way cock shown a little above the throttle valve for the pump. When

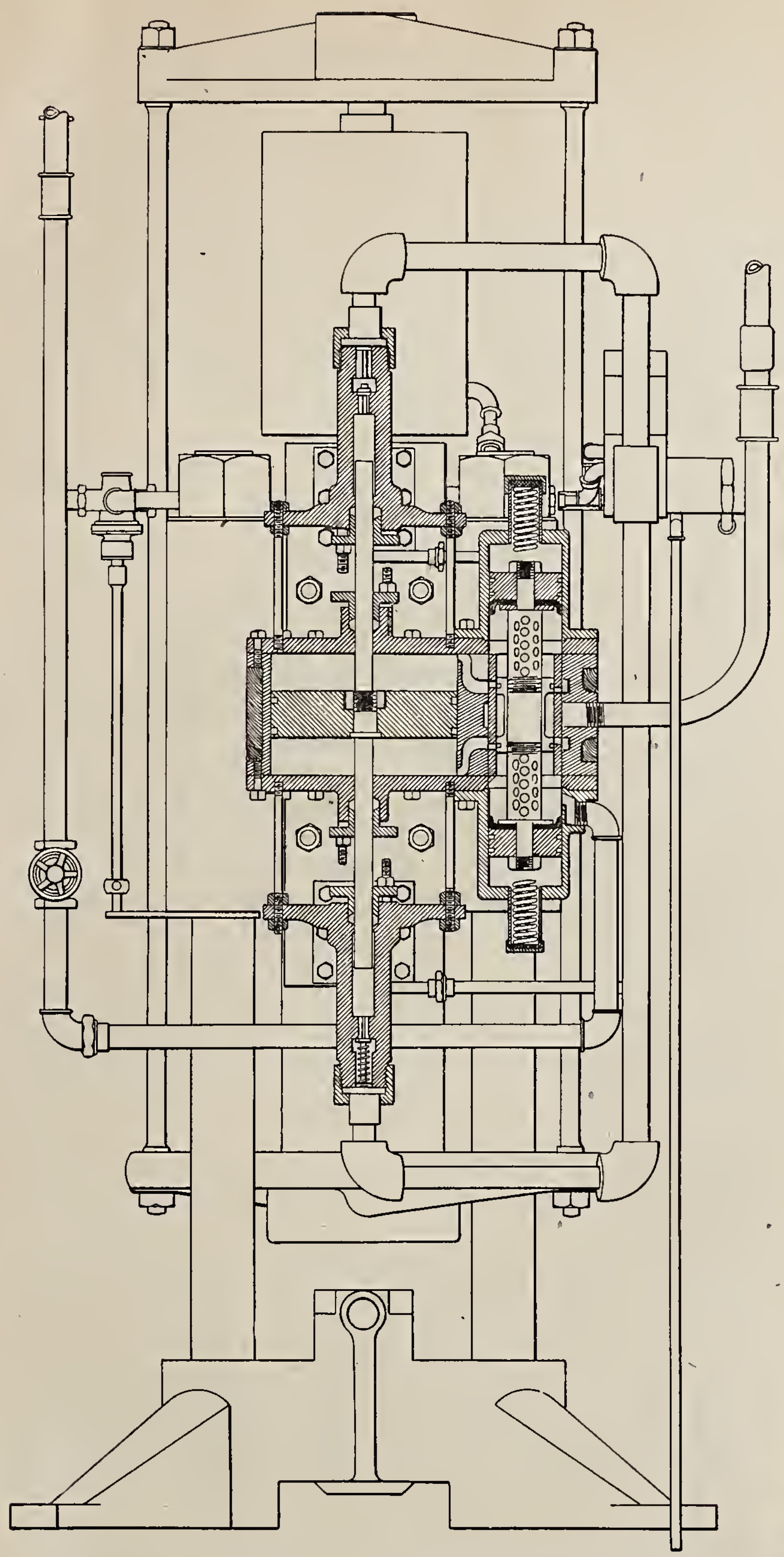


Fig. 3—Forging and Coupler Pocket Machine.

this is turned for letting the ram down air is admitted on top of the oil reservoir shown at the left of Fig. 2; it exhausts the air from the bottom of the raising cylinder shown at the top of Fig. 2, and closes the release valve and bleeder shown in Fig. 3 to the right of the upper spring of the piston valve. This forces the oil from the reservoir through the pump checks into the cylinder above the ram and gives a quick travel of the ram until it reaches the work, when the pump is started, which gives the high pressure to do the actual work.

For releasing, the pump is stopped and the 3-way cock is turned in the opposite direction. This exhausts the air pressure from the oil reservoir; operates the bleeder and release valve, which allows the oil above the ram to flow directly into the reservoir, and admits air under the lifting cylinder to raise the ram.

We are indebted to Mr. L. G. Parish and Mr. R. Fildes of the Lake Shore and Michigan Southern Railway for the above drawings and information.

Forty-Two Inch Borimg and Turning Mill

THE accompanying cut illustrates a boring and turning mill with one turret head and one swivel head, as manufactured by the Baush Machine Tool Co., of Springfield, Mass.

The capacity is 44 inches in diameter and 37 inches in height under the cross rail or 31 inches under the tool holder. The table is 42 inches in diameter, is powerfully geared, and has ten changes of speed; five with back gears and five without. The maximum speed of the table is 20 R. P. M., and the minimum speed 6 R. P. M. The teeth on both table and pinion are steel, and are accurately planed. On the under side of the table there is an outer bearing nearly equal to the diameter and 20½ inches in length. The spindle has a straight bearing, which acts in conjunction with an angular bearing to receive the side strains. There is also a thrust ball bearing on the lower step of the spindle, which acts as a preventive against any lifting tendency, and which relieves the friction of table when a heavy cut is being taken. The height of the table from the floor is 2 ft. 6 in. The size of the slots are 1¼x2½x1¼ in.

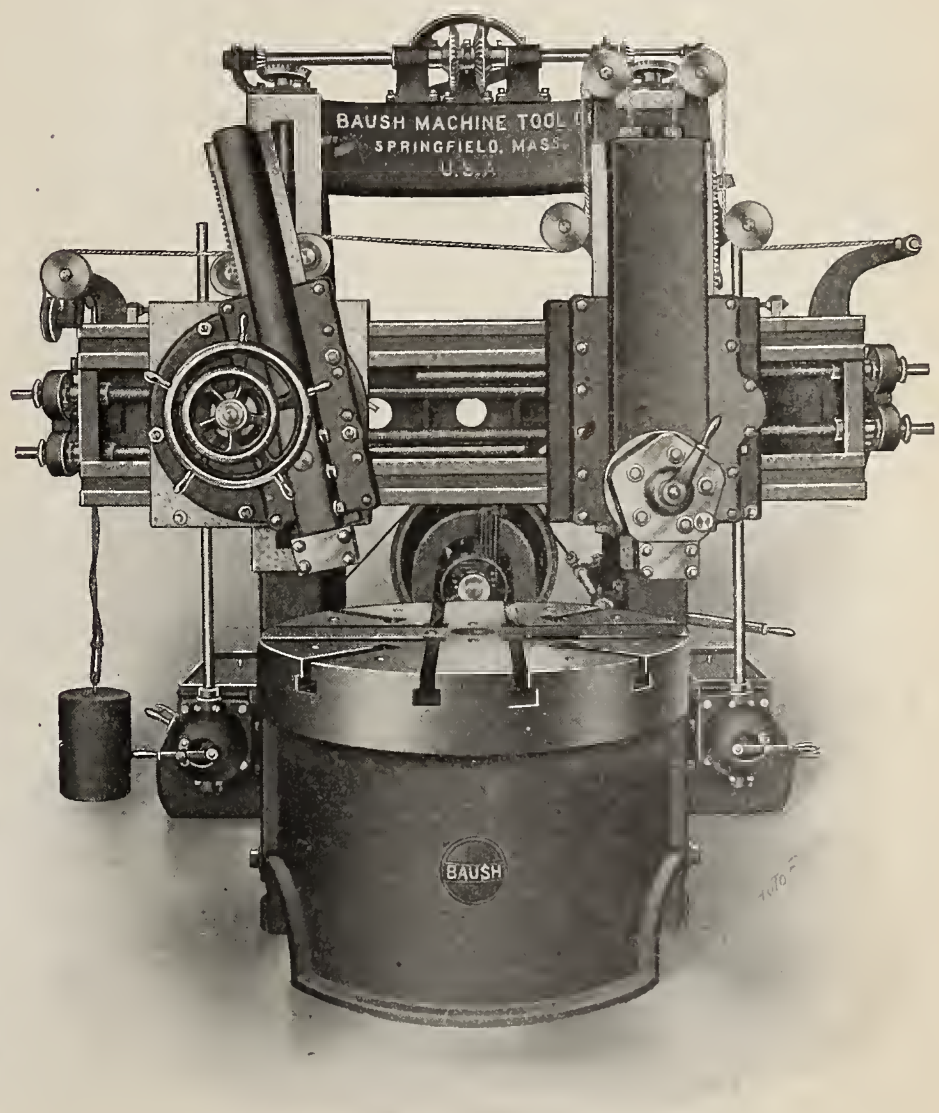


Fig. 1—42-inch Boring and Turning Mill.

The turret slide (right hand) can be set to bore, turn and cut 8 and 11½ threads per inch, and has a vertical movement of 24 inches. It has five sides 10 inches across flats, and has five 2 5-16-inch holes. The heads are entirely independent in their movement, both as to direction and amount of feed. The left hand head can be set at any angle and has a movement of 24 inches. Either head can be brought to the center for boring. Both heads have a vertical movement of 24 inches. They are attached to steel feed screws by slit nuts, which can be opened, and a rapid movement obtained by ratchet and pinion, engaging a steel rack on the cross-rail.

The feeds are positive and have fifteen changes, ranging from 1-64 inch to 61-64 inch horizontally, and 1-64 inch to 9-16 inch in angular and vertical directions.

The cross-rail is raised and lowered by power, which can be done without revolving the table. The band brake which operates on the main driving cone, by hand, stops the table instantly. The back gears can be changed by means of a lever without the use of a lock nut.

The plain table is ordinarily furnished with this machine, as illustrated; but when wanted, a three or four-jaw independent and universal chuck can be supplied. This machine can be made with two regular swivel heads if wanted. The counter shaft has tight and loose pulleys; the driving pulley is 20 inches in diameter, for 4½-inch belt, and should run 800 R. P. M. The machine is self-contained, and therefore does not require an expensive foundation. The weight is 16,200 pounds and the floor space 8 ft. 5 ins. by 9 ft.

A New Turret Screw Machine

THE illustration shows a Turret Screw Machine of new design by the Warner & Swasey Company, Cleveland, Ohio, this size being one of a complete line of this type of machines made by this company.

This machine takes bar stock up to 3⅝-in. in diameter, through the automatic chuck. The travel of the turret slide is 14 inches. The swing over bed is 20 inches. The head and bed are cast in one piece, insuring the greatest strength and rigidity. The cone has three steps for 4-in. belt, is geared 1.85 to 1 and back-geared 7.44 to 1; the back gears being engaged and disengaged by friction clutches. There are twelve spindle speeds, from 15 to 156 r. p. m.

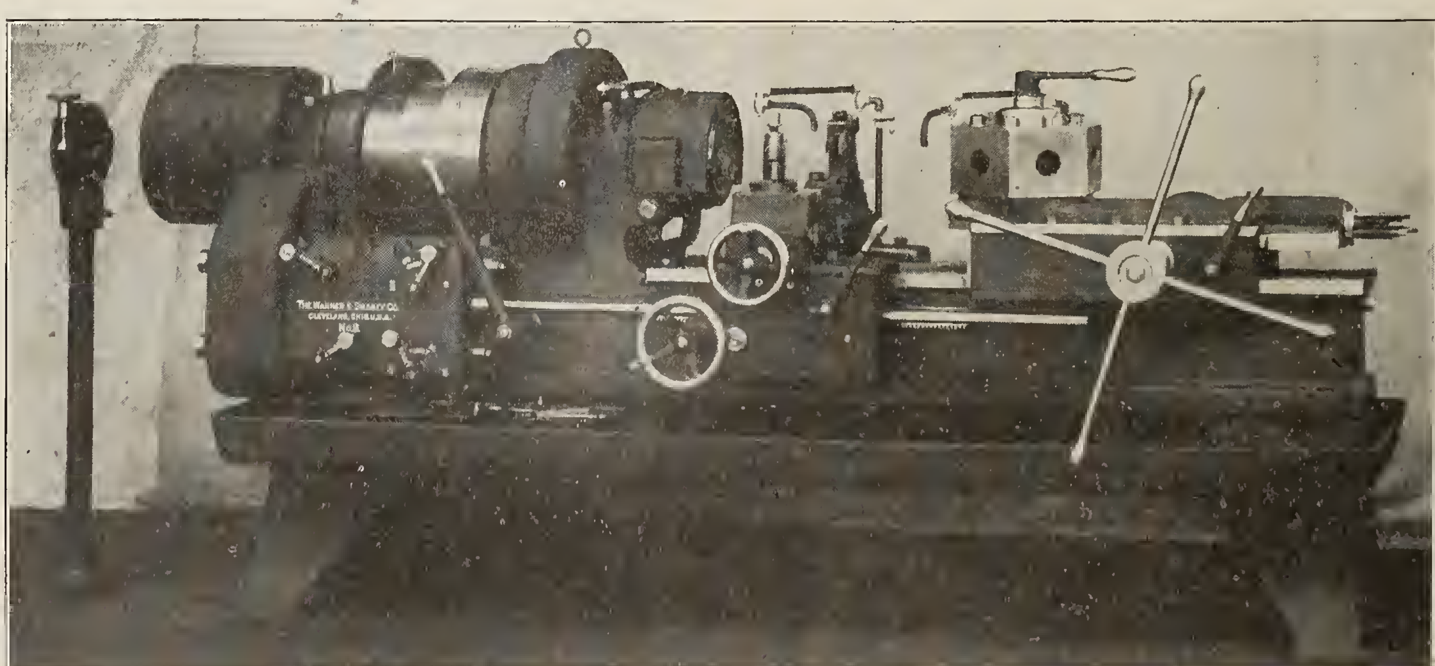
The automatic chuck and the power roller feed handle bar stock of any shape. The chuck is operated by the long lever in front of the head, working through a system of compound levers which gives a powerful movement for closing the jaws, and the same lever also engages and disengages the roller feed. The chuck jaws are adjustable for variations from actual size to 1-16 inch smaller. An outer stock support accompanies the machine.

The turret saddle is provided with a supplementary taper base, by means of which the center of the tool holes in the turret can be adjusted to the exact height of the center of the spindle. Taper gibs, fitted the whole length of the saddle on each side, provide means of adjusting the slide sideways. The turret slide is equipped with geared automatic feed, with four changes in either direction, from 20 to 102 (revolutions of spindle to feed one inch.) The turret is hexagon in form, has six tool holes 2½ inches in diameter and also bolt holes for attaching tools to the faces. It is so arranged that stock of any diameter smaller than the tool-holes can pass entirely through. The index is nearly the full diameter of the turret, and the lock bolt is placed directly under the working tool. Independent adjustable stops are provided for each face.

The carriage has geared automatic cross feed, with four changes in either direction, from 61 to 306 (revolutions of spindle to feed one inch), and hand longitudinal feed. A tool post for holding, forming and turning tools, and a cutting-off tool holder are provided.

The geared feeds insure a positive drive, and any one of the changes is instantly available by shifting a lever. The turret and carriage feeds are independent of each other, and both are provided with adjustable, automatic trips.

The pan and oil reservoir are of large dimensions.



A NEW TURRET SCREW MACHINE.

The geared pump delivers a copious flow of oil to the cutting tools for both the turret and carriage, through two systems of piping. It operates when running in either direction.

A double friction countershaft accompanies the machine, as regularly furnished, arranged for belt drive. Motor drive can readily be applied.

The net weight of the machine is about 6,000 lbs.

The Railroad Y. M. C. A.

"The Railroad Young Men's Christian Association is good for the Men, better for the company, but best of all for the public."---Paul Morton.

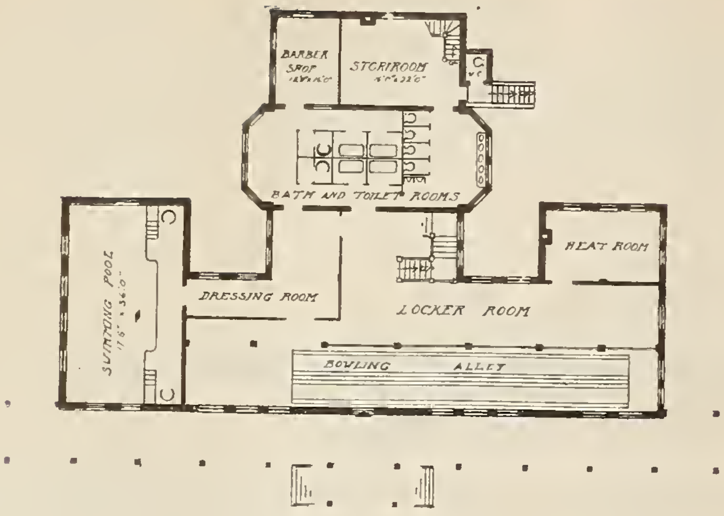
THE Railway Master Mechanic has in years past illustrated and described some of the more important and interesting railroad Y. M. C. A. buildings as they have been erected. The report of this association for the past year shows a most gratifying growth and some reference to this progress will, no doubt, be of interest to many of our readers. We are indebted to Mr. E. M. Willis, office secretary of the railroad department, for the accompanying illustrations and for data regarding the organization and growth of the association.

Nearly thirty years ago there was organized in Cleveland, Ohio, an association for the betterment of railroad employes, under direction and influence of Christian men. It was the first Railroad Young Men's Christian Association. Starting with the first association at Cleveland, the number has grown, there now being 208 association at divisional points, junctions or railroad centers. There are 70,110 men enrolled as members, with many more who are daily entering the buildings. One hundred and thirty buildings are owned or occupied, the value of the buildings exceeding $2,000,000, many of them being as well equipped as the average clubhouse. Well appointed, attractive, wash and bath rooms; restaurants, where good, wholesome food can be secured at a very low cost; social and game rooms, including billiards and bowling alleys; well-selected libraries, and good comfortable beds in the dormitories. These buildings are so well arranged to meet the needs of the members that many of the men, when entering the terminal go direct to the railroad men's building, and, whether the lay-over be short or long, spend the entire time within its walls. The men pay a membership fee of $5 per year, which includes all the privileges, except the rest rooms and restaurant, the charge for rest rooms being only 10 cents. The associations are all under the the direction of a general secretary, who seeks in every possible way to be of help to the men. A committee of management has the direct oversight of the work of the secretary, the members of the committee consisting of officials and employes. There are 355 secretaries, assistants and physical directors giving their entire time to this service.

The general supervision of these associations is under the direction of the International Committee, who employ nine secretaries for this purpose, five are assigned in various parts of the country caring for a number of associations on certain railroad systems, two are engaged in special religious work, and two at the office, 3 West 29th street. One with the general supervision of the entire field, and one for office correspondence and special matters. The work of these secretaries is directed by a subcommittee of practical and successful railroad officials; the chairman being John J. McCook—and members—Charles F. Cox, Dr. John P. Munn, Wm. A. Patton and B. D. Caldwell, with Morris K. Jesup as advisory member. The work of this committee is supplemented by the state committees and secretaries in many of the states.

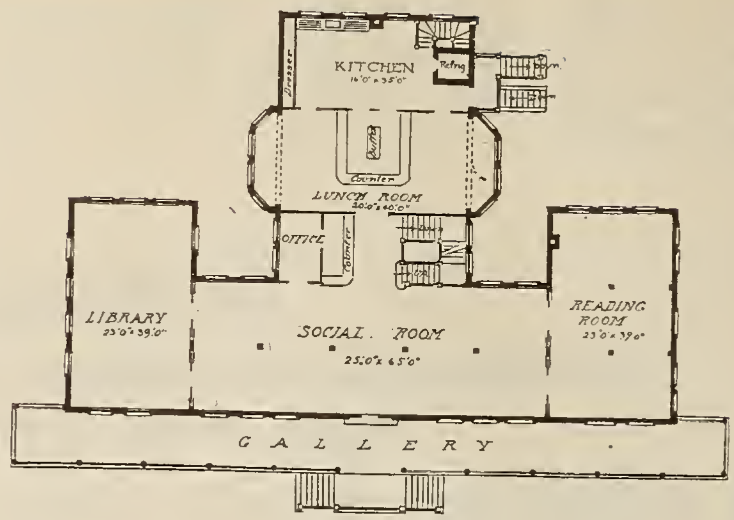
FIG. 1—Y. M. C. A. BUILDING, PENN R. R., TYRONE, PA.

FIG. 2—Y. M. C. A. BUILDING, B. & A., B. & M., AND N. Y., N. H. & H., SPRINGFIELD, MASS.



BASEMENT

FIG. 3—Y. M. C. A. BUILDING, NEW DECATUR, ALA.



FIRST FLOOR

FIG. 5—Y. M. C. A. BUILDING, NEW DECATUR, ALA.

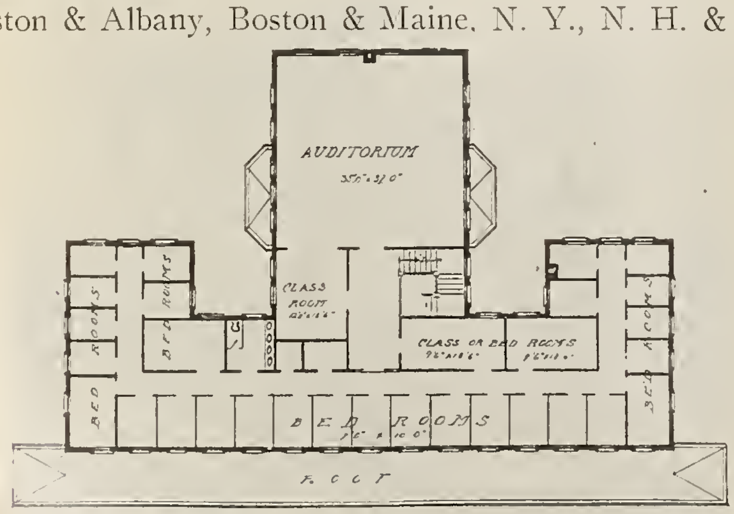
The appreciation of railroad officials is increasing year by year, and with few exceptions associations are now on all of the railroad systems of the country. Men like President Cassatt, of the Pennsylvania; Mr. Stevens, of the C. & O.; Mr. Tuttle, of Boston & Maine; Mr. Ingalls, of the Big Four, and many other leading operating officials give their unqualified endorsement. During the year 1904 the railroad corporations appropriated $260,000 toward the current expenses of the local associations. The value of this work from the standpoint of railroad officials, may be summed up in the statement of Hon. Paul Morton, Secretary of the Navy, at a recent dinner. Mr. Morton, previous to his entering the Cabinet of President Roosevelt, was the second vice-president of the Santa Fe System. Mr. Morton said: "The Railroad Young Men's Christian Associations is good for the men, better for the company, but best of all for the public."

The year ending January 1, 1905, has been one of unusual growth, and new buildings at sixteen points were occupied during the year by railroad associations. The following buildings being owned: Fort Erie, Ontario—Grand Trunk and Wabash, at a cost of $6,000. New Decatur, Alabama—Louisville & Nashville, costing $25,000. Van Buren, Arkansas—Iron Mountain, costing $19,000. Sapulpa, I. T.—Frisco, costing $10,000. Marshalltown, Iowa—Iowa Central, costing $28,500. Horace, Kans.—Missouri Pacific, costing $4,500. Springfield, Mass.—Boston & Albany, Boston & Maine, N. Y., N. H. & H., costing $16,000. Mechanicville, N. Y.—Boston & Maine, Delaware & Hudson, costing $20,000. Bellevue, Ohio—N. Y. C. & St. L., costing $18,000. Tyrone, Pa.—Pennsylvania, costing $12,500.

In addition to the buildings owned, six have been set aside for association purposes. Four buildings erected in former years have been enlarged to accommodate the growing membership. The extent of this work and the hearty support accorded it by the corporations is indicated by the fact that twenty-nine different railroad companies co-operated with their employes in contributing toward the $306,300 expended on these twenty buildings.

Many associations have within the year taken up educational class work and practical lectures for the first time. The result has been a gain of over 40 per cent in the educational work within twelve months. Over 9,800 members have been added making the total membership of 208 associations 72,148. The total average daily attendance at these buildings during 1904 was 37,419.

Although nearly every prominent railroad in North America is officially committed to appropriations for the support of this work, only a small proportion of the needy fields have been equipped. Appeals are constantly being made by the railroad men at these unorganized division points, with assurances of hearty support from the men. For example the railroad men of one town recently presented a pledged membership list of 750 men, and also a subscription list amounting to over $7,000 toward a building, all conditioned upon the co-operation of the corporation being secured. The rate of advance in providing for these needy fields is determined by the financial backing accorded by the company. The support of the



SECOND FLOOR

FIG. 4—Y. M. C. A. BUILDING, NEW DECATUR, ALA.

FIG. 6—Y. M. C. A. BUILDING, L. & N. R. R., NEW DECATUR, ALA.

Fig. 7—Y. M. C. A. Building, St. L., I. M. & S. R. R., Van Buren, Ark

Fig. 9—Y. M. C. A. Building, B. & M. and D. & H. R. R., Mechanicville, N. Y.

men can always be counted upon, and the type of work needed in each particular railroad community has been well determined by experience. In every community, however, the association needs a well-equipped building, to enable it to attract and maintain a helpful influence over large numbers of men in all classes of railroad service.

The International Committee of the Y. M. C. A. is authorized and prepared to negotiate through its railroad secretaries with any inter-state railway lines that are ready to bear a fair proportion of the cost of one or more buildings and their maintenance, with a view to assuming responsibility for organizing associations at such points.

The accompanying illustrations are of the new buildings occupied during the past year. The floor plans of the new building at New Decatur, Ala., are also given to indicate the general character and arrangement of the average Railroad Y. M. C. A. building.

Communication from a Railroad Apprentice

Editor Railway Master Mechanic:

At the last convention of the Master Mechanics' Association at Saratoga, the subject of the Railway Apprentice was given considerable discussion, and this was all from the Master Mechanics' standpoint. Possibly some of those taking part in the discussion had at one time been an apprentice, at any rate I would like to present the matter from the standpoint of the apprentice, having been through the mill myself.

Fig. 8—Y. M. C. A. Building, N. Y., C. & St. L. R. R., Bellevue, O.

Circumstances prevented my beginning the course until I was in my 19th year, having had experience in various branches of machine work most of the time since my 15th year, earning on special work from $1 to $1.75 per day. On going into the railroad shop I was told that my experience did not count, they would prefer I had no experience, and was started in at 10 cents an hour the first year, being then on my own resources, my parents not being in a position to help me. I was put at work in the rod gang, which at that time did all the rod and valve motion work, with men I had known from boyhood. The latter part of the first year the working time was but eight hours a day, and my pay was 11 cents an hour, out of which I paid $4.50 a week for my board, yet I found I could spare a little each month to send home.

The second year found me still in the rod gang at 12 cents an hour, being later transferred to the machine room, where I was taught to do all kinds of planing from a rod key to an engine plane. In the second year there was a change in the master mechanic, and at the beginning of the third and last year I was told that I could continue at the 12 cent rate or get out. At the same time it was decided to reduce expenses, and two planer hands were taken off, leaving one man and myself to do the work of four men. It was the usual thing to have four and at times five planers running between us, the man getting 35 cents and the boy 12 cents an hour. At the end of the third year I was offered 17½ cents, but finally got 20 cents, at which figure I worked a year or more, and seeing nothing better there, went elsewhere. Such was my experience at learning a trade. I was kept at the specialty in which I was considered the most useful to the company. This is too often the case with apprentices, they may learn one branch well, while of the others they know little or nothing, except as in my case, what they can pick up.

Yet I left that shop a young man thinking I knew it all. But I soon found there were some things I didn't know, and that other shops could do good work. Possibly the special apprentice may have a better opportunity to learn the business than the regular, though I can see no reason or justice in putting him ahead of the regular apprentice. Both are giving their time to learn a trade, and other things being equal, both parties should have the same opportunities.

Some of the members of the association were of the opinion that the railroad needed the technical graduate. No doubt they do. He is a valuable man if his theory is combined with practice, but with his theory alone he is not as valuable a man. I studied theory after going through the practical, and found it a valuable help, but if one was denied me should say give me the practical. It is so easy to see someone else do a thing, but practice alone enables you to do it. The shop in which I began, while not up to date in tools and appointments, built most of the engines for the division, and any complaint on the crudeness of the tools would be met with, that's all right, Joe, any one could do good work if they had good tools. A fellow apprentice was put on a lathe making bolts and he did nothing else until he left in disgust.

My idea of the proper training of the apprentice to make a successful railroad machinist would be to start him on a four years' course, the time to be divided as follows: If he has had no experience start him in with the floor gang, continuing with this gang at least one year, at the end of this time he should know how to fit up driving boxes and wedges, take out and put in good condition throttle, steam and exhaust pipes, in fact do all that usually falls to the floor gang to do. Above all, impress on him the importance of doing his work quickly, at the same time doing it well. The next eighteen months should be spent in the machine room learning to drill (not one railraod machinist in fifty can do a good job at drilling), and do a good job on the lathe, the slotter, and particularly the planer. The next six months put him in with the air pump man, who generally also repairs the pops and injectors, while the fourth and last year should be spent with the rod and valve gang, during which time he should be taught to set valves properly, and if the shop has a drawing room connected with it, he should be taught the principles of laying out valve motion. If your apprentice is of the right stuff, at the end of four years, you will turn out a machinist you can be proud of, one who can go anywhere and do anything required of him. The first year he should be worth nine cents an hour, the second year 12 cents, the third year 15 cents and the fourth year 17½ cents. If he isn't worth these figures he missed his calling and should be treated accordingly.

Yours truly,

J. V. N. Cheney.

Cast Steel Trucks

THE accompanying illustrations show two trucks used on Lima engines of the Buffalo & Susquehanna Railroad. Figure 1 is the truck received with the engines and consists of wrought iron bars with an indefinite number of bolts and parts. This construction gave considerable trouble and required repairs every time the engine went on the road.

For this reason Mr. C. R. Williams, general master mechanic of the B. & S., designed the truck shown in Figure 2. This is made of cast steel with very few parts and very light in comparison to the trucks previously used. It has been in service on several engines for some time and thus far has not cost anything for repairs.

We are indebted to Mr. C. R. Williams, general master mechanic of the Buffalo & Susquehanna Railroad, for the above information.

Fire Alarm System

NEARLY all railroad shops have a volunteer fire department composed of the employees. The value of such a department consists principally in the quickness with which they respond to a fire.

The usual outfit is composed of fire pumps in the power house, hydrants in or near all the buildings, and a signal whistle. When a fire starts the engineer has to be notified, upon which he blows the fire whistle and starts the pumps. In a large plant where no signal system is used to notify the engineer, it is a serious problem for the department to reach the fire in time to prevent any great damage.

The system described here consists of simple and inexpensive means for notifying the engineer to blow the whistle and start the pumps. For this purpose

Fig. 1—Original Truck on Lima Engines.

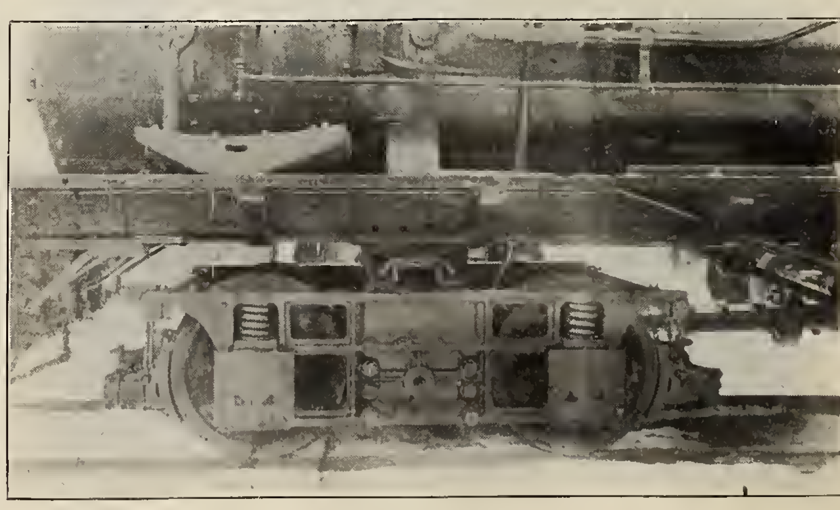
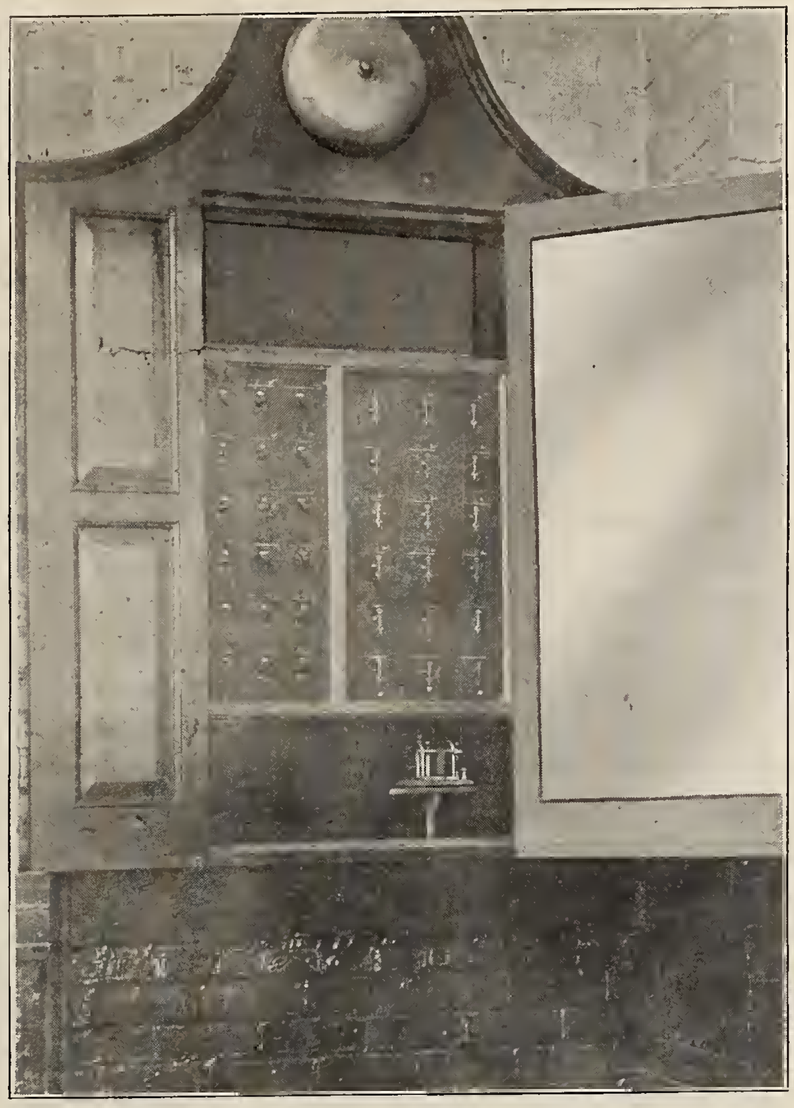


Fig. 2—Cast Steel Truck on Lima Engines.



Annunciator Fire Alarm System.

alarm boxes are placed in conspicuous places in the various buildings. The boxes consist of a switch closed by means of a circular glass. By breaking the glass the switch is opened, which sounds the alarm in the power house. The wiring is on the closed circuit system which has a battery current on the line continually. When the glass is broken it opens the circuit and closes the bell circuit by means of magnets, and also indicates on the annunciator which building the alarm comes from. The bell will continue ringing until shut off by the engineer. All the boxes in one building can be connected in series so as to sound the same signal on the annunciator, or if the building is very large it can be arranged to have different signals for the various departments. Having all the signals in one building connected in series makes it impossible to send in more than one alarm until the glass is replaced. This is no serious disadvantage, however, as the glass can be replaced by the department before leaving the building.

The closed circuit system has this advantage over the open circuit system in that it will sound the alarm when there is a break in the line. With the open circuit system this is not detected without testing every station.

When there are several buildings in the same general direction from the power house, one common return wire can be used, without interfering with the signals for the buildings, and make the cost of erection considerably cheaper.

The accompanying cut shows the annunciator and bell of this system as applied in the Collinwood shops of the Lake Shore & Michigan Southern Railway.

The Alternating Current Series Motor

Paper by F. D. Newbury before the Testing Section of the Westinghouse Electric and Mfg. Co.

IT IS a matter of common experience that in a direct current series motor, if the direction of current in both armature and field be changed, the armature will continue to revolve in the same direction. Then, with alternating current in the motor, and with the armature and field in series, the direction of rotation will not change with the reversals of the alternating current and the armature will revolve just as it does with direct current.

So far as the production of mechanical energy is concerned the action of the motor is the same whether direct or alternating current is used. The alternating current, as such, is not essential to the operation of the new motor; on the contrary, the problem has been to develop a motor that would operate in spite of certain difficulties inherent in the alternating current, so that it would have the proper speed characteristic for railway work, and at the same time, enable the simple voltage transformation possible with alternating currents to be used in other parts of the railway system. The direct current series motor may be considered a special case of the more general alternating current motor, for while the alternating current motor makes an equally successful direct current motor, the reverse is not true. From the similarity of the two motors it follows that changes in voltage, load and so on have corresponding effects on speed and torque in the alternating current motor as similar changes in the direct current motor. The practical operation of the two motors is also the same. The alternating current motor is started by lowering the voltage, either by resistance, as in the direct current motor, or, more economically, by some form of transformer. The motor is reversed by interchanging either the field or armature connections, as in the ordinary railway motor. On account of its self-induction the alternating current motor will stand rougher usage than the direct current motor. For example, a 100 horse power motor has frequently been started by full voltage and has been reversed, when running under full load and voltage, by simply throwing over a double-throw switch.

While, in general, the alternating current series motor works on the same principles as the direct current motor, several things happen inside of the former, by reason of the varying magnetic field produced by the alternating current, that are not found in the direct current motor. A more detailed explanation of the action of the alternating current motor may, therefore, be of interest. The phenomena characteristic of the alternating current motor are:

1. An e. m. f. generated in the armature winding

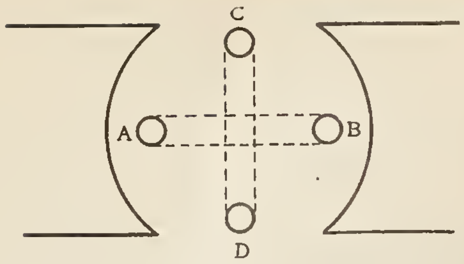


Fig. 1.

by the alternating magnetic field, in addition to the e. m. f. generated by the rotation of the armature.

2. A local current circulating in the armature coils short circuited by the brushes, do to the e. m. f. in 1.

3. An iron loss occurring in the entire magnetic circuit, due to the alternating magnetic field.

4. An active e. m. f. existing between the turns of the field coils—what may be called the counter e. m. f. of the field coils.

1. The electrically generated e. m. f. With an alternating field there are two distinct e. m. f.'s generated in the armature coil; the first by the movement of the coil through the field, with a maximum value when the coil is in the position AB, Fig. 1, and a zero value in the position CD; and the second by the alternating magnetism, with the maximum value occurring when the coil is in the position CD and a zero value in the position A. B. The first, or mechanically-generated e. m. f. is proportional to the speed; the second, or electrically-generated e. m. f. is proportional to the current frequency. While these two e. m. f.'s exist in the armature winding, only one—the mechanically-generated e. m. f.—appears at the terminals of the motor. The reason for this is shown by Figure 2. In this sketch the directions of the e. m. f.'s in each part of the winding, at one instant, are shown by the arrows, the full arrows representing the mechanically-generated e. m. f., and the dotted arrows the electrically-generated e. m. f. On the two sides of the line C D the mechanically-generated e. m. f. is in opposite directions, and on the two sides of the line A B the electrically-generated e. m. f. is in the opposite directions. It is evident from Figure 2 that so far as the outside circuit is concerned the electrically-generated e. m. f. neutralizes itself, and plays no part in determining the current taken by the motor. This is only true when the brushes are on the

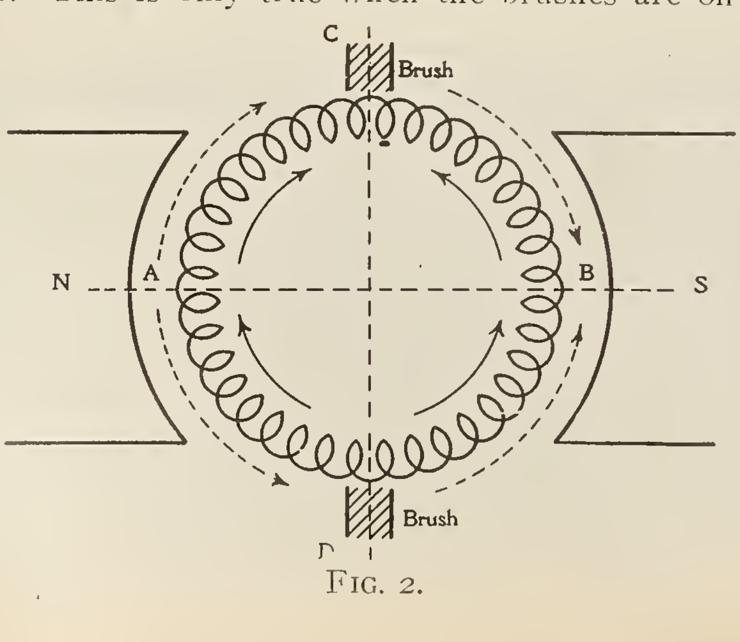


Fig. 2.

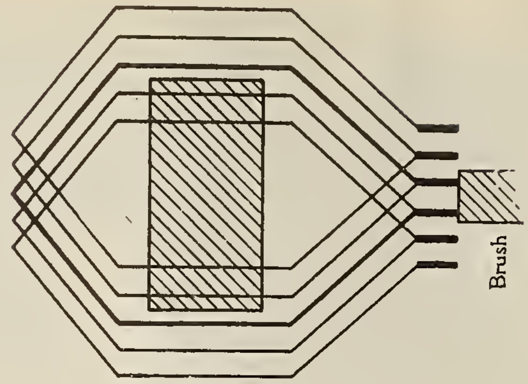


Fig. 3.

neutral points. The electrically-generated e. m. f. is of only theoretical interest, except for its effect on the armature coil short-circuited by the brush, as explained in the following paragraph.

2. The local armature current. At each brush there is a local circuit in which the electrically-generated e. m. f. is not neutralized, a current results, which, if not prevented, effects commutation and increases the motor loss. Figure 3 shows this local circuit made up of an armature coil and the brush. It is seen that when the coil is short-circuited by the brush it is in the position of maximum value of the electrically-generated e. m. f., corresponding with the position C D Figure 1. This local circuit may be compared with the short-circuited secondary of a transformer, of which the field coil is the primary. The loss is occasioned by the local current, appears as a part of the energy component of the field voltage, the action being the same as in a transformer.

3. The Alternating-Current Iron Loss.—The total iron loss occurring in the motor may be divided in two parts—that occurring in the armature and pole-faces, due to the rotation of the armature, and that occurring in the entire magnetic circuit, due to the alternating magnetic field. The former is analagous to the iron-loss occurring in a direct-current motor, and for that reason may be called the direct-current iron-loss. It is supplied mechanically, its effect being to increase the fractional torque of the motor. The latter will be called the alternating current iron-loss. This is supplied electrically by an increase in the energy—component of the voltage of both armature and field.

4. The Counter E. M. F. of the Field Coils.—The three properties of the alternating-current motor, already considered, are chiefly of interest to those concerned with the design of the motor. For instance, the presence of an e. m. f. in the coil short-circuited by the brush introduces a problem for the designer to solve, and when he has solved it, its action is of no further importance. On the contrary, the existence of a generated e. m. f. in the field coils is a thing with which the man who operates the motor is very actively concerned. The field coil of the alternating-current motor is simply a choke coil, and has generated in it the familiar counter e. m. f. of self induction. This

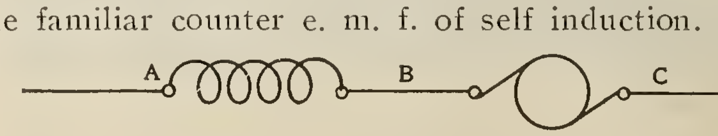


Fig. 4.

counter e. m. f. affects the operation of the motor in two ways:

a. It introduces a voltage in the alternating-current motor that is not present in the direct current motor, which increases the total voltage required to run the motor, particularly at starting. This voltage, however, is very nearly at right angles with the armature voltage, so that the different voltages are not directly added and subtracted; i. e., the numerical sum of the armature voltage and field voltage is not equal to the total voltage of the motor, as measured across the terminals.

b. It increases the seriousness of a short circuit in the field coil. With direct current a short circuit simply means cutting out the short-circuited turns; it does not usually put the motor out of service. With alternating current, however, it is obvious that this counter e. m. f. will cause a destructive current to flow in the short circuited turns, burning them out and opening the motor-circuit. This is taken care of in the motor by additional insulation in the field turns.

A more detailed explanation of these effects can be made most clearly by a diagram of the motor voltages.

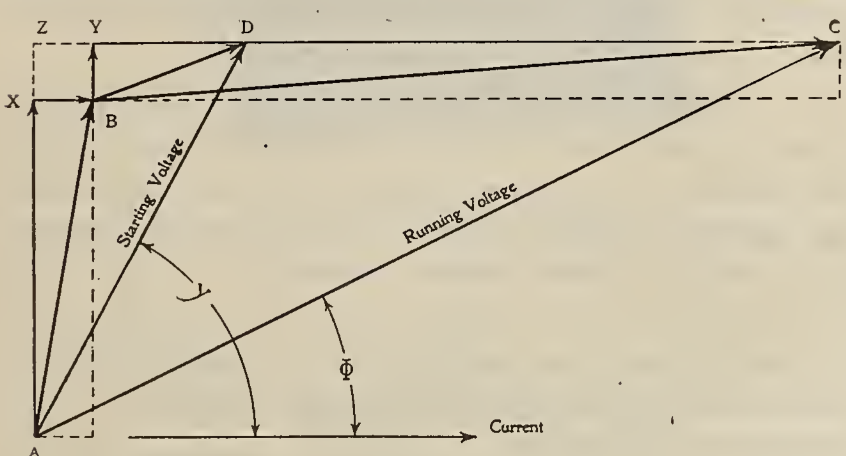


Fig. 5.

Figure 4 represents the motor circuit and Figure 5 the voltage diagram. The two sketches are similarly lettered, so that the line A B in Figure 5 represents the voltage of the current A B in Figure 4. Starting at one terminal, A, and with the direction of current as shown, the field voltage is in line A B. It is made up of two components, the e. m. f. used in overcoming the counter e. m. f. of self-induction, A X, and the e. m. f. representing the losses supplied by the field, X B; or, in other words, of the inductive component, A X, and of the energy component, X B. It is seen that the energy component is small compared to with the inductive component, which makes the field voltage nearly 90 degrees ahead of the current. The line B C is the armature voltage. This also is the resultant of energy and inductive components B Y and Y C. In the armature, the energy component is the larger, since it represents, in addition to the armature losses, the energy transformed into mechanical work. It is also seen that the armature self-induction is small, compared with that of the field. The total voltage of the motor is A C, and is the resultant of the armature and field voltages. It is considerably smaller than their numerical sum. The total voltage is also the resultant of the total inductive component, A Z, and of the total energy component, Z C.

Since the motor is a series machine, the total inductive component is always the same for the same current; it does not depend on the impressed voltage or power developed. For example, in a shunt motor, the magnetizing current—and, therefore, the inductive voltage—would depend on the impressed voltage. Suppose that the motor is just starting, and is taking the same current as when operating under the conditions shown in the diagram, in which it is running at high speed and developing considerable power. Since the current is the same, the total inductive voltage is the same. The energy component of the field voltage is the same, but the energy component of the armature voltage is very much less, since on starting the power developed is inconsiderable, although the torque may be the same. The total energy component approximates Z D, Figure 5. Then on starting, the motor voltage (the resultant of the total inductive and total energy components) is A D. It is evident that the field counter e. m. f. has a much greater effect on the total motor voltage on starting than when up to speed. With alternating current the starting voltage is about one-half the full rated voltage; with direct current in the same motor and under the same conditions the respective voltages would be approximately

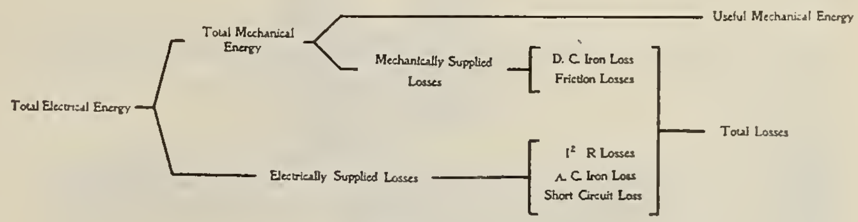


Fig. 6.

equal to the energy component Z C and Z D in Figure 5. The relation, instead of one-half, would be about one-sixth. The power factor is also low on starting, as shown by the diagram, the angle Y representing the phase difference between voltage and current. This follows naturally from the fact that the inductive component is about the same as when the motor is loaded, while the energy component is very much smaller. It may be noted that the low-power factor at starting implies less power from the circuit than a high power factor. The angle represents the phase difference under running conditions. The power factor on high speed is greater with small currents than with heavy currents, as the inductive e. m. f. of the field is less.

The alternating-current series motor serves as a very interesting illustration of the fact, true of all motors, that certain losses are supplied directly from the electrical energy, and others, indirectly, by the mechanical energy produced by the motor. The chart, Figure 6, shows this more correctly, distinguishing these two classes of losses in the alternating-current motor.

Cleaning Crown-Sheets With a Sand Blast

At a recent visit to a roundhouse, the writer saw a crown sheet which had ⅜-inch scale removed by the use of a sand blast. The engine was a switch engine and time could not be taken to remove the firebox or flues to remove the scale. For this reason the sand blast was put in operation through the dome. In eleven hours every particle of scale was removed from the crown sheet and crown bars.

Personals

Mr. A. R. Ayers has been appointed night roundhouse foreman of the Lake Shore & Michigan Southern at Elkhart, Ind. Mr. Ayers graduated from Cornell University in 1900 after which he served a three years' special apprentice course on the Lake Shore. He was then appointed special inspector on the eastern division in charge of soda ash handling and blowing off engines. Later he was in charge of the construction of the Elkhart roundhouse and on February 1 was appointed night roundhouse foreman. This promotion is in line with what this paper advocated and we feel confident that Mr. Ayers will rise rapidly.

Mr. C. E. Boss has been appointed acting master mechanic of the Ft. Worth & Rio Grande and St. Louis, San Francisco & Texas, with headquarters at Sherman, Tex.

Mr. John E. Cullen, master mechanic of the Chicago, Rock Island & Pacific at Herrington, Kan., died on January 21.

Mr. Albert Nugent has been appointed master mechanic of the Spokane Falls & Northern, with office at Spokane, Wash.

Mr. C. G. Arthur, foreman locomotive repairs of the Southern Railway at Columbia, S. C., has been appointed master mechanic at that point, in place of Mr. J. F. Sheahan, transferred.

Mr. Fred Mertsheimer, who recently resigned as superintendent of motive power and car departments of the Denver & Rio Grande, has been appointed superintendent of motive power of the Cincinnati, Hamilton & Dayton, with headquarters at Lima, O., vice Mr. C. H. Cory, resigned.

Mr. M. D. Franey has been appointed superintendent of shops of the Lake Shore & Michigan Southern, with headquarters at Collinwood, vice Mr. George Wagstaff, promoted. Mr. Francy will have charge of the Collinwood locomotive shop.

Mr. George Wagstaff, formerly assistant master mechanic of the Lake Shore & Michigan Southern at Collinwood, has been appointed supervisor of boilers of the New York Central Lines.

Mr. Benjamin B. Allen, formerly master mechanic of the Southern Pacific in California, died at Seattle, Wash., on January 19.

Mr. R. R. Young has been appointed master mechanic of the Atlantic Coast Line, with headquarters at Waycross, Ga., succeeding Mr. W. H. Dyer, resigned. Mr. C. M. Weathers has been appointed acting road foreman of engines of the first division at Wilmington, N. C., in place of Mr. Young.

Mr. N. A. Waldon has been appointed general storekeeper of the St. Louis Southern Railway, with headquarters at Pine Bluff, Ark.

Mr. F. R. Cooper has been appointed master mechanic of the Georgia, Florida & Alabama and the Carrabelle, Tallahasse & Georgia, with headquarters at Bainbridge, Ga.

Mr. H. H. Kendall has been appointed superintendent of motive power of the St. Louis, Brownsville & Mexico, with headquarters at Kingsville, Tex., to succeed Mr. C. B. Chase, resigned.

Mr. N. A. Waldron has been appointed storekeeper of the St. Louis Southwestern, with headquarters at Pine Bluff, Ark., and of the St. Louis Southwestern of Texas, with office at Tyler, Tex.

Mr. Robert H. Rogers has been appointed master mechanic of the Plymouth division of the New York, New Haven & Hartford, with headquarters at South Boston, Mass., vice Mr. C. J. Howe, resigned.

Mr. William Miller has been appointed master mechanic of the First division of the Denver & Rio Grande and assistant to the superintendent of motive power and car department, with headquarters at Burnham, Denver, Colo., vice Mr. W. L. Calvert, resigned.

Mr. Alfred Lovell, formerly assistant superintendent of motive power, has been appointed superintendent of motive power of the Atchison, Topeka & Santa Fe, with headquarters at Chicago.

Mr. A. C. Hinckley, master mechanic of the Denver & Rio Grande at Salida, Colo., has been appointed master mechanic of the Cincinnati, Hamilton & Dayton at Lima, O., to succeed Mr. J. E. Gould, resigned.

Mr. W. L. Tracy, formerly assistant master mechanic of the Louisville & Nashville at Louisville, Ky., has been appointed master mechanic at that place. Mr. W. A. Stearn has been appointed to succeed Mr. Tracy as assistant master mechanic.

Mr. D. P. Angell, assistant road foreman of engines of the Baltimore & Ohio, has been appointed assistant trainmaster at Connellsville, Pa.

Mr. M. Prendergast has been appointed general foreman of shops of the Baltimore & Ohio at Fairmont, W. Va.

Mr. W. E. McEldowney has been appointed master mechanic of the Denver, Enid & Gulf, with headquarters at Enid, Okla.

Mr. E. G. Haskins has been appointed acting master mechanic of the Second and Third districts of the Denver & Rio Grande, with office at Salida, Colo., vice Mr. A. C. Hinckley, resigned.

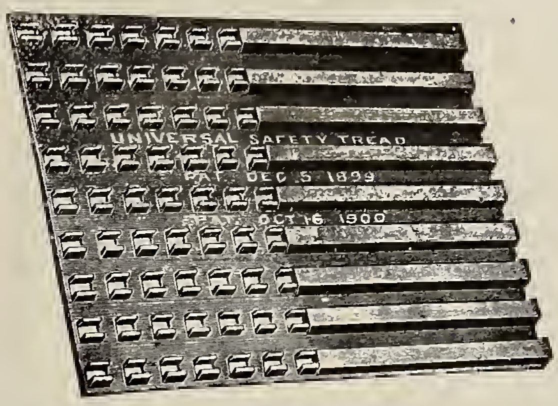
Mr. W. O. Johnson, formerly master mechanic of the

Iowa Central, has been appointed foreman of machinery and equipment of the Manistee & Grand Rapids, with headquarters at Filer City, Mich.

Mr. H. C. Bayless has been appointed mechanical engineer of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn.

Universal Safety Tread

The accompanying cuts show the steel base and the same after it has been filled, of the safety tread manufactured by the Universal Safety Tread Co., 45 Broadway, New York. They make a specialty of treads for railroad purposes, supplying them to pattern. Their tread is being used by a large number of prominent railroads, who have adopted it for use on the steps of open and closed coaches, steps upon engines and tenders, and steps upon the pilots of engines. The tread



UNIVERSAL SAFETY TREAD.

is found to be not only a preventer against slipping, but unaffected by wet, snow, ice, oil or grease.

No. 2 Stockbridge Index Center

The Stockbridge Index Center is the product of a manifested demand for a center that will meet certain requirements that no center has previously met. These suggestions, together with improvements which their experience has taught, have been embodied in the new design as illustrated and described.

The dimensions of the No. 2 index center are as follows: Swing diameter, 10 inches; it takes between centers, 14½ inches; the length over all is 27 inches; the hole in the spindle is 1 3-16 inches; the weight is about 110 pounds net. When packed for export it occupies about 2 cubic feet with a gross weight of about 125 pounds.

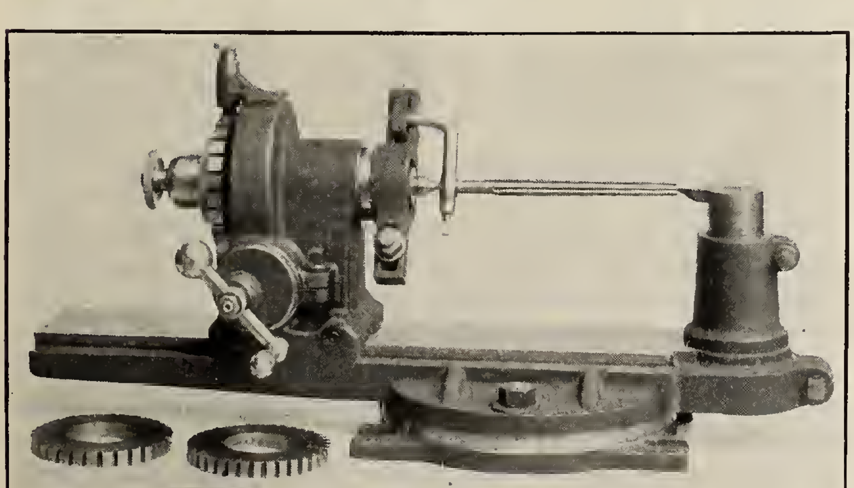


FIG. 1—SHOWING RAISED CENTER OF STOCKBRIDGE INDEX CENTER.

Three index plates, with 24, 30 and 36 notches are furnished, but any other divisions required can be had.

The pitch of the worm and the diameter of the gear make it possible to get any fractional division of a thousand. If desired, the worm may be thrown out of mesh and the works revolved with the hand wheel. The index center, as shown in the illustration, is designed to be used with their regular shaper graduated chuck-base, in which center distances of bolt holes is 6 inches. If used without chuck-base, the regular bolt centers are 8¼ inches. Other centers can be furnished. In ordering it should be specified what center distance is required, also, if base is to be used.

This center, as illustrated, is manufactured by the Stockbridge Machine Co., of Worcester, Mass.

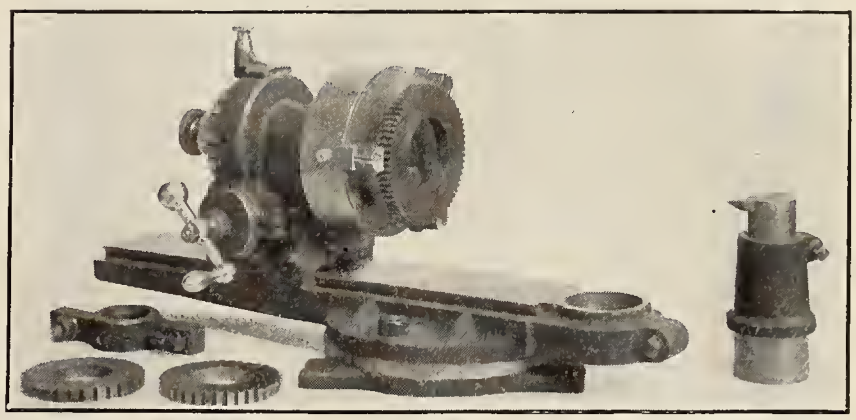


FIG. 2—SHOWING DOG HOLDER REMOVED AND CHUCK IN ITS PLACE, STOCKBRIDGE INDEX CENTER.

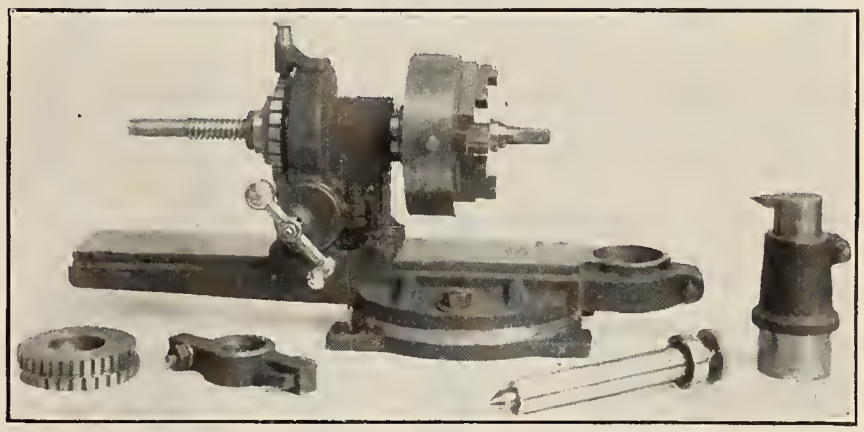


FIG. 3—SHOWING QUILL AND SCREW REMOVED, STOCKBRIDGE INDEX CENTER.

New Style of Auxiliary Grain Daor

The accompanying illustrations show a new form of grain door now being introduced by the Chicago Grain Door company, Monadnock block, Chicago. The construction is clearly shown in the line drawings. The door is made in two parts, not hinged together, as has been the previous practice, but so arranged that either section may be handled without difficulty by one man, while both doors may be hung up against the roof so as to be out of the way when not in service.

A prominent point in connection with the lower part of the door is the provision made to relieve pressure upon the inside of the door in discharging the load. This consists of two ports, which may be of any size desired, but which are shown as 5½ inches square, this size being considered sufficient to give the necessary relief in a reasonable time, and not so great as to weaken the door. These ports are normally closed by a lifting gate, which is retained in ways formed by the attachment of strips of iron to the frame of the gate, while above the frame is fastened a heavy batten serving as a stop to the upward movement of the gate and as a reinforcement to the door to compensate for the weakening by the removal of material to form the ports. The door is made very strong by thorough battening vertically and diagonally, a greater weight being allowable on account of the upper part of the door being separate from the lower. The lower door is hung upon guide rods by means of swivels. The upper section is hung upon and guided by the same

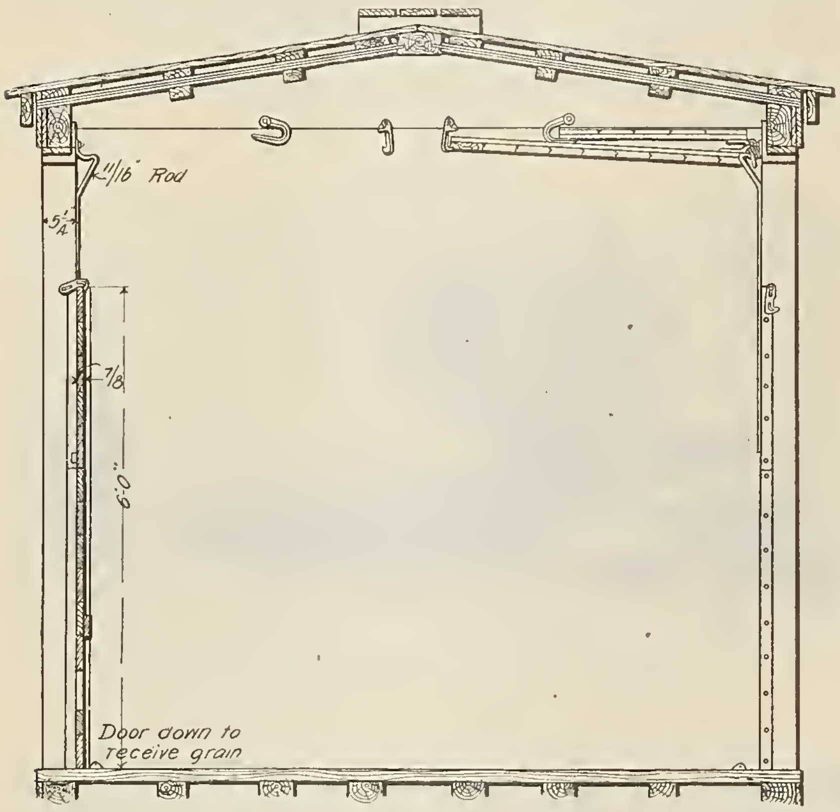


FIG. 1—NEW STYLE OF AUXILIARY GRAIN DOOR.

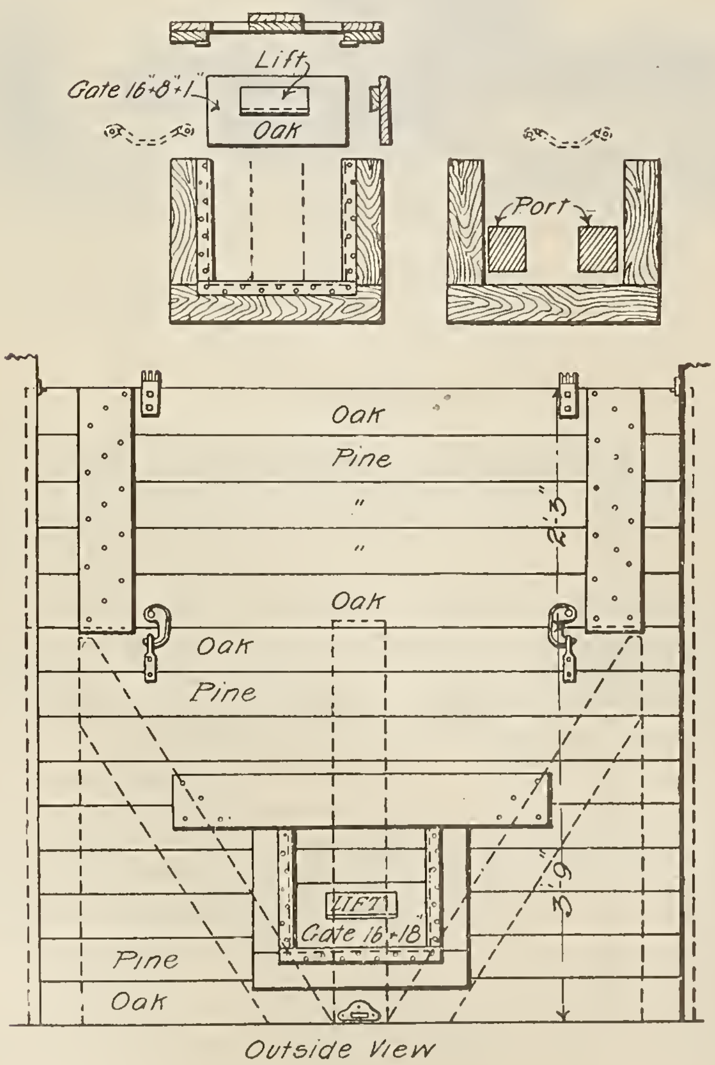


FIG. 2—NEW STYLE OF AUXILIARY GRAIN DOOR.

rods, and rests upon the upper edge of the lower section. It is held in position against grain pressure from within by the arrangement of battens on both sections, one of the battens on the lower section overlapping the inside of the upper section, and the two battens of the upper section overlapping the lower section on the outside. The two sections are held closely together by means of hooks on the upper section, which take into staples on the lower.

When not in use both doors are hung up against the roof, the upper section folding closely against the carlines, where it is held by a special form of hook with a deep jaw, while the lower section is held below the former by a hook of the same form used with doors of other construction. It has been found impossible to jar down the door by any ordinary means.

In unloading the lift gate is first opened, permitting a discharge of grain through the ports. The tendency is, of course, first to draw away the grain which is pressing against the upper section, which can then be thrown up against the section. While this operation is going on the lower section of the door is also being relieved of grain pressure, and by the time the upper section, or auxiliary door, is housed, the lower section is sufficiently relieved though the ports

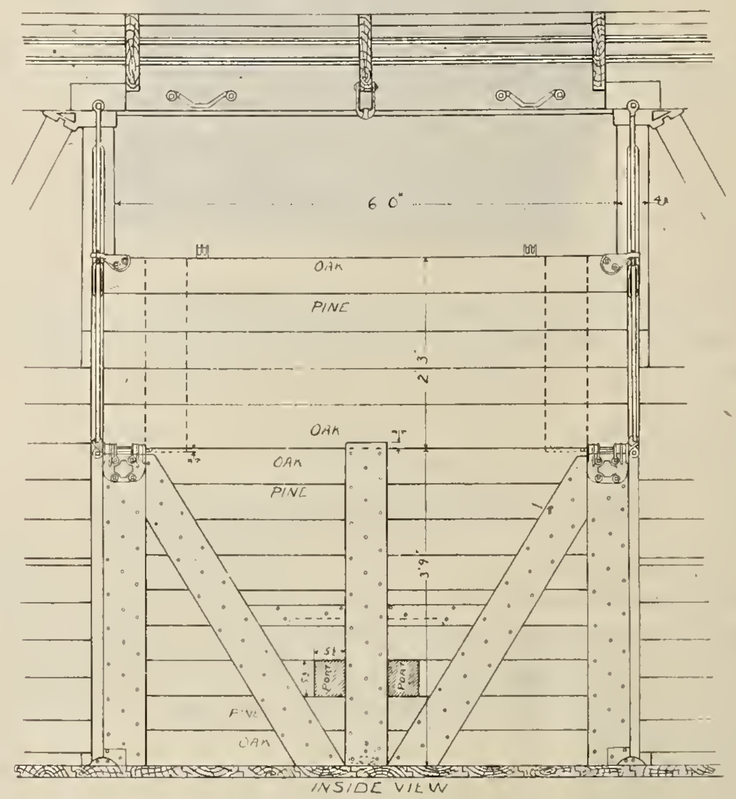


FIG. 3—NEW STYLE OF AUXILIARY GRAIN DOOR.
WILLIAM B. ALBRIGHT.

to enable it to be similarly disposed of. The car is then in condition for the use of power shovels or other unloading appliances.

Lackawanna Railroad New Ferry Boats

The Lackawanna Railroad Co. recently received four new ferry boats for use between Hoboken and New York City.

These new boats are a distinct advance over anything that has been attempted in the ferry service of New York harbor. They are 250 ft. long with a 62 ft. beam and a draught of 10 ft. 6 in. Each boat will have a horsepower of about 14,000 and a speed of 16 m. p. h. They are considerably larger than the largest ferry boat now operating on the North River, and are designed with special reference to handling large crowds comfortably. The hull is sub-divided into water-tight bulkheads, so that in case of collision the safety of the public will not be endangered. The hulls and floors of these boats are of steel.

The interior is finished in Colonial style, the lower cabin having a system of cross seats on the inner side and an attractive arrangement of arches. The upper cabin has a large seating capacity, so that one thousand passengers can be accommodated without crowding. An indirect hot-air system is provided and an improved method of ventilation will assure fresh air at an even temperature at all times.

American Railway Appliance Exhibition

The general committee of arrangements of the American Railway Appliance Exhibition in connection with the International Railway Congress, have sent out the following letter, which should appeal very strongly to the supply fraternity:

"The Congress of the United States with the approval of the President, has signally honored the American manufacturers of railway appliances by the passage of an act permitting an exhibition of the products of their factories to be made on a part of the Monument Grounds in Washington, D. C., in connection with the meeting of the International Railway Congress to continue from May 3d to 14th, 1905, inclusive. This gracious and generous compliment by the federal authorities, which places at our disposal a central, convenient and conspicuous site for our exhibition, offers a supreme opportunity for the exploitation and exaltation of our craft. To improve it, is a duty; to neglect it, would be un-American. The occasion will be unique in the annals of our industry. For a period of twelve days several hundred railway officials of high and important rank, representing many foreign countries, together with more hundreds of American railway officials of similar rank, will be gathered in Washington for the sole purpose of discussing railway problems.

"In connection with this distinguished assemblage what could be more appropriate or important than an exhibition which shall show the fertility of resource, inventive genius, energy, enterprise and economic achievement of those who study with assiduity and with the zeal born of commercial ambition, the requirements of railway operations. The members of the American section of the International Railway Congress, are most anxious that the first meeting in America of the Congress shall be a crowning success. As an adjunct powerfully conducive to such a success, the proposed American Railway Appliance Exhibition has their cordial approval.

"Your committee appeals to the patriotic impulses and commercial acumen of our fraternity to make the proposed exhibition such a demonstration as shall command the interested attention of all railway officials, and cause to be known to the world what the American manufacturer has accomplished for the railways in solving some of their vexatious and pressing engineering and operating problems. Your special attention is called to the fact that the delegates to the International Railway Congress are being chosen from the executive, operating, mechanical and maintenance of way officials. All departments with which supply men have dealings will be represented. While the exhibition will offer exceptional advantages to those who seek export trade, it cannot be too forcibly stated that those who manufacture exclusively for American trade will have an opportunity to gain the attention of a larger number of American railway officials than has heretofore been enjoyed at any similar exhibition. The director of exhibits has been authorized by the committee to invite application for membership and for exhibit space under certain rules and regulations prescribed by the committee, which are fully set forth in the director's circular, and it is our earnest hope that the responses thereto will be prompt, and in such numbers as shall show enthusiastic concert of action, and that a happy issue of our undertaking shall be quickly assured. Again you are reminded that the funds ascribed by you will be disbursed with due heed to proper economy in keeping with such a great and dignified enterprise, and that no member of the committee or any officer thereof is to receive any monetary compensation for his services. It will be compensation enough for your servants of the committee if their efforts shall rebound to the general welfare of the industry they seek to serve. The fees for membership and for exhibit spaces have been fixed by the committee at figures to insure financial solvency beyond a peradventure. A deficit would be disgraceful and must not occur; a surplus can readily be returned pro rata to those contributing, and would be so distributed.

"Finally, the appeal is made for exhibits,—fine ones, impressive ones. Anyhow, whether you exhibit or not, you are urged to enroll as members, as upon the fund raised from membership fees the proper and adequate administration of the exhibition and the entertainment of the visitors thereto, depends. Now, gentlemen, the preliminary arrangements and our appeal for co-operation having been made, the fate of the exhibition,—its success or failure—rests with you."

Notes of the Month

Mr. Geo. W. Austin, who was the western railway representative of Berry Bros., Limited, has resigned.

Mr. J. R. Cardwell of the American Cotton Oil Company, has been elected vice-president of Templeton, Kenly & Co., Limited, manufacturers of the simplex car jacks, Chicago, Ill.

In order that there may be no confusion or conflict with previously organized companies using the name "Monarch," they have changed the name of this company to the Frost Railway Supply Co.

The Miller Anchor Co., of Norwalk, O., have issued a catalogue describing their anchors, augers and excavating buckets. The catalogue fully illustrates the anchors, showing the amount of earth which would have to be lifted in order to pull the anchor. They are now putting on the market another anchor—a smaller one—to be used for light guying. This will be known as No. 1 and will prove fully as satisfactory as the larger sizes.

The Columbus Machine Co., of Columbus, Ohio, have issued a circular describing their hoisting engines. These engines are run by gas, gasoline or distillate. The geared engine described is readily portable and positive in action. The arrangement is such as to admit of the use of the standard engine, mounting it on iron sub-base and gearing it with cast iron cut gears to drum shaft, which is carried in babbitted bearings on sub-base. The circular also contains a table of sizes and dimensions of their hoists.

John F. Allen, 370-372 Gerard Ave., New York City, manufacturer of the Allen Portable Pneumatic Riveting Machines, who recently established an agency with A. H. LeHand & Co., Mexico City, Mexico, has received an order from this firm for six Allen riveters to be shipped the Cia Consolidada de Construcciones Metalica, S. A., of Mexico City, Mexico. There is no doubt that there will be an extensive demand for the Allen riveters in Mexico, as its merits becomes more generally known.

The total output of the Baldwin Locomotive Works for 1904 was 1,453 locomotives, of which 1,352 were steam, 94 electric and 7 compressed air. This is nearly one-third less than the number built in 1903, which was 2,022. The falling off in business which began in the fall of 1903 affected the locomotive industry. The works were run at their full capacity until last spring, but from June until the latter part of October very few orders were received. During the year 286 locomotives were exported.

The Boston & Maine Railroad has contracted with the Laconia Car Company for the construction of 300 36-foot box cars for delivery in the near future. These cars are to be similar in construction to those which were built some time ago at the Concord, N. H., and Fitchburg shops of the company, both as regards carrying capacity, which will be 60,000 lbs., and as to trucks, which are steel, as formerly. Twenty passenger coaches will also be purchased from the Pullman company, same to be delivered in July, 1905. These coaches will be uniform in construction with those which were delivered by the Pullman company during the past summer, that is to say, 60 feet in length, lighted by Pintsch gas, and otherwise of the most modern type.

The Diamond Drill and Machine Co. of Birdsboro, Pa., have issued catalogues on the Jackson belt lacing machine, cold saw cutting-off machines and diamond pointed prospecting drills. A belt lacing machine is an indispensable adjunct to every shop in which belting is used, because the lacing costs less with machines and can be done in less time. The machine fully described and illustrated in the catalogue, laces a 6-inch belt in three minutes. The catalogue on cold saw cutting-off machines illustrates ten different styles of machines. Each type is built in seven sizes with beds to suit all requirements. The smallest machine will cut 2½-inch and the largest 13-inch round forgings or steel castings. Most of the standard sizes are carried in stock. Especial attention is given to the clamping devices.

Boiler compounds that are truly scale solvents and water softeners are being experimented with abroad and the results reported to be most satisfactory. One of these is a fluid composition that is represented to soften any hard water and prevent scaling of boilers and disintegrate and remove scale already formed without priming. The composition is purely vegetable, no chemicals whatever being used in its manufacture, and there is said to be nothing in it to injure the boiler plates. In a test to determine its harmless character, a boiler was filled with crude undiluted scale destroyer and run for three weeks in 60 lbs. pressure, after which it was examined by a boiler inspector who reported the boiler in perfect condition.

There is a technical and art school at Leicester, England, founded about seven years ago, to give a scientific training in the more important manufacturing processes and industries carried on in Leicester, and also for the encouragement of artistic pursuits. The curriculum includes a wide range of subjects, such as boot, shoe and hosiery manufacture, wool dyeing, engineering, carpentry, plumbing, house painting and dressmaking, with the allied sciences of chemistry, physics, electric lighting, power distribution and mathematics.

The Northern Electrical Mfg. Co., Madison, Wis., has found extensive sale for its single voltage, two wire, variable speed motors in all lines of industrial work. The field of the variable speed motor is primarily the machine shop, as no other line of work calls for so many individual machines. However, Northern variable speed motors are used in all kinds of industries for operating pumps, for boiler feed, circulation, etc.—ventilating and blowing fans—elevators, hoists, conveyors, etc. An extensive field for Northern variable speed motors has been found in the cement industry where variable speed drive is especially advantageous.

Ames College, Iowa, recently received an old and peculiarly constructed locomotive from Mrs. Joseph Mallory Thayer, as an addition to its museum. The locomotive originally belonged to Mrs. Thayer's father, who used it in contracting work. It had until recently been stored at the West Burlington Shops of the C., B. & Q. Ry. It is 3 ft. gage, Forney type, having outside valve motion and driving wheels. The cylinder is on a truck separate from the boiler. It is equipped with the old-fashioned funnel stack, small drivers and tender and a headlight out of all proportion to its size. It was at one time the property of the Denver & Rio Grande Ry., and from castings on different parts of the engine it is seen that it has also been the property of the Union Pacific, Denver & Gulf Ry., and the Denver & South Park Ry. The last time the engine was used was when Mr. Mallory bought it for the purpose of laying the double track on the C., B. & Q. Ry. at Red Oak, Iowa.

In welding locomotive frames the heat of the liquid Thermit steel melts the ends to be welded, and amalgamates with them so that upon cooling the ends and Thermit steel are found to be united into one piece. It is hence necessary to have the ends to be welded so arranged as to permit the liquid metal to properly reach all parts of the fracture. In the case of a locomotive frame, the fracture may be opened by pulling or springing the frame apart so as to leave ⅜ in. to ½ in. clear space throughout the crack, permitting the parts to spring back into place about 25 to 30 seconds after the Thermit steel is poured and while the metal is yet plastic, and squeezing or jacking the parts together to their proper position; or the metal can be cut out, or a line of holes may be closely drilled through the line of the crack in a vertical position, bearing in mind always that the object is to let the liquid metal equally reach all parts of the fracture to insure fusing and amalgamation into one piece. Thermit and equipment is now supplied through the Commonwealth Steel Co., St. Louis, Mo.

The government of the Grand Duchy of Baden has, within the past year, provided further for the comfort of the employes of its railways. The government now owns 2,936 apartment houses where officials and other employes reside. The train crews have been furnished with sleeping accommodations, when their runs require them to be absent from home overnight, and small cooking stoves, of which there are now in use 230, have been provided where meals may be warmed. At Karlsruhe and Mannheim the government has lunch rooms established where the employes may obtain meals consisting of soup, meat and vegetables for 8 cents. The intention is to furnish the meals at cost. At these two restaurants the sale of liquors is forbidden. At Karlsruhe a library, consisting of 1,300 volumes, has been furnished the employes. The restaurants of the various depots throughout Baden are rented to private individuals, but government employes are furnished meals at reduced rates. Some of the restaurants are sources of considerable revenue; for instance the depot restaurant at Heidelberg rents for $11,900, at Mannheim for $8,568, and at Offenburg for $4,760 per annum.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

Among the Supply Men

FREDERICK FISCHER.

We introduce to our readers this month Mr. Frederick Fischer, of Pomeroy & Fischer, 28-30 Frankfort St., New York, whose portrait appears herewith. Mr. Joseph Pomeroy died Dec. 16, 1901, but the business has been conducted on the same lines by the surviving partner, Mr. Fischer.

The popular varnish house of Pomeroy & Fischer is, as is well known, one of the oldest firms in that line of trade in America. It may not be so well known that this firm represents, and is the sole agent in the United States of, the

FREDRICK FISCHER.

venerable paint house of Nobles & Hoare, which dates its beginning from 1814 and has had a representative in America since 1848. It is as much to the personality of the surviving member of his firm, Mr. Fischer, as to his indefatigable energy that his business has reached its present magnitude. The trade of the house is, as always, exclusively Nobles & Hoare's English varnishes and Walker, Parker & Co.'s English white lead, besides bronze powders and fine colors.

No one who has wielded a varnish brush, or lettering pencil, on a car or carriage needs to be introduced to Nobles & Hoare's Wearing Body varnish and Japan Gold Size. Scarcely any letterer has laid gold leaf on anything else of a size on car work than one composed of these two valuable materials mixed in right proportions.

Pomeroy & Fischer have been connected with the firm of Nobles & Hoare since 1872, Mr. Pomeroy as their traveling representative in many lands, and Mr. Fischer as confidential adviser in their export department. In 1886 they made their home in the United States, establishing the house as above stated.

This writer enjoyed an acquaintance with Mr. Pomeroy, who used to call on him many years ago; and has been entertained with his descriptions of travels in foreign lands, and held him in high regard and sincerely mourned his death.

The Scale and Rust Problem

Editor Railroad Paint Shop:

In the February issue of "The Painters' Magazine" there appears this note: "The Erie Railroad has recently placed in service the first steel baggage car ever used on any railroad on this country. The feature of special importance to the readers of this department is the painting, especially the durable quality of the paint, or enamel, used upon the surface of this steel leviathan, a report of which may be expected later."

This reminds me that I promised some time ago to write up the appearance of the tanks on the engines exhibited at the Louisiana Purchase Exposition when I was there about Nov. 1st, just six months after the opening. There was hardly an engine on exhibition, not excepting the Anheuser-Busch switching engine (which I must confess was the finest painted engine I have seen in years), but what gave indications of scaling or rusting. I even noticed that one of the foreign engines was not exempt from it, which is evident to my mind that they also lose sight of this very important feature of removing the scale before painting. Now when we know that these engines were protected from the weather and, being exhibited ones, presumably were painted better than the ordinary, and with no dampness from water inside, nor outside, what is the natural conclusion? Simply that the rust and scale had not been properly removed from these tanks; for if it had been there was nothing in the treatment or exposure of these engines to have created rust after painting. The condition of these engines only emphasizes what every one of us maintained at Atlantic City—that is, the scale and rust must necessarily be removed before painting. For our special committee, appointed after hearing the papers read on painting steel cars, reported seven points as being of vital importance in their preservation, the first of which was: "All flash, or mill scale, should be entirely removed before any paint is applied, and we believe this can be best accomplished by the use of the sand blast." This report was adopted without a dissenting vote, I believe; and yet there are some who claim it is not necessary to remove flash or scale from new steel tanks before painting.

At a meeting of the Pittsburg Railroad Club, some months ago, a prominent master mechanic claimed it was not necessary to remove flash and scale before painting, and that he was using a paint that entirely obviated the use of the sandblast, emery, or any other means of cleaning. Now this may be true, but does this master mechanic know whether the results he will get from this paint will be satisfactory?

I recall very distinctly that James A. Gohen of the "Big Four," told us at Atlantic City that he had bronzed a tank with dry graphite from which tank the scale had not been removed, and while there was no rust on the tank, he said that the paint applied was not satisfactory, although it was his usual formula; and he was still experimenting. I do not have much faith in graphite in any form as a primer or under-coating for surface work. So before I am convinced that scale need not be removed I must certainly know that this scale or rust-resisting paint used by this master mechanic is satisfactory in other ways. It may turn out with him as it did with Gohen, who is of the opinion that the safest plan is to thoroughly remove the scale; for he so expressed himself to me at St. Louis when I met him at the exposition.

Now, Mr. Editor, you had an article in the January issue of the "Master Mechanic" advocating water-proof paint for steel cars. You say it is plainly evident that if a paint upon steel allows water to go through it and attack the metal, rust must be the immediate result. I cannot agree with you altogether, because I have seen tanks painted that rusted badly, and after being cleaned off and repainted they did not rust again. And I would just like to hear from our friend Weis of the Central Railroad of New Jersey, in these columns, about the steel cars that Mr. McMasters sand-blasted on that road in the spring of 1902. There is an opportunity to prove or disprove your theory as to the water penetrating the oil paint. Then let us hear from John H. Kahler, who has sand-blasted a number of tanks, and be satisfied on this question.

Mr. Editor, we have a number of cranks in our association. You might be termed the literary crank; "Sam" Brown, a shellac crank; "Jim" Gohen, the Emulsion-cleaner crank; "Billy" Quest, the paint-spray crank, and I guess I will have to admit being a scale-and-rust crank.

D. A. Little.

"Paint Burners vs. Paint Removers"

St. Paul, Minn. (Como Shops), February 9, 1905.

Editor Paint Department, Railway Master Mechanic.

My Dear Sir:—Reading in recent publications has led me to write MSS. herewith, for which I beg space in one of the issues of the Railway Master Mechanic.

In the shadows of the gigantic oak, in the balmy zephyrs of the beautiful summer time, we may lie in repose and, listening to the twitter of the birds, enjoy nature's gifts. In the cold and bleak days of winter we may repose in comfort in the warmth of the pleasant home, listening perchance to the howling of the winds, feeling thankful for the means afforded for our protection as well as also a thankfulness for other present blessings;—at these times may we read of or hear the advanced (?) ideas of our fellow craftsmen, but with possibly only benumbed senses, or perhaps a feeling of sympathy in our hearts and a desire in our minds that we might be able to think out a way whereby we might assist in the advancement of our calling and be the means of bringing to the front an idea, a method that might prove to be an improvement upon the present. But I fear I am too slow. In this frame of mind I read through the lines of recent publications, and among them the Railway Master Mechanic, in a recent number of which I came upon an article the title of which has been the cause of this writing; an article entitled, "Paint Burners Vs. Varnish and Paint Removers," and I am loath to permit the points set forth to go unnoticed for the reason that the idea expressed may be taken up and an effort put forth by the uninitiated to install a process of which the article in question appears as a recommendation.

Why is it, after years of practice and after such a vast advancement has been made in the mode of removing paint from car exteriors with the flame, it now appears that the mode should be abandoned for the very recent system of the so-called paint remover, a combustible, an inflammable substitute satisfactory in a small measure only, to say the most or best? Why this change I am at a loss to understand. Great stress appears to be placed upon the occurrence of a few fires which have destroyed shops and these during a short and recent period of time; and this being taken as sufficient data to warrant the abandonment of the old and only true, practical, economical and satisfactory method for removing paint from the exterior of passenger cars and in its stead adopting this latest method, the paint remover, so-called; the combustible, inflammable, the in many ways unsafe method.

If man will only think, and he need not delve very deeply, he will discover that more fires and more destruction has occurred since the introduction and use of these varnish and paint removers than can possibly be traced as being directly caused by the burning process of removing paint. A few instances of destruction by this as a direct cause may be discovered; but, if so, these should rightly be attributed to carelessness upon the part of the workmen and not to the method of removing paint, or to the construction of the apparatus successfully in vogue for so many years. While I will not say that recent fires were, or might have been, caused by or through this, I am frank in claiming that the fires were, or originated, in places where knowledge, judgment and understanding were not lacking, and I attribute the cause to thoughtlessness or lack of foresight upon the part of the workman; for no one would ever think of using an inflammable, combustible, gaseous article upon the interior of a car and charge it to its fullness with gas and at the same time place upon the exterior the necessary, the proper torch for ignition. While it is said that the paint shop at all times contains gases of combustible nature and that there is a possibility of their being set off and property destroyed through the introduction of the paint burner, all of which I claim unnecessary and avoidable, how few are the instances of such cases of destruction. Again, I repeat, it is claimed that the paint shop contains these gases of combustible nature and that they are dangerous, and still we would recommend an article more gaseous, more combustible, so that the risk engendered to life and property shall be enlarged, so that we may live a life of preparedness, a consciousness within ourselves that at any time, any moment, someone may enter into this gas tank, this paint shop charged with the combustible, with a lighted torch, or perhaps he may light a parlor match, and instantly send us into eternity! Beautiful is the sentiment, so consoling, which brings such peace to the mind, a peace which lulls one to sleep, making him unconscious of this possible "rapid transit!"

To my mind it is essential that here is an opportunity for the insurance and health departments to investigate. Paint burning by heat, fire, or flame, in one form or another has been in practical use possibly before many of us were born, or perhaps while many of us were strutting about in kilts. My memory goes back to the time when it was thought that the heated slab of iron held to the surface of old paint was an advanced idea for removing paint. This perhaps was followed by the improved, the well-remembered charcoal furnace, with its screened open front; and then came the other improvement, the small hand, gasoline torch, explosive, finger-lacerating, self-pressure-generating paint burner, to which, after a time, was attached the insignificant hand-pump; but nevertheless an advancement in the right direction to the present successful, practical and generally adopted method, the compressed air and gasoline paint burner of today. Speedy, reliable and safe, carefully and properly constructed, producing a surface perfectly satisfactory to the most exacting in after-results and with a speed not possible to be obtained with any paste or liquid remover that has yet been devised. Barring all these advantages of the good, old-time paint burner over the combustible and dangerous varnish and paint removers as to fire, no one as yet has become poisoned in system or body through its use. This cannot be said of the removers, while it may be true and possibly is true that some do not contain the poisonous property. There are those that do, and who is it as a user that is so sure that he may not be deceived and be using some of it? Not one. The odor given off from burning paint is certainly more pleasant and healthful than the sickening, nauseous odor given off by nearly all of the so-called paint and varnish removers. There is, however, possibly one advantage that the paint remover has over the flame and might be considered in the study of economy and, economically thinking, it would be the only advantage, allowing that we care nothing as to the condition of the shop floor after removing the paint from the car with the remover, and by the way saying nothing of the cost of labor required to clean the floor; just think how the scrapings and waste may be gathered up and used as fuel. It certainly will make a good fire and would raise some steam and in some localities raise something else, especially where the health department has such serious objections to the volume of smoke; and this certainly will make a good black one, to say nothing about the worse than stock-yards odor.

As a user of varnish removers I close, claiming for it many advantages, economically and otherwise; but am not now ready to discard the most practical and economical methods for something positively unsatisfactory.

A. J. Bishop, Foreman Painter.

A Sister Convention Visit

The house painters know a thing or two as well as the Master Car and Locomotive Painters. It was this scribe's happy privilege to attend, as an invited guest, the annual convention of the Master House Painters and Decorators of Massachusetts, held at the American House, Boston, Jan. 11-12, 1905. So, together with his colleague and associate, Albert P. Dane, he strolled in there one day and ex-President Edwards took us up to the platform and "told on us," and told them all what he thought of us. And "a right smart" attendance they get out, too, as our southern associates would say—rather more than our entire active list of M. C. & L. P. A., we should think. And they religiously attend upon the sessions as well. They have their fun as well as the rest, but when the time for meeting comes they crowd into the big hall until there is hardly a vacant chair left. And there is a space reserved for the ladies, some of whom attend also. The lieutenant governor (Guild) made the opening address, but the writer lost the pleasure of hearing this, for he is a glib speaker. We reached the afternoon session of the first day when the subject of "Shellac" was up for discussion, and sincerely regretted that our old-time friend, "Sam," alias "Shellac" Brown, was too ill to be present. Think of it, here was one of the greatest tirades you ever heard of against shellac as we are getting it today, right in the same hotel where "Sam" so nobly stood up for it at our convention in 1890, when he showed us a car finished with it on the Old Colony R. R. on the trip to Plymouth, that enjoyable excursion day. We could but ask ourself, "How are the mighty fallen?" and reflect on the retrogression of the times and the adulteration that is practiced, as speaker after speaker told of his troubles with what he was getting and the expense he had been put to to make spoiled work good. Mr. Otto Walburg, of Boston, convulsed the convention with laughter with his witty presentation of his side of the case. Mr. Aiken, of New Bedford, read a paper first upon the subject, following it with some interesting tests for wood alcohol with permanganate of potash. Next came Mr. Langmuir, of a New York firm, with some tests for resin in shellac. This was most interesting. With a solution of chloride of iodine and acetic acid he would demonstrate at once if a cut shellac had any resin in it, after he had told us that almost all grades of the gum are adulterated with it before it leaves India, the resin being obtained from this country. Putting a few drops of the solution into a vial of pure shellac its color would not be changed, but just as soon as a pinch of dry resin was dropped into it it would turn red. Vials of resin shellac were tested and exhibited, as well as the pure. We obtained a vial of the solution with a promise of a bottle at a later date, and counted it a new and useful test. Debate was so free and the hour so late that we made our exit before the session ended, for our train home.

Thursday morning the subject of paint and varnish removers was up, especially with reference to their effect upon the health of the users, and we were invited to speak upon it, and were introduced by the president. Prefacing our talk with some remarks on the subject of shellac of the day before, alluding to the change of sentiment in fourteen years since our convention was held there. and how shellac was then talked about and saying that we cut our own shellac in all our car shops, and had no trouble, we went on to tell something about the dangers lurking in varnish removers, citing our report read at Chicago a year or so ago, and telling how we had tested a remover recently that was one of their exhibits in the room below, that contained something like 40 per cent of carbon bisulphide. Our own opinion of the discussion entered into by their own members was that they did not know much about up-to-date varnish removers when they advocated alkali and potash removers and oxalic acid and vinegar to remedy the troubles caused by them. One man said he wanted a remover that would remove the filling as well as the varnish from the wood. We replied that we wanted the filler to remain as so much additional work and material saved, and the shellac also, if we could get along without its removal. Altogether it was an interesting two days' convention.

They had a large banquet hall divided off into floor spaces for exhibitors, from which a revenue is obtained to support the association. There was "a smoke-talk" for one evening's entertainment, and a banquet for the closing night.

Notes and Comments

By April 1st next it is expected that the B. & M. will have equipped the remainder of its freight equipment with air brakes, a few of which will have "straight air" applied, as the most is already equipped with the air brake complete.

Frank H. Crocker, formerly foreman painter at the Kansas City shops of the St. Louis & San Francisco R. R., no longer connected with that road, we are advised is spending the winter in California.

In our last issue a wrong impression was given in connection with the recent promotion of Mr. J. W. Warden, when it was stated that all car repairs, etc., within a radius of 15 miles of Boston were under his jurisdiction. As a matter of fact, his authority as assistant master car builder extends over the whole B. & M. system.

W. B. Burpee has resigned as foreman painter of the Portsmouth, Va., shops of the Seaboard Air Line, to accept a similar position with the Atlantic & Birmingham at that company's shops at Waycross, Ga. Mr. Burpee is succeeded at the Portsmouth shops by his assistant foreman, B. H. Covert, formerly master painter of the Long Island R. R.

Frank L. Robbins has been appointed foreman painter of the St. Albans, Vt., shops of the Central Vermont R. R., succeeding W. J. Orr, resigned. Mr. Robbins has been with Mr. Orr for a number of years at Norwalk and Cleveland, O., on the Lake Shore, prior to his service with the Central Vermont, and is referred to as well qualified for the position to which he has just been appointed.

By the way, there is to be another World's Fair at Portland, Oregon, the coming summer. Is this to hold over the month of September? If so, what was that contingent thinking of, of the M. C. & L. P. A., that always wants our convention near one of these expositions so as to take it in, that they did not urge to have it out there somewhere? Still, Cleveland is on the way.

In addition to the new equipment mentioned in the last issue, the Boston & Maine is building three new milk cars at its Concord shops. These, with over 50 others in use, are painted and varnished in the same way as is the rest of the passenger equipment as, with few exceptions, they run on passenger trains. Also another 60-ft. mail car is to be built at the Lawrence shops like the one described in last issue. These mail cars are built in accordance with government requirements and receive three inspections while building by railway mail officials. They are not dynamite and bullet-proof, but they do seem to be telescope-proof from collision.

Mr. Little writes, Feb. 14, that "J. B. Sipe and wife stopped over in Altoona Saturday night and left here Sunday noon for Florida to stay there the balance of the winter. His health is not good and he looks it."

We also learn today, Feb. 16, that our associate, Mr. C. E. Nance, of the O. & W., goes to St. Augustine, Florida, to stay until spring to see if he cannot regain his health which, none of the best at last accounts, the ravages of the severe weather of this latitude was threatening. Our best wishes and kindest regards go with him, with the hope that he will round up at the Cleveland convention all right.

Meeting Mr. H. M. Butts, master painter of the N. Y. Central, in Boston recently, in connection with a visit of his to the B. & A. shops of that road at Allston, he says that Mrs. Butts' mother died Feb. 1st, the interment occurring Friday, the 3d. She was 77 years old and had been ill five months with ailments incidental to old age. Also states that Mr. Louis Fox, assistant to Mr. A. L. Allen, at West Albany, is in quite poor health and is on a leave of absence to regain it, if possible. The N. Y. Central shops at Albany were not quite so busy at this time on account of not being able to get the cars released from service for shopping. Their average for the past two months—December and January—was 4½ cars per day, while last year at this time they were turning out seven a day. Similar conditions were existing at the Allston shops.

Another good test which we recommend in connection with oils for preservative paints for steel, as indicated in our article in the January issue, entitled, "The Preservation of Steel from Decay," especially with reference to the steel structure of train sheds, overhead viaducts, etc., is as follows: Take strips of glass coated with the various oils to be tested and place them in a jar through which pass a current of Sulphur Dioxide (SO_2) and note results. Raw linseed will be immediately attacked and destroyed, while some other oils will be slightly affected. This is the gas in train sheds to a large extent, though not, of course, in its pure state. After taking strips out of jar and allowing them to be exposed to the air again note results. This would be a good test to show at the convention, as the raw oil shows its effect immediately, while other oils may not be affected for several days.

There has recently been sent us a copy of "Protection, Resistance, Durability," a handsome and interesting booklet, describing the methods of manufacture in the electric furnace and use of Acheson graphite for paint pigment. Any one interested in protecting metal surfaces from corrosion and decay may obtain this booklet by writing to the International Acheson Graphite Company, Niagara Falls, N. Y. It is gotten up in good shape, well illustrated, and tells "the story of Acheson Graphite Paint," its process of manufacture by electricity, its durability, etc. We would be glad to make an extract describing the interesting way this material is developed, also that wonderful related material, "Carborundum," and the new refractory material, "Siloxicon," but we trust our interested readers will write these people, as above, and obtain the booklet for themselves.

It will be seen that Mr. Pitard's article in a former issue, in which he advocated a paint remover in place of the paint burner for removing paint from the exterior of cars, is stirring up opposition. This was expected. Mr. Bishop in his article in another column quite agrees with the position taken by the editor of these columns in the last issue in an article under the same caption.

In sending his article for publication, which appears elsewhere in this issue, Mr. Bishop says in a personal note that he is very busy at the shopes and has been since his return from the Atlantic City Convention, with plenty of work in sight and preparations being made for the great fair at Portland, Oregon, next summer. Mr. Bishop has the advantage over many shops in the East by having lots of work in the summer in painting and varnishing the storm sash that they screw on the outsides of the windows of the cars in winter time. The Northern Pacific has cords of these—thousands of them.

The output of the Boston & Maine's six passenger car paintshops for the month of January, 1905, was 217 cars. From the beginning of the fiscal year, July 1, 1904, to January 31, 1905, 686 cars were painted and varnished as against 553 the previous year, showing a gain of 133 over last year; thus all losses for two years are made up, with 34 cars ahead. The total equipment as it now stands is 1,629 cars, from which 51 express freight cars of Fitchburg division may be deducted that, though treated with varnish color in Pullman shade, run partly on freight trains. Another deduction of 63 electric cars at Portsmouth and Concord leaves a total of 1,515 cars running wholly in passenger service that have to be varnished. Thus it will be seen that there are remaining 829 cars to be done in order to complete the equipment by June 30, the end of the fiscal year. On account of summer travel, if the season is favorable, which starts in early to the mountains and seashore, cars are reluctantly taken from service after June 1st, if not during the latter part of May, so that there can only be February, March, April and May to count on to do this work. But as this will mean but about 207 cars per month it seems feasible at this writing.

We commend Mr. Little's interesting article in another column to the thoughtful attention of all who, having anything to do with painting locomotive tanks. He makes the mistake, however, in his criticism of our article in the January issue, of ascribing to that article the claim that a water-proof paint is the thing for engine tanks; that would be useless in that case, as they are protected with an after-coating of varnish, or varnish color, or both, that is more water- proof than any paint can be. We stated, in substance, that, no matter whose paint is used, a tank filled with water warmer than the atmosphere without and sweating takes place from beneath the paint, rust pits will form and work their way out, "but with the steel car a different problem is met." Read again, Bro. Little. We also stated "that paints have to be constructed differently for various purposes and according to their several needs." We agree with Mr. Little, however, in his sand-blast argument as the proper means for preparing rolled steel for painting; and plead guilty to his "crank" indictment, and think the rest of the culprits in the "cage" with us will stand up in their turn and say "Guilty, your honor." If a man amounts to much of anything in this world in any calling that little gets to him by common consent; but "the cranks of today are the heroes of tomorrow."

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 501 and 503 The Plymouth Building
305 Dearborn Street, Chicago

TELEPHONES - - { Harrison 3357 / Automatic 7357

Eastern Office: Room 714, 132 Nassau Street, New York City.

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.
Communications on any topic suitable to our columns are solicited.
Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.
In remitting make all checks payable to the Bruce V. Crandall Company.
Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent

Vol. XXIX. CHICAGO, APRIL, 1905. No. 4.

Contents.

The Editorial and Business Offices of the Railway Master Mechanic will be located after May 1st in the Security Building, corner Madison Street and Fifth Avenue, Chicago.

THE International Railway Congress, which is to hold its seventh session at Washington May 4-13, will be the most important gathering of railway officials ever held in this country. For the first time its sessions will be held in America, and not only delegates from foreign countries will be present, but delegates from all of the leading home roads. Washington next May will undoubtedly see the largest gathering of railway and the railway supply men that has ever been witnessed anywhere. Not only will the subjects discussed in the sessions of the congress be of interest and importance, but the exhibition of American railway supplies will be an education in itself. Every man interested in any way in railways should be in Washington next May.

THE number of engine failures due to cold weather should be a strong argument for introducing electric power on steam railroads. With the electric car the only cause for failures in cold weather are snow banks, while with the locomotive leaky flues and fireboxes add to the strain in keeping trains moving in weather as experienced during February.

The reason for the electric car having this advantage is because its power house is in a building and the boilers are not exposed to the changes. Furthermore, a different class of power is installed in the power house, which is more accessible and failures are not so liable to occur.

ON February 21 the Western Railway Club held a reception to its past presidents, it being the occasion of having reached its majority. The club was organized in 1884 with about a dozen members and has grown until now it has a membership of over 1,000. The majority of its members are connected with the mechanical departments of railroads, and the papers presented have nearly always been on the performance and maintenance of locomotives and cars and shop practice. The papers presented and discussed have always been interesting and instructive. One feature in which the club differed from most similar organizations is that several subjects were chosen for an evening. In this way topics were selected which would not take up a whole evening, but more information directly in line with practice could be taken up. Quite frequently the discussions became so interesting that only one of the selected subjects could be taken up on the evening, which proved the active interest the members took in the discussion.

In a social way the members of the club formed many intimate friendships, and if it had done nothing more than this, it would have been worth while for the attendance.

When the club was first started shop methods were crude, locomotives and cars were small, the use of steel—forged, structural and cast—were in their early experimental stage. During the existence of the club all these developed and the members were all influential in their development. The club has always taken part in the M. C. B. rules of interchange, and to some of its members is due much of the work which resulted in the present rules of interchange It was the recommendation of the Western Railway Club which resulted in making the car owner responsible for repairs in interchange. Three past presidents of the club should be mentioned in this connection —Peck, Rhodes and Barr.

Some of the principal papers discussed in the club are "Car Lighting," by George Gibbs; "Steam Distribution in High-Speed Locomotives," by C. H. Quereau; "The Utility of Electric Motors on Railroads," by D. L. Barnes. Other subjects that were taken up were on the experimental work on tonnage rating of locomotives. Water purification has been a frequent subject for discussion. Some of the later subjects have been on piece work and shop management.

The principal element which has contributed to the success of this club has been the willingness of the railroads to make public the results of their experimental work and investigations.

POOLING locomotives is partly in favor with foreign railroads. According to the Bulletin of the International Railway Congress, only three roads apply this system as a regular thing, of which one uses it by force of circumstances, because there is a want of locomotives, and in every way prefers the single crew system, which it considers best. One road seems to be entirely satisfied with it. The Transbaikal line states that it is the small importance of the traffic on the line which has led to the adoption of the pooling system. Perhaps it may be partly, also, owing to the fact that the Transbaikal line, which is more than 745 miles in length, is at present only a single-track railway connecting Lake Baikal and Manchuria. This configuration of the line lends itself quite well to the application of the complete pooling system to the locomotives of the few trains running long distances, although it sometimes gives rise to difficulties in maintenance.

The London & Northwestern Railway of England applies the complete pooling system to optional trains and shunting locomotives; the Danish State Railway to the latter only. The Belgian Northern, the Great Northern and Great Central in England, the Great Indian Peninsula and the Cape Government Railways occasionally apply the pooling system in order to meet a sudden rush of traffic; but they are not satisfied with the system and do not recommend it. The Madras Railway, which had adopted it for sudden rush of business, abandoned it owing to its disadvantages.

According to these observations the pooling system is not a complete success.

This has been discovered on some of the American lines. One of the principal trunk lines west of Chicago abandoned the pooling system on their passenger service. They claim that with the pooling system an engineer and fireman experience the same difficulties that a cook would if he was to prepare a meal in a strange kitchen. It is not that he would not know how to prepare the meal, but the surroundings are different and all the utensils in different places. The crews experience the same difficulties in getting a strange engine. They do not know its weaknesses, and so considerable time is lost in getting acquainted. If the engineer and fireman have the same engine all the time they know at what cut-off she will do the best work, and the fireman will know exactly what her weaknesses are in the firebox. Furthermore, they will take a greater interest in their work. A good example of this was shown the other day in riding an engine that was not in the pooling system. There were new brasses put in the trailing boxes. The engineer knew that these were new and liable to get hot, so he kept his eye on these all the time, with the result that they ran cool. If this engine had been in the pooling system, the chances are that the engineer would not have known that he had new brasses and the train would have lost time on account of hot trailer boxes. Another point is the pride the crews take in having their engine "ship shape." They will ask visitors to look at the engine and point out with pride how well she is kept up and how clean she is. They also know exactly what repairs are to be made and see that they are made before the engine goes out again, often spending a lot of time out of hours repairing and painting parts themselves that they know the roundhouse force will not have a chance to do.

MR. J. M. GRUBER
GENERAL MANAGER CHICAGO, BURLINGTON & QUINCY.

Mr. Gruber has been in railway service since 1885, beginning with the St. Paul Minneapolis & Manitoba. He was later connected with the Santa Fe system for a number of years as stenographer, clerk, assistant trainmaster at Gainesville, Tex., superintendent of transportation of the Gulf, Colorado & Santa Fe, and chief clerk to general manager of the same road. He was then assistant superintendent of the Eastern of Minnesota for five months, and superintendent of the same road from June, 1895, to July 25, 1896. He was then transferred to the Montana Central as general superintendent, and on March 25, 1897, was appointed assistant general superintendent of the Great Northern. In April, 1903, he resigned to accept the position of general superintendent of the Western district of the Chicago, Rock Island & Pacific at Topeka. He left the latter road on January 28, 1904, and on February 5 of the same year was appointed general superintendent of the Union Pacific. Mr. Gruber left the latter position to become general manager of the Chicago, Burlington & Quincy on February 1, 1905.

New Angus Shops, Canadian Pacific Railway

THE Canadian Pacific Railway recently put into operation one of the largest and most complete locomotive and car shops. This road has a mileage of 8,183 miles and owns 840 locomotives and 28,655 cars. The road is divided into the eastern and western divisions, each of which has its own separate management.

The locomotive shop was designed to handle the heavy repairs of half of 450 locomotives on the eastern division. The heavy repairs of the western division will be handled at the new shop, nearly completed at Winnipeg. At present they are turning out one new locomotive per week and about 35 repairs per month.

The plant has a local telephone system connecting all the foremen's offices. This system has a capacity of one hundred 'phones.

The shop buildings are arranged on either side of a center passage or midway over which is located a 10-ton crane running on structural steel supports. The tracks from the different buildings extend into or across the midway, and all materials in transit between the shops or storehouse is handled by this crane.

The general office building which contains the offices of the motive power and car departments, including the test department, and general storekeeper, is located in the center nearly opposite the end of the midway to the southeast of the shop buildings. Starting from this end of midway, the locomotive shop building, which includes the erecting, machine, boiler and tank shop, is the first building to the left. Almost directly opposite this is the general storehouse, whose platform extends far enough into the midway to allow the crane to take material from it. The next building on the right side is the blacksmith-shop. Opposite the blacksmith and next to the locomotive shop is an iron foundry, and following on the left is the pattern shop, behind which is a fire proof building for pattern storage. Next comes the car machine shop, then the truck shop, and the last building on the left side is the freight car- shop. Opposite the freight car shop is the planing mill. Between the planing mill and the blacksmith shop, located back from the midway, is the power house. All these buildings with the exception of the power house receive and exchange material from the midway crane. Directly back of the truck shop is the wheel foundry and core sand shed. A frog shop is located back of the pattern store house and an oil house room back of the grey iron foundry. Another crane travels at right angles to the midway crane along side of the grey iron foundry. This crane handles the supplies of the foundry as well as elevating the material to the charging platform. The two passenger car shops with a 75 ft. transfer table between are back of the blacksmith shop. The cabinet shop, including the hardwood store room and upholstery, is back of the power house, alongside of the passenger car shop. The dry kiln is located back of the planing mill and the cabinet shop.

The location of buildings and arrangement of tracks is clearly shown in the general layout. From this it is seen that loaded cars can be run into or alongside of all the buildings or under the midway crane.

The walls, which are constructed of brick laid in cement mortar, rest on a foundation of concrete three feet high. This extends a short distance below the ground. Below the concrete is rubble masonry, and this rests on dry rock wall carried down to rock foundation.

The heating is by means of the Sturtevant system of hot air blast. The hot air pipes are carried overhead, with downward outlets in all cases, except on the erecting side of the locomotive shops, where ducts are under the floor, with uptakes every four bays.

In the power house is located a city fire alarm box. To this are connected boxes located in or near all the buildings. By these means an alarm turned in from any building will go to the city fire department. Besides this, there is a local department, composed of employes.

There is a tunnel leading from the power house across the midway and from there parallel to the midway connecting all the buildings. This is used for steam, air and water pipes.

Besides the midway crane and foundry crane, there is

Fig. 1—View down the midway, Canadian Pacific Shops.

Fig. 2—View in the erecting shop, Canadian Pacific Shops.

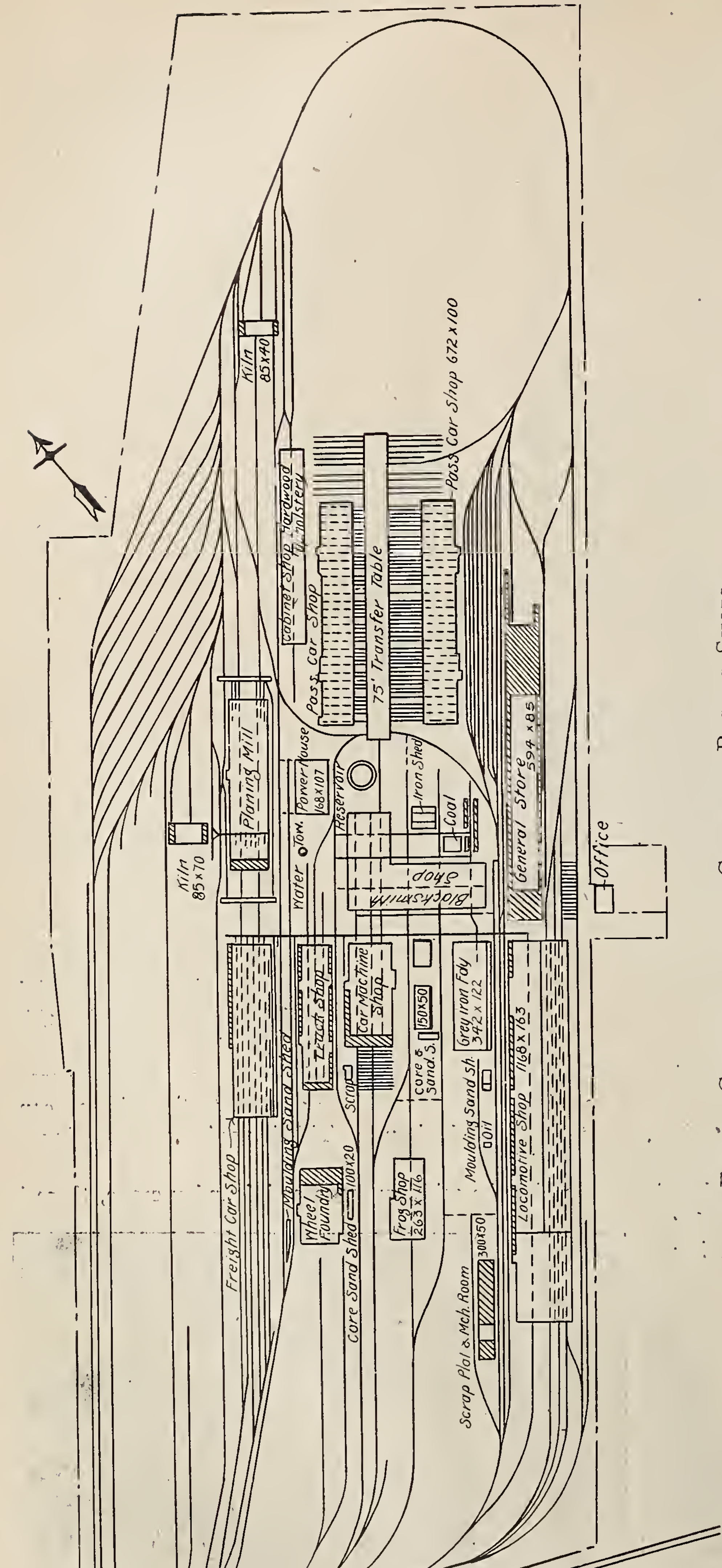


Fig. 3—General lay-out, Canadian Pacific Shops.

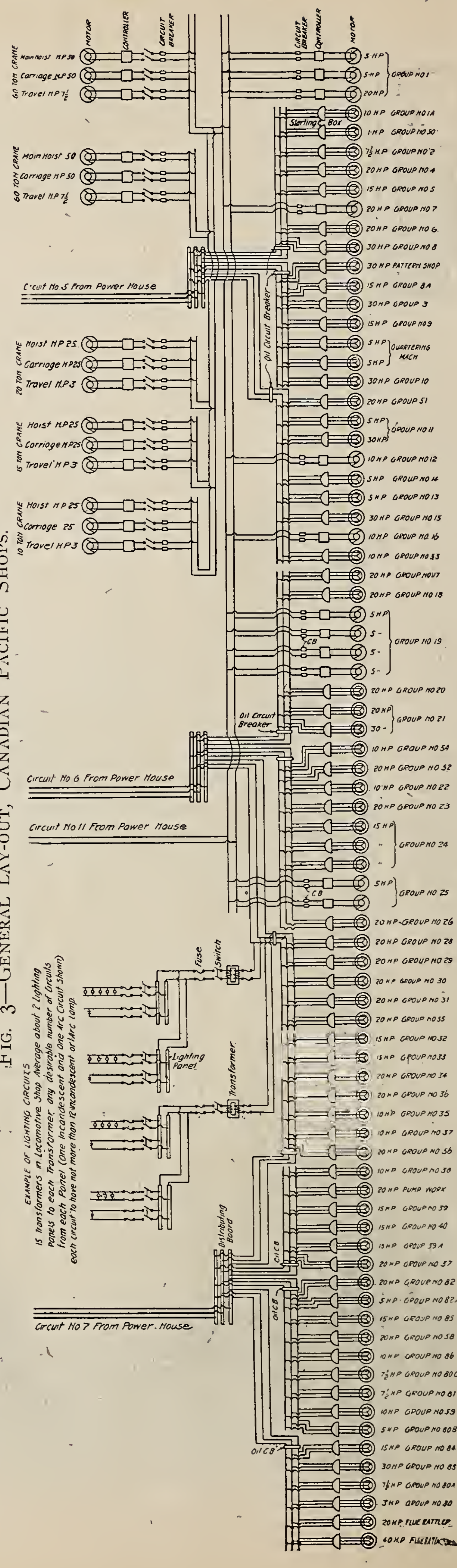


Fig. 4—Electrical distribution in locomotive shop, Canadian Pacific Shops.

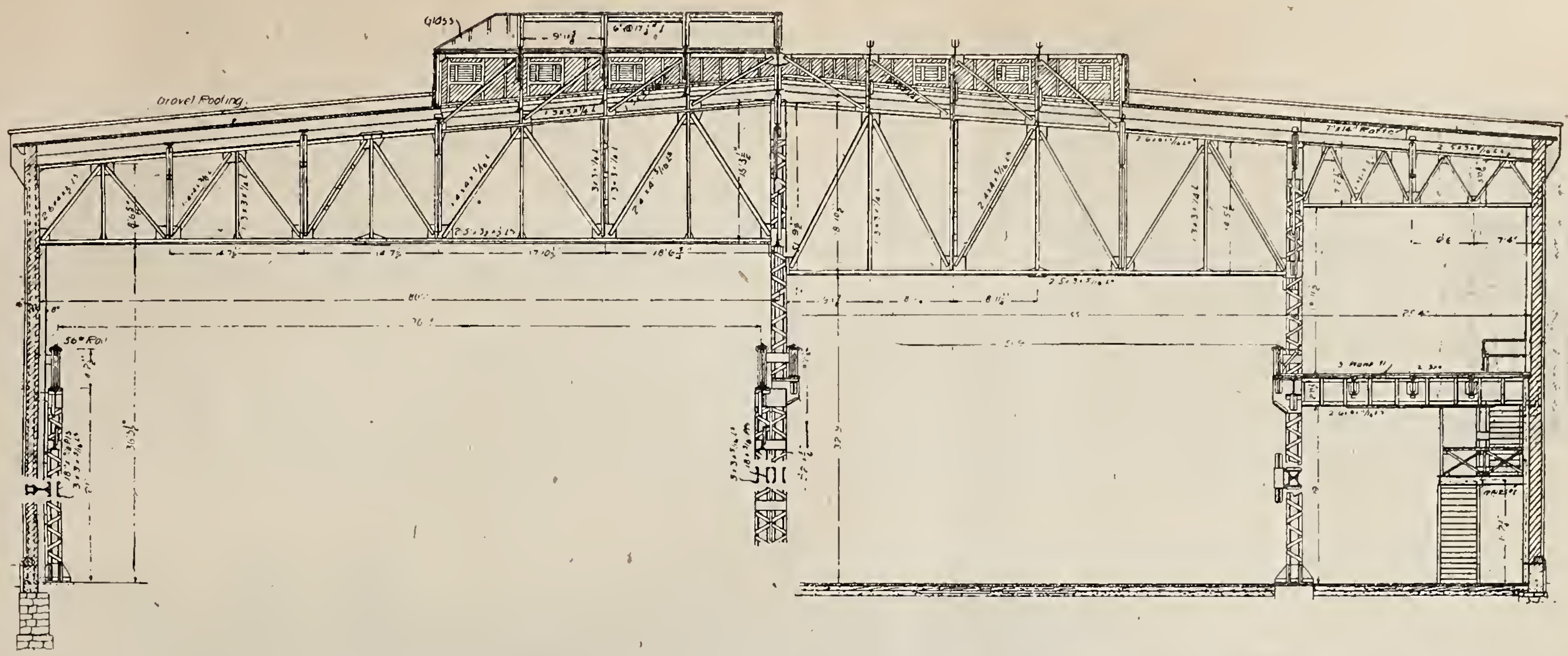


Fig. 5—Cross-section of locomotive shop, Canadian Pacific Shops.

a 30 ft. radius rubber-neck crane, built by the Browning Engine Co., of Cleveland,O. , for handling material in the yards. There is also an industrial railway in and about the buildings. This has a 2 ft. gage track inside of the regular track. In some places this is double track and very narrow cars are used so as to be able to pass one another.

LOCOMOTIVE AND MACHINE SHOP.

This is the largest building. It measures 162 ft. 8 ins. x 1,167 ft. 4 ins. outside. It is arranged in three bays, running longitudinally. Half of the building, forming one bay, is given up to the erecting, tank and part of the boiler shop. The next bay, comprising about two-thirds of the other half of the building, is for heavy machine tools and boiler shop machinery, and the third bay, over which there is a gallery, is for small machine tools. The gallery is also used for small machines and tool work.

Over the erecting shop, which has three parallel erecting pits and two standard gage supply tracks, are two 60 ton cranes, each with a 10 ton auxiliary hoist, and on the same runway is a 20-ton crane, which is intended principally for boiler shop work. On the machine side there is one 20 ton and one 10 ton crane over the heavier machine tools, and numerous jib cranes extending from the building columns. These in most cases carry an air hoist or in a few cases electric driven chain hoists. Over the boiler shop is a hydraulic crane, which serves the large riveter.

The main roof trusses, which are steel, are carried by a steel frame work. The roof is of 3-inch planks laid on heavy wooden rafters and covered with gravel roofing and galvanizzed iron flashing at the connection with the monitors. These transverse monitors are 12 ft. wide and 72 ft. long and have ventilating doors on the sides and two rotary ventilators on top. The roofs of the monitors are of glass. The walls are provided with two rows of large windows.

All the machines are electrically driven, in most cases in group form from a counter-shaft, but there are also quite a large number of individually driven machines, to some of which the motors are directly connected, and in others the motor rests either on the floor or column and is belted to a short shaft. Alternating current, three-phase induction motors are used principally. But in cases where variable-speed is required, direct-current motors have been installed. These are usually direct-connected to the machine.

(To be continued)

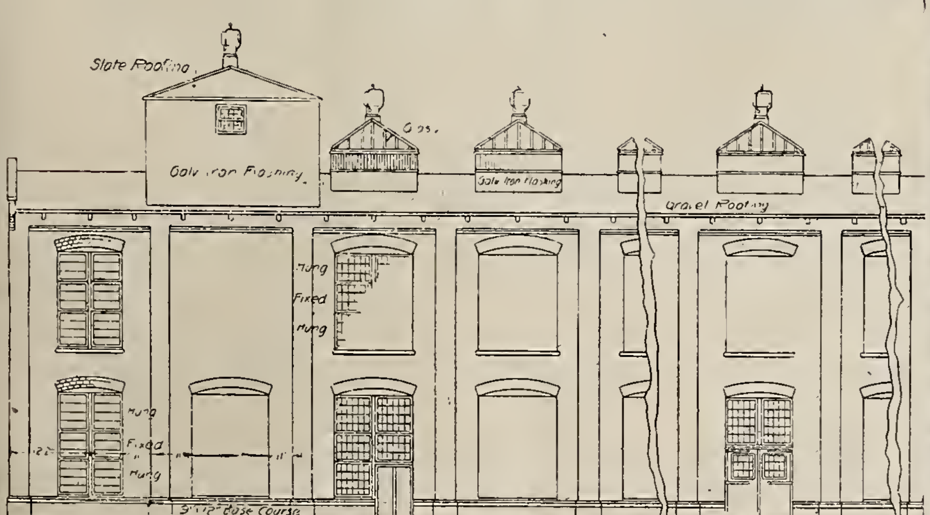


Fig. 6—Elevation of locomotive shop, Canadian Pacific Shops.

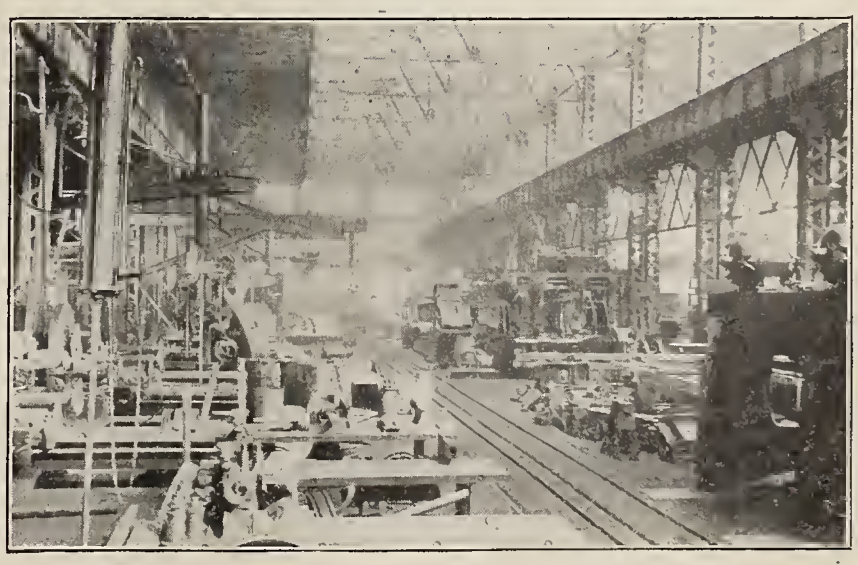


Fig. 7—View in machine shop, Canadian Pacific Shops.

4-6-2 Type of Locomotive of the C. M. & St. P. Ry. Co.

ON page 154 of our May, 1904, issue we published a new design of locomotive boiler, which was to be used on a number of passenger engines as an experiment. At the time of the publication we did not mention the name of the road designing the boiler, but there were a number of communications published in the June and August issues. One communication is in part as follows:

"The first point that attracts attention as being very much smaller in proportion than usual is the grate area. With 36 square feet of grate area it will be absolutely necessary to maintain a very high rate of combustion per square foot of grate surface per hour, and, in fact, it is questionable whether with the grate area in question enough coal can be burned to produce the necessary amount of heat. There is no question whatever of the value of firebox heating surface, the firebox evaporating at least 35 to 50 per cent of the total evaporation, and that the greater the heating surface of the firebox the better steamer the boiler will be. While apparently the later designs of engines have shallow fireboxes with less proportion of firebox heating surface than the older types of engines, it is very probable that in all these designs there was no desire to decrease the firebox heating surface, but rather to obtain the necessary grate surface. The depth of firebox had to be sacrificed in order that it might be widened out, as the length had either reached the firing limit or was restricted by other features of the design. With the wider type firebox, which must at least clear a trailing wheel, it is impossible to get the depth as great as when the firebox rested on top of the frames or between the frames. The question becomes, whether it is better to have sufficient grate area to properly and economically burn the necessary fuel, or is it better to have a smaller grate area and a greater area of firebox heating surface? Evidently the boiler in question is going to determine this point. We may, however, from an analysis of the best designs, form some opinion as to what the new boiler will or will not do, and from such analysis it would seem that it is going to be deficient in grate area."

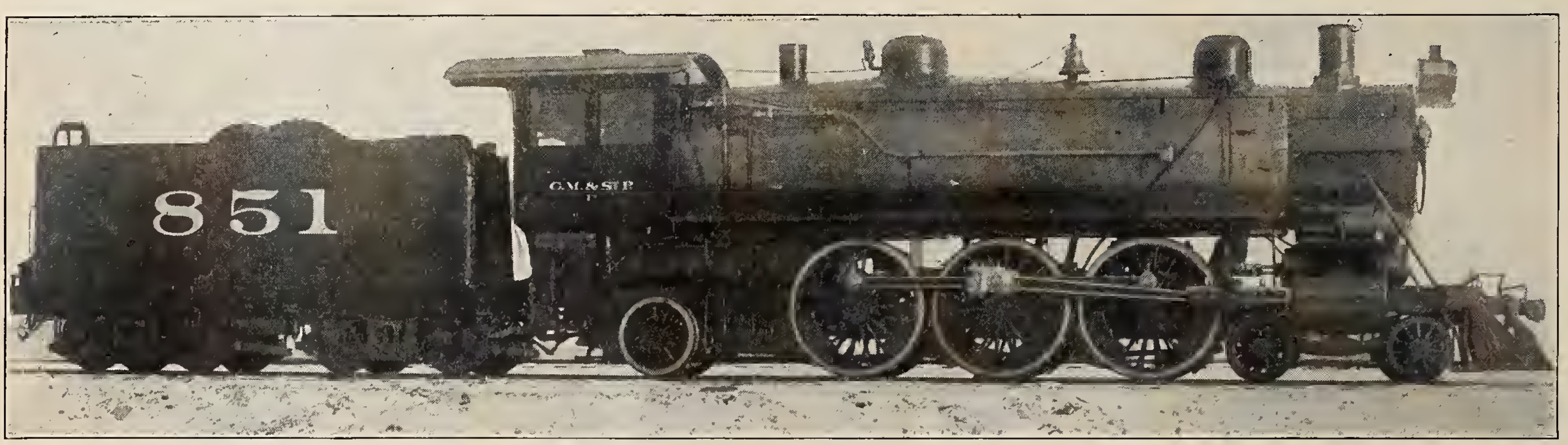


Fig. 1—4-6-2. Type of locomotive of the C., M. & St. P. Railroad.

This locomotive was designed and built by Mr. J. F. De Voy, M. E., of the Chicago, Milwaukee & St. Paul Railway, under the direction of Mr. A. E. Manchester, S. M. P. The conditions under which the design was worked out are as follows: The weight per wheel was not to exceed 23,500 lbs.; it should have piston valve and stroke must be 26 ins.; the flues could not exceed that of their present Atlantic type engines, which have a 2-in. outside diameter, flue 16 ft. 6 in. long; and in view of the very satisfactory service both in the life of firebox and fuel consumption, Mr. Manchester insisted on a narrow firebox. Also that the distance a man had to fire should

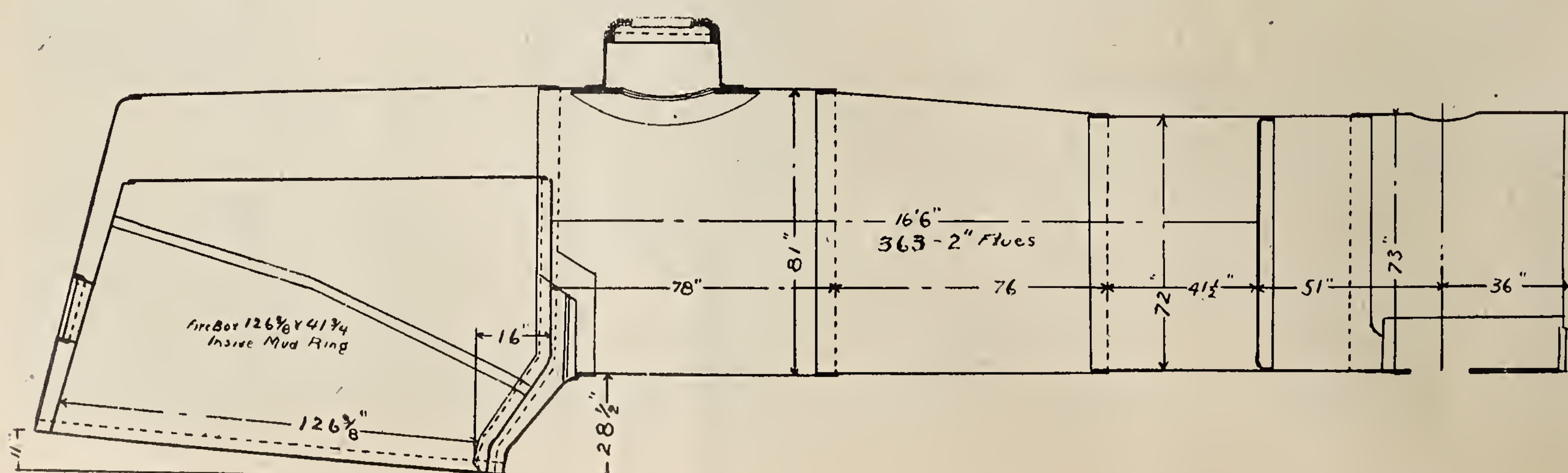
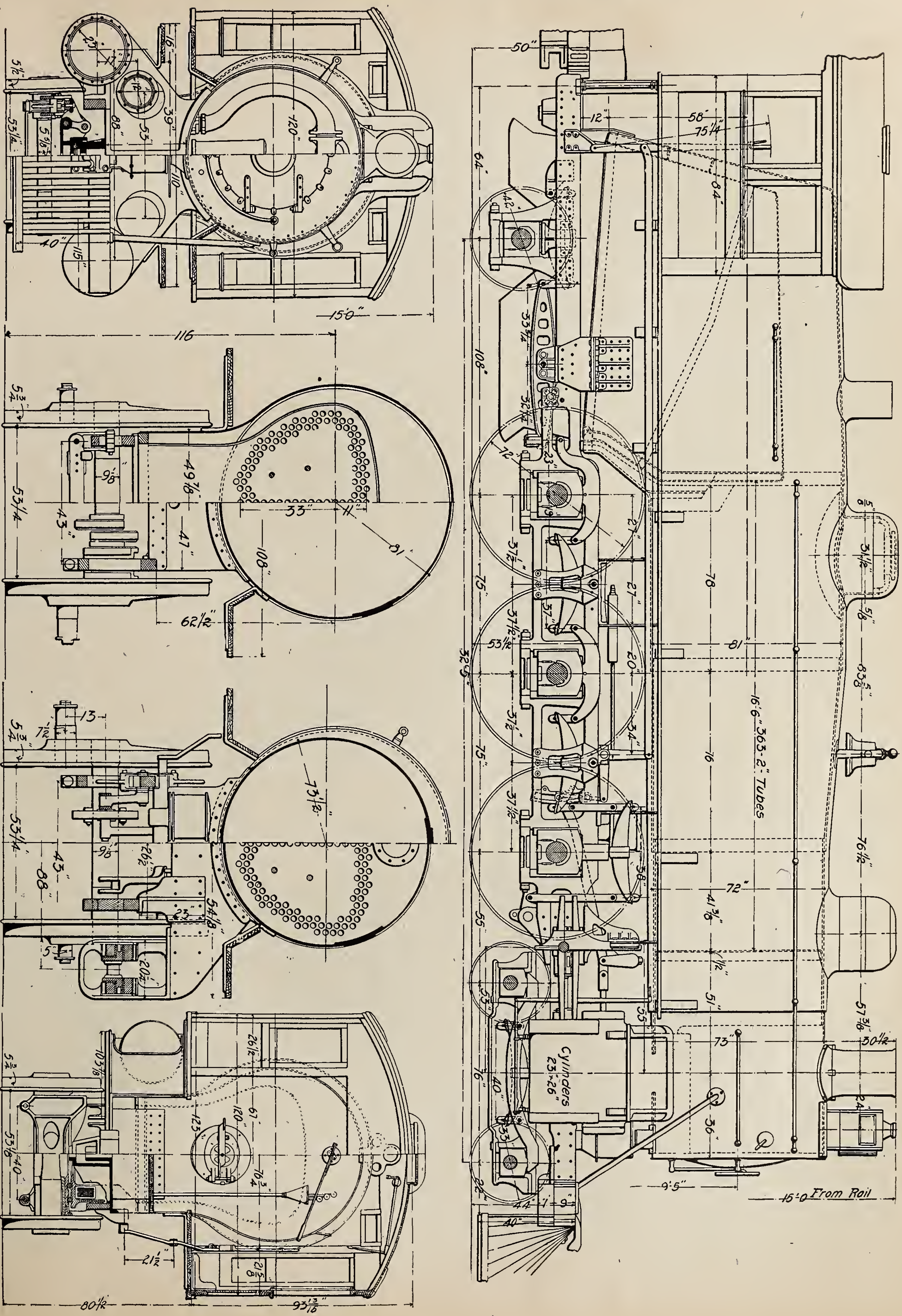


Fig. 2—Cross section of boiler, C., M. & St. P. locomotive.



FIGS. 3, 4, 5, 6 AND 7—ELEVATION AND CROSS-SECTIONS, C., M. & ST. P. LOCOMOTIVE.

not be over 10 ft., and while the length is 10 ft. 6 in., the back head and fire door have been placed in a position that the actual distance coal has to be thrown is less than 10 ft. He also insisted that the depth of firebox must be greater than in any other boiler on the road, and it will be noted that a depth at throat of 28½ in. is obtained, which enables them to gain in depth of fire what they lost in width.

The short flues necessitated setting the back flue sheet as far ahead as possible. This distance is 16 ins. ahead of the mud ring, giving a large combustion chamber in which the gases circulate, becoming thoroughly heated before reaching the flues, and assists in better combustion. The short flues also necessitated moving the front flue sheet as far back as possible, giving a front end 87 ins. long. With this construction a larger area of netting is used, making the area through the netting more nearly equal to the flue area, a point which is quite frequently lost sight of in trying to make a self-cleaning front end. It also makes the boiler more accessible to repairs, as there is no water space over the cylinders.

The deep firebox forced the design of a new construction of equalizers and radial trucks and, in fact, all that back of the rear drivers. The trailer consists of six pieces outside of bolts and rollers. By referring to the illustration it will be seen that A is a roller cap on which the springs rest. This is free to move up and down in the two guides C. B is the pedestal, of which there are two. These are bolted to both frames. D is the trailer box. It is constructed in one piece for both bearings. The side motion of the wheels is limited by the lugs E and F. This allows a total movement of 4½ ins. for the trailer box D. This truck was designed by Mr. J. F. De Voy.

The size of cylinders is comparatively large when compared with the weights on drivers. This great tractive power for weight on drivers was adopted to make the engine compete with the compound engine when admitting high-pressure steam to the low-pressure cylinder when working on grades.

The performance of this engine has been so satisfactory, both from its steaming qualities, speed and ability to haul trains, that the design is fully justified and has more than met expectations.

The general dimensions are:

Road	C., M. & St. P. Ry.
Builder	C., M. & St. P. Ry.
Class	F2
Gage	4 ft. 8½ in.
Fuel	Bituminous coal
Weight on drivers	142,000 lbs.
Weight, total	218,000 lbs.
Weight, engine and tender loaded	343,600 lbs.
Wheel base, total, of engine	32 ft. 5 ins.
Wheel base, driving	13 ft.
Wheel base, total, engine and tender	59 ft. 11 7-16 ins.
Length over all, engine and tender	70 ft. 6 ins.
Height, center of boiler above rails	9 ft. 5 ins.
Height of stack	15 ft.
Heating surface, tubes	3,136 sq. ft.
Heating surface, fire-box	245.6 sq. ft.
Heating surface, total	3,381.6 sq. ft.
Grate area	35.84 sq. ft.
Drivers, diameter	72 ins.
Truck wheels, diameter	33 ins.
Trailer wheels, diameter	42 ins.
Journals, driving axle, size	9 x 12
Main crank pin, size	6½ x 7 ins. and 7½ x 4½ ins.
Cylinders, diameter	23 ins.
Piston stroke	26 ins.
Main rod, length center to center	9 ft. 7 ins.
Steam ports	1⅝ ins.
Exhaust ports	2½ ins.
Bridge width	1⅞ ins.
Valves, kind of	Piston
Valves, diameter	12 ins.
Valves, greatest travel	6 ins.
Valves, steam lap	1 in.
Valves, exhaust lap (negative)	⅛ in.
Boiler, type of	Radial Stay
Boiler, working steam pressure	200 lbs.
Boiler, material in barrel	Steel
Boiler, thickness of material in barrel	¾ ins.

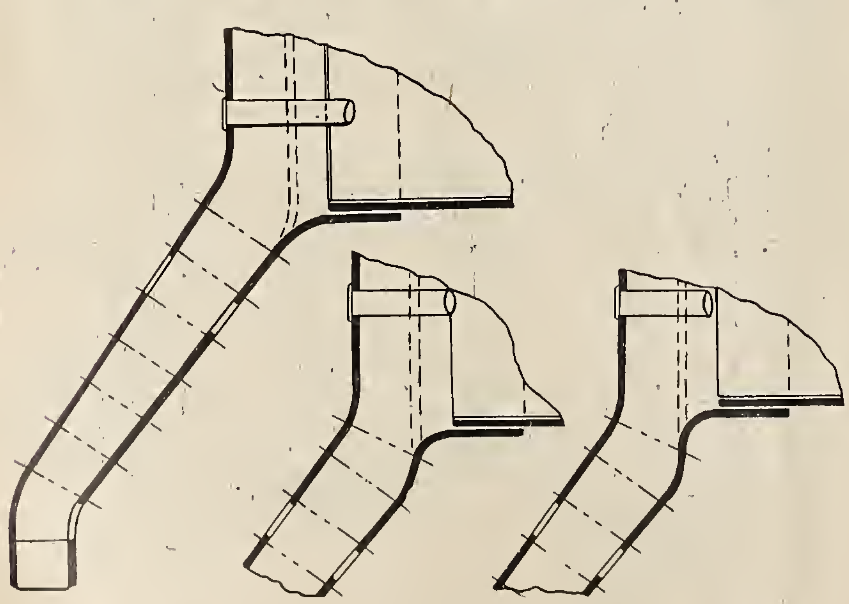


Fig. 8—Sections of throat sheet, C., M. & St. P. locomotive.

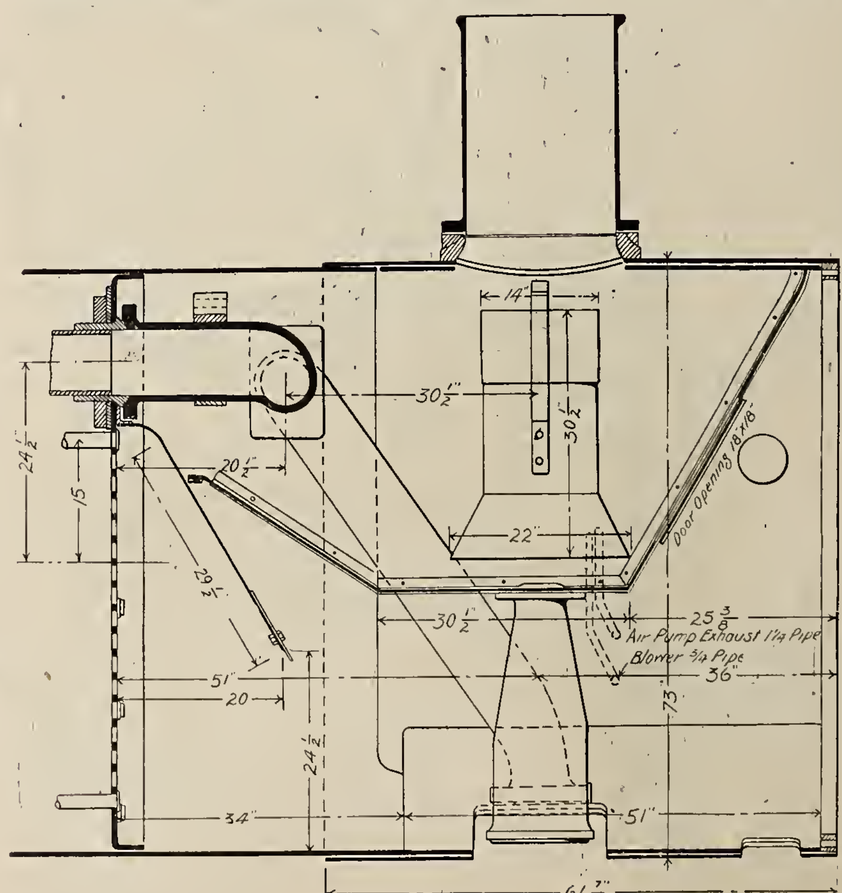


Fig. 9—Cross-section of front end, C., M. & St. P. locomotive.

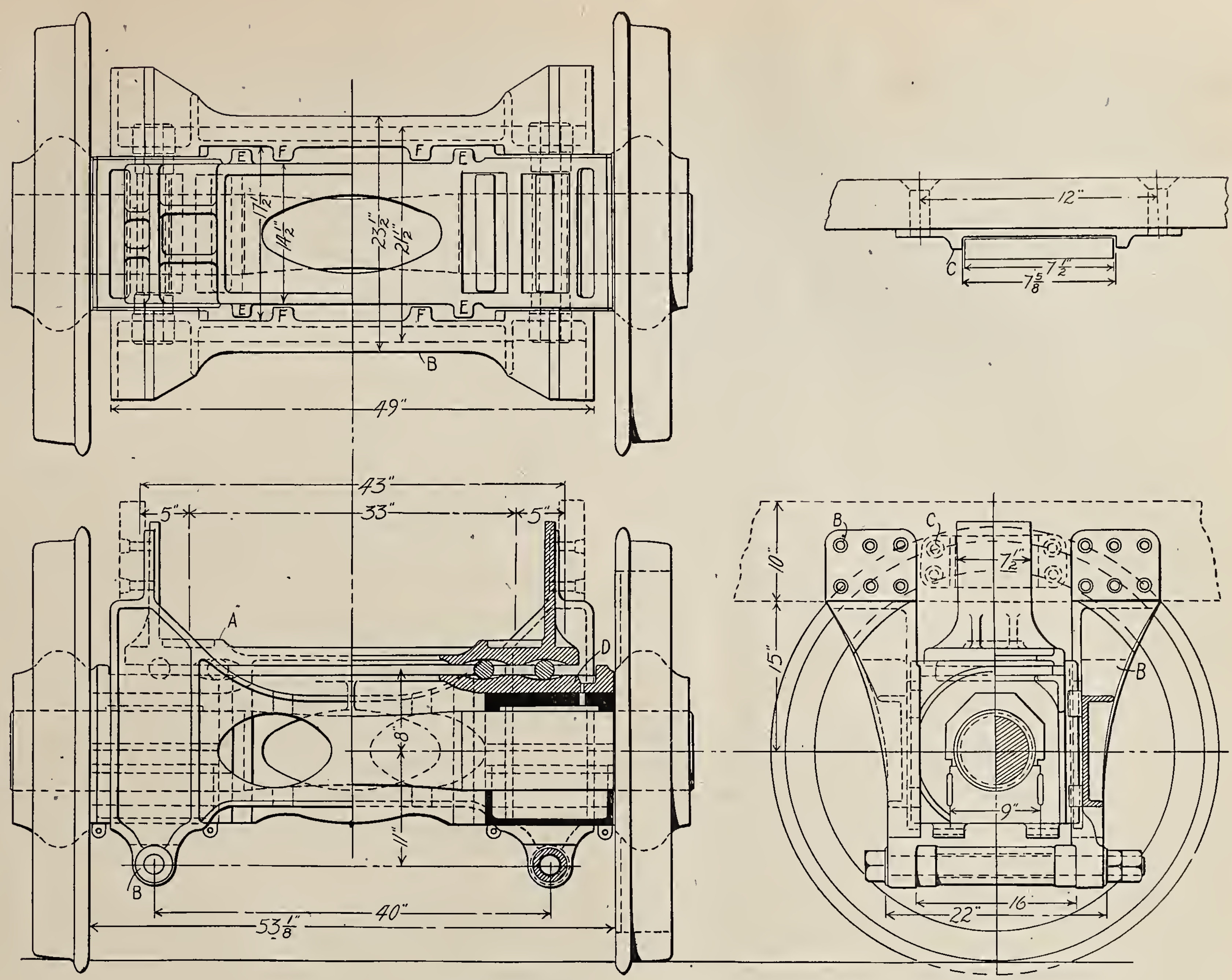


FIG. 10—TRAILING TRUCK, C., M. & ST. P. LOCOMOTIVE.

Boiler, diameter of barrel	72 ins.
Thickness of tube sheets,	½ in.; back, ⅝ ins.
Thickness of crown sheet	⅝ ins.
Crown sheet, stayed with	1 in. Radial Stays.
Dome, diameter	31½ ins.
Fire-box, length	10 ft. 5⅛ ins.
Fire-box, width	3 ft. 5⅛ ins.
Fire-box, depth, front	7 ft.
Fire-box, depth, back	5 ft. 10½ ins.
Fire-box, thickness of side sheets	5-16 in.
Fire-box, thickness of back sheets	⅜ in.
Fire-box, water space	front, 4 ins.; sides, 3½ ins.
Tubes, number	363
Tubes, outside diameter	2 ins.
Tubes, length over sheets	16 ft. 6 ins.
Smoke box, diameter	72 ins.
Smoke box, length	87 ins.
Tender, capacity for water	7,000 gals.
Tender, capacity for coal	10 tons.
Tractive effort	32,500 lbs.
Ratio weight on drivers to tractive effort	4.36
Ratio tractive effort to total heating surface	9.61
Ratio total heating surface to fire-box heating surface	13.8
Ratio total heating heating surface to grate area	94.3
Ratio fire-box heating surface to grate area	6.85
Ratio of total heating surface to volume of both cylinders	.270
Ratio of grate area to volume of both cylinders	2.86
Ratio of total heating surface to weight of one cylinder full of steam at boiler pressure	1,150

Systems of Electrical Distribution in Railway Shops

By J. Henry Klinck.

THE general problem of motor driving has been discussed at considerable length in the technical papers of late and many system have been advocated by the various writers.

In many cases systems have been advocated regardless of their applicability to any particular class of service. The systems now on the market providing speed variations electrically have been worked out with a great deal of ingenuity, and all of them have some points in their favor for certain classes of service.

The problem before the railroad repair shop, however, is peculiar, and has certain features which are not common to any other line of manufacture. The success or failure of any system in a railroad repair shop will depend largely upon the simplicity and reliability of the system for obtaining a given result. Railroad repair work, in general, is not susceptible to such great refinement as are certain lines of manufacture which duplicate standard parts indefinitely, and for this reason a system of distribution adapted to the needs of the repair shop must be flexible.

It is also important that, as far as possible, the system be capable of sub-division, in so far as the generating units are concerned, due to the fact that considerable overtime work is necessary, and at such times it is desirable to shut down parts of the generating equipment, operating only such machines as necessary.

There was a time, a number of years ago, when the railroad shop was extremely conservative in the matter of taking up new ideas, and was probably working to less advantage than any manufacturing establishment, for the reason that railroad repair work is practically devoid of competition. As the number and capacity, and consequently the size, of locomotives in service have increased, not only has the necessity for increasing either the size or output of existing repair shops arisen, but, in many instances, entirely new shop plants have been constructed. Some of the railroads have been extremely progressive in adopting new methods of production as applied to repair work, and they have virtually set a pace which must eventually be followed by the others. This will be more true as reliable reports of the better results obtained by the use of modern machinery and methods become public.

The two factors which have had more to do with the recent impetus given to the study of rapid production than any others have been the high speed steels, and the variable speed electric motor. These agents have not only brought about conditions entirely new to the manufacturing fraternity at large, but their influence has extended farther, having induced a complete study of manufacturing conditions, involving not only the rapid production of work, but also improved methods of handling work between operations.

The importance of increasing the output of a locomotive repair shop canot be overestimated. The increase in output generally reduces the cost of a given class of repairs, a matter of considerable value, but of far more importance is the fact that an increase in output of a given shop reduces the time a locomotive must be out of service. The ideal locomotive repair shop may be defined as the shop which makes its repairs thoroughly and economically, keeping an engine out of service for the shortest time.

Second only in importance to the rapid production of work is the economy and reliability of the installation. Economy in operation means a reduction in the capacity of the engines and boilers operated in the power plant, and should also logically include the cost of maintenance and repairs to the apparatus installed.

Third in importance is the question of cost. Before any particular system is installed, complete costs should be obtained, including not only the cost of the machinery proper, but also the cost of wiring and special fixtures which in many cases constitutes a very appreciable percentage of the total cost of the installation.

Next in importance is the matter of simplicity. The average mechanic to-day is not a skilled electrician, and the installation of apparatus which is so simple that it may be maintained by the operator will save much time on the part of the regular repair man, who is usually busy with more important duties than the maintenance of individual motors throughout the plant.

In many cases individual drive will be found desirable, particularly for the larger machines, such as wheel lathes, frame planers and slotters, boring mills, axle and crank pin lathes, and in general machines doing comparatively heavy work. For the lighter machines, the group drive seems to be preferable, chiefly on account of its smaller cost. It is not the intention to discuss the relative merits of the individual and group drive to any considerable length in this paper. It is deemed desirable, however, to call attention to the fact that the individually driven tool is capable of being used independently of the rest of the equipment, and that, when so operated, it calls upon the

Fig. 1—Westinghouse alternating current induction motors, belted to line shafting.

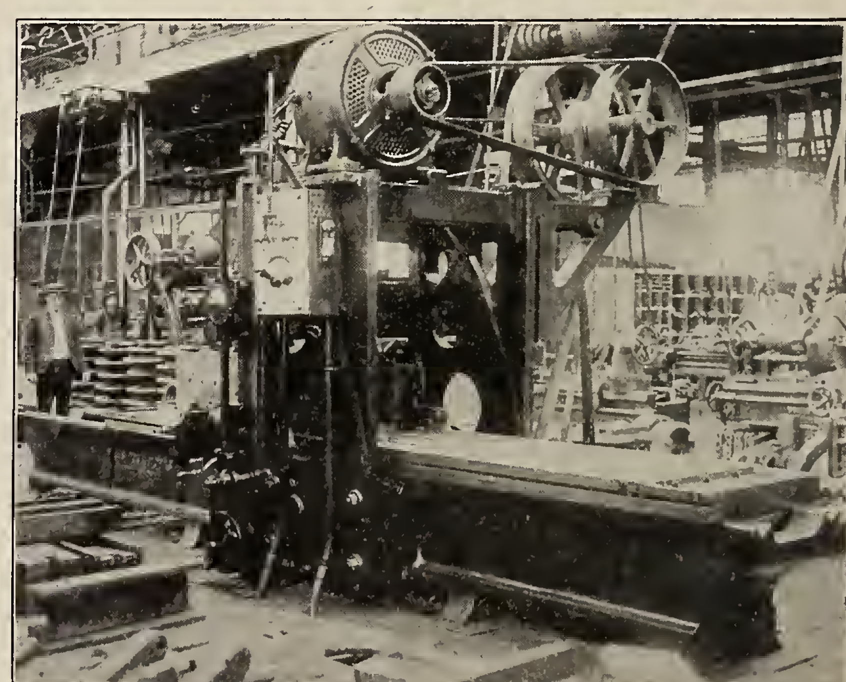


Fig. 2—38 ins. by 38 ins. by 14 ft. Niles planer, driven by 10 H. P. Westinghouse direct current Type S Motor, in Union Pacific Shops, Omaha, Neb

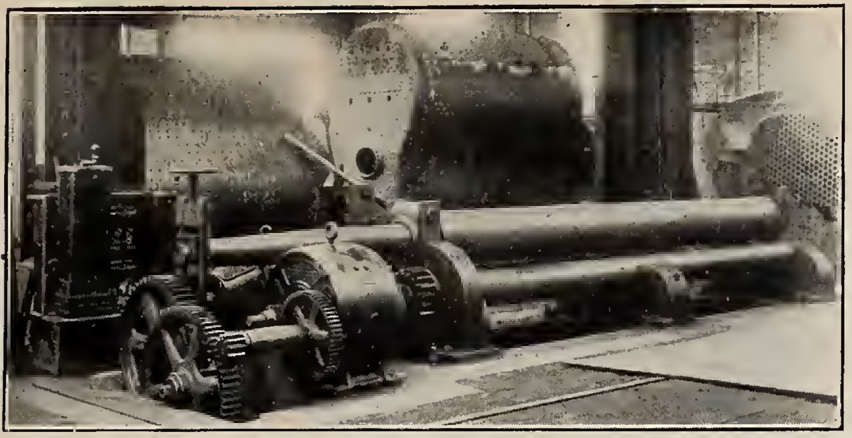


Fig. 3—Niles No. 5 bending rolls, operated by Westinghouse D. C. variable speed motors.

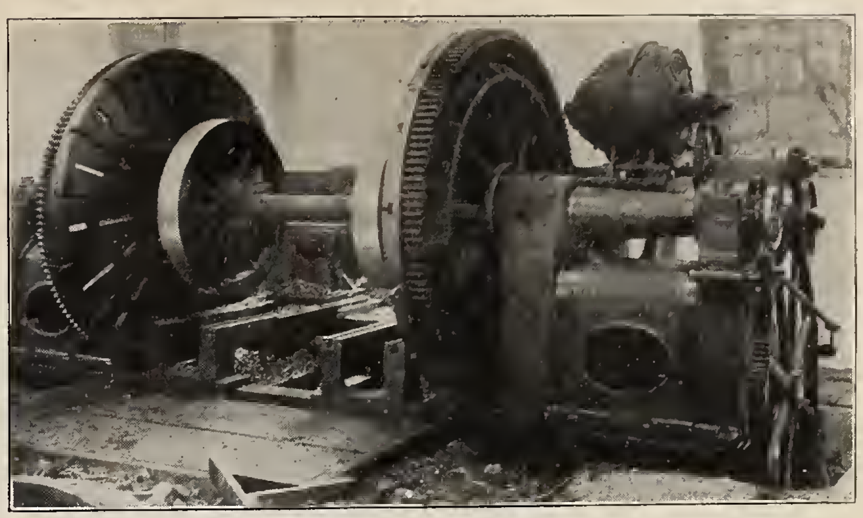


Fig. 4—90-in. lathe in P. R. R. Shops, Fort Wayne, Ind., operated by 10 H. P. Westinghouse Type S direct current motor.

power plant for only the power necessary to supply the driving motor. In making an installation it is usually possible to arrange for such a combination of group and individual drive that, when it becomes necessary to work part of the shop equipment overtime, there will be operated, as a rule, only the tools required for the work in hand.

We shall assume that in a given installation there will be certain machines individually driven by means of either constant speed or variable speed motors, and that the question then to be decided is the system of power distribution best adapted to the operation of the installation as a whole.

Broadly speaking, the various systems of electric driving which admit of speed variation applicable to machine shop work are as follows:

(1) Multi-voltage systems;

(2) Double commutator systems;

(3) Systems in which the speed regulation is obtained by means of field control on one or two voltages; that is, a 2-wire single-voltage system or a balanced-voltage 3-wire system.

MULTI-VOLTAGE SYSTEM.

Considering first the multi-voltage system, it may be stated that this method, in general, consists of a number of wires between which various voltages may be obtained, the differences in voltages being produced by means of a series of boosters, or motor-generator sets, in combination with the main generator. This system originally involved the use of the following voltages: 40, 80, 120, 160, 200 and 240, and required for its distribution four wires. For the reason that the horsepower output in a given motor is practically proportional to the horsepower input, it is evident that at the lower voltages, in order to transmit a definite horsepower, the current must be quite large as compared with that required at the higher voltages. This being the case, considerably larger conductors will be required for a given horsepower transmitted at the lower voltage than would be the case were the voltage maintained at a higher value. For this reason, as stated elsewhere, it is essential that the cost of the wiring be carefully considered before the multi-voltage system is adopted.

One of the principal characteristics of the multi-voltage system is due to the fact that the horsepower which may be developed by a motor increases directly with the voltage impressed on the armature terminals, the field strength remaining constant. This can be stated in another way, which may tend to bring out some interesting information relative to motors operating on the multi-voltage systems, under the present scheme of normal ratings adopted by the manufacturers of multi-voltage apparatus, the horsepower delivered by the motor decreases directly with the decrease in voltage from about 120 volts to whatever voltage may be called the starting voltage of the system. Since, in machine tool work, approximately constant output is demanded of the motor, it can be readily seen that, as the capacity of the motor decreases, the amount of the metal which can be removed decreases, and with it the value of the extreme range of speed variation; for speed variation in itself is of no value; it must be accompanied by the ability to operate the driven tool at its maximum capacity at all points within the limits of speed range claimed for the system. This condition will qualify the claims of 1 to 10, and 1 to 8 in speed variation which are made by the multi-voltage advocates, making approximately 1 to 3 the effective working range, unless the motor is abnormally large, and but a fraction of its possible output is utilized at the higher speeds. It is essential that the purchaser of a variable speed motor obtain a continuous horsepower output over the entire speed range claimed for the motor, in order that he may be fully informed as to its suitability for the work in hand.

One of the advocates of the muti-voltage system has made the statement that 1 to 3 variation in speed is sufficient for machines requiring a constant horsepower output, such as lathes, boring mills, milling machinery, etc. It should be noted that this is the maximum speed range possible with the multi-voltage system, using as a minimum voltage about 120 volts, which is the lowest commercial voltage at which power may be generated, distributed, and utilized without making the size of feeders abnormally large. For machines involving a reciprocating motion, such as planers, slotters, etc., the same manufacturer has made the statement that the horsepower increases directly with the speed. This statement is incorrect, for the reason that if the machine tool be worked anywhere near its capacity, the horsepower at the tool actually increases with a decrease in speed, within the working limit. Adding to this the increase due to the greater friction of the machine itself, it will be found that on machines involving reciprocating motion the horsepower required at the varying speeds will not fluctuate greatly. For this reason it is evident that the multi-voltage system as applied to machine tools should only be used throughout such a range of speeds as will permit of constant horsepower being obtained at every speed. In fact, this point is now realized by the manufacturers of multi-voltage apparatus to such an extent that one of them has made the statement that the lower voltages are to be used "for starting and light cuts only." It is a remarkable fact that the advocates of the multi-voltage systems are gradually abandoning the lower voltages, and tending toward a single, or at most, two voltages in combination with field control, with a corresponding decrease in the total variable speed range, and a corresponding increase in the range of speed permitting constant horsepower to be taken from the motor. Thus one manufacturer has abandoned 40 and 80 volts, while the second has abandoned 60 and 80 volts and is now using 90 volts as a minimum. In both of these systems the intermediate speeds are obtained by means of field control—thus tacitly approving of this method of obtaining speed variation.

The controller used in connection with the multi-voltage system must handle a number of voltages, in addition to the field current, and is of necessity more complicated than would be the case were the machine operated on a single or two voltages.

DOUBLE COMMUTATOR MOTORS

The use of double commutator motors has been limited, more or less, to the operation of printing presses, in which service the horespower varies approximately as the speed; in other words, the minimum speed requires the minimum horsepower.

The construction of the double commutator motor involves the use of one commutator on each end of the armature. The armature windings connected to these commutators may comprise either the same number of turns or a different number of turns, the principle of operation remaining the same. As the speed of a motor on constant voltage depends upon the number of turns in series in the armature, it is evident that by connecting both of these commutators in series, the number of armature turns may be increased, thereby producing a slow speed. As it is desired to increase the speed of the motor, one of the sets of windings in series is cut out, and, on one system, the speed is further increased by connecting the two commutators so that the two sets of armature windings having a different number of turns oppose one another. The characteristics of the double commutator motor may be fairly represented by the performance of an ordinary motor on the multi-voltage system, in which the horsepower increases approximately with the increase in speed, but as a rule the controller used in connection with the double commutator machine is extremely cumbersome on account of the numerous functions which it has to perform, that is, connecting the commutators in series, connecting them to the circuit individually, and finally connecting them in parallel, and, in addition to this, the field current must also be varied for the purpose of obtaining the intermediate steps in speed.

One of the principal objections to the double commutator motor for machine tool driving is that, where the double commutator motor is used, the overhang from the center of the motor frame to the point of attachment of the pinion, if the machine be gear driven, is considerably greater than would be involved were the commutator, and consequently the extension of the bracket on the pinion end, absent. The importance of a rigid frame, with the point of application of the pinion for gear driving as close to the point of support at the base of the motor as possible (this distance being measured perpendicularly to the shaft), cannot be overestimated. Gears have imposed upon the shafts, bearings and end brackets of motors much more severe conditions than they ever encountered when belt drive was used, and this is a feature which is well worthy of careful consideration in installing motors for individual drive.

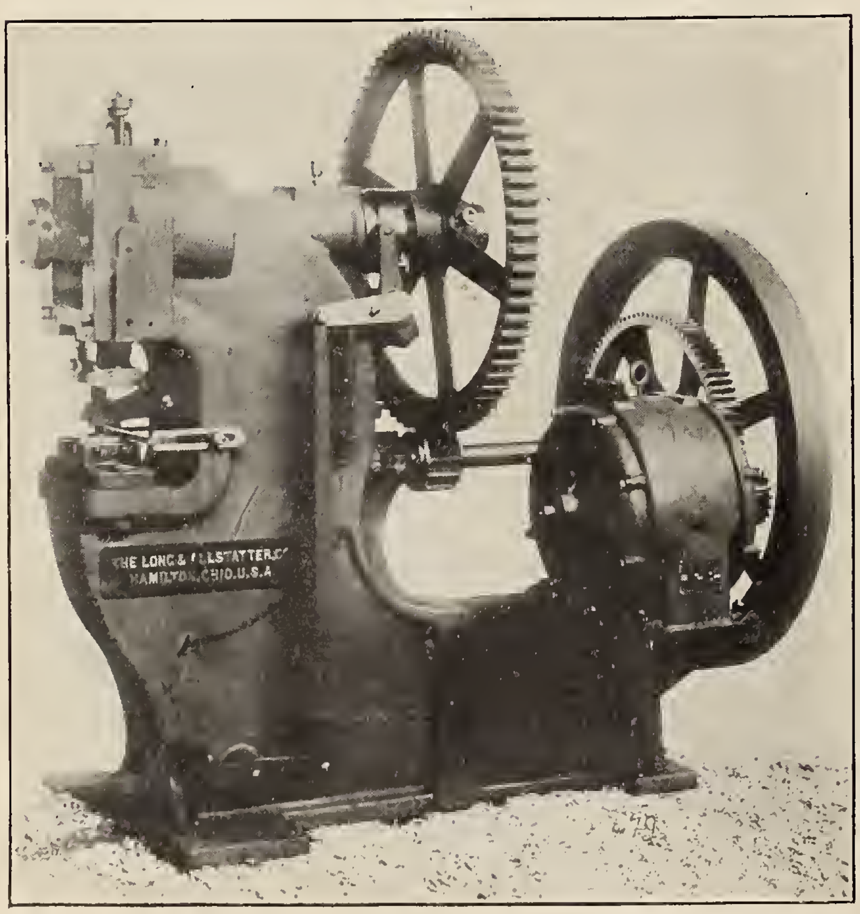


FIG. 5—WESTINGHOUSE 5 H. P. INDUCTION MOTOR DIRECT CONNECTED TO LONG & ALLSTATTER SINGLE PUNCH.

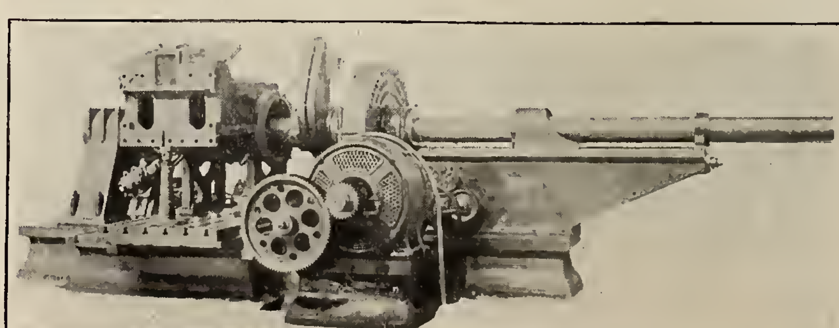


FIG. 6—BARRAT CYLINDER BORING MACHINE, DRIVEN BY WESTINGHOUSE D. C. MOTOR.

A second objection to the double commutator motor is the duplication of perishable parts, such as the commutator and brushes. While the renewal of brushes in a properly designed and well constructed direct current motor should not of necessity be very frequent; at the same time the double commutator motor doubles the opportunity for wear. The rear brushes, that is, the brushes on the pinion end, will very frequently be found more or less inaccessible, for the reason that the pinion end of the motor is frequently crowded closely into the machine tool, and it is the opinion of one of the largest machine tool builders in the country that this constitutes one of the principal objections to the use of a motor of this character.

This system has without question some advantages over the straight multi-voltage system, but the fact that double commutator machines have been built for a number of years, and that these machines have not come into general use, indicates possibly better than any other argument the feeling of machine tool builders and manufacturers as regards this system.

THE ALTERNATING CURRENT SYSTEM.

The alternating current system of power distribution has been exploited so frequently that it seems scarcely necessary to touch upon it here. A few words, however, may not be amiss.

Because of the ease with which alternating current may be transformed either in voltage or phase it presents many advantages over any other system of distribution. Long distance transmission may be effectively accomplished by means of the alternating current.

The alternating current motor is peculiarly adapted to severe service, and for driving line shafting, or individual machines, the speed of which may be changed by mechanical devices, gives all the advantages obtained by the use of electrical distribution in general, together with a motor which is the acme of simplicity so far as mechanical construction is concerned. The absence of commutator and brushes contribute to produce a motor on which the maintenance is extremely small, and many large installations are now operating by means of alternating current motors exclusively.

The alternating current motors may be used in connection with direct current motors, both alternating current and direct current being obtained from a single generator, or from rotary converters, and it would not be surprising if the mixed systems became quite common for industrial and railroad plants, one large railroad shop now being in successful operation and a still larger one, probably the largest railroad shop power plant equipment put in up to this time, will be placed in operation shortly. In each of these installations the main generators are of the polyphase alternating current type, direct current being obtained by means of rotary converters of the 3-wire even voltage type. These rotaries possess all of the advantages of the 3-wire generators, giving a 3-wire even voltage circuit from a single machine, using highly efficient stationary balancing coils in place of the wasteful motor-generator balancing units.

SYSTEMS IN WHICH SPEED VARIATION IS OBTAINED BY FIELD CONTROL.

Referring now to the third general division, that is, systems in which the speed variations is obtained by field control: There are on the market to-day a number of manufacturers advocating this means of speed variation. The system involves the insertion of resistance in the shunt field of the motor, and while the general scheme used by different manufacturers is the same, the details have been worked out differently by the various companies building machines of this class. One manufacturer uses a so-called reaction winding, the purpose of which is to neutralize the armature reaction. This method has in its favor the possibility of considerable range in speed on a single voltage, while on the other hand, it involves considerable complication in construction, as compared with the ordinary motor.

A further objection to this construction is that this reaction winding interposes in the armature circuit considerable resistance, and the introduction of resistance in the armature circuit has always been accompanied by undesirable results, so far as machine tool driving is concerned. The greater the resistance in the armature circuit, the greater will be the drop in speed between no load and full load, and it is evident that on many classes of work, such, for example, work involving intermittent cuts, a tool would very quickly be ruined.

It is possible on a machine of this type, by giving the brushes back lead, to produce a certain demagnetizing armature reaction which will counteract the resistance drop in the reaction winding at normal speeds. This, however, is a dangerous procedure for the reason that when the higher speeds are reached, the field is extremely weak and there is a possibility of the field being reversed, in which case the motor will draw an abnormally heavy current, and in all probability be burned out, provided the fuses or other protective devices do not open the circuit promptly.

It is claimed by the manufacturers of this motor that a range of speed as high as 1 to 6 on single voltage is entirely possible, the horsepower remaining constant throughout the whole speed range. It is not the intention of the present article to go into the matter of the practical speed range on an electric motor for machine tool driving. It is sufficient to say, however, that the size and weight of a variable speed motor of given output, operating on any system, whether it be multi-voltage or field control, will increase as the minimum speed of the motor decreases. Where a range of speed of 1 to 6 is obtained the minimum speed must be kept fairly low for mechanical reasons, and there is some question as to whether speed range of 1 to 6 on a single voltage represents the best practice.

A properly designed shunt or compound wound motor may for machine tool service be operated throughout a speed range of 1 to 2 on a single voltage by field control without the use of reaction windings, or in fact any device especially intended to minimize the sparking at the commutator. This system presents the simplest variable speed mechanism yet developed for moderate speed ranges. The motor is a standard motor; the number of wires is reduced to a minimum and the speed range is sufficient to eliminate a considerable amount of intermediate gearing, the coarser increments being obtained by gears, frequently in combination with clutches, or belts and cone pulleys. With this range of speed, at a given output, a motor of normal size may be employed with a corresponding decrease in the cost as compared with the wider speed ranges, and the generating outfit presents the simplest possible solution for a power and lighting distribution plant.

Some of the machine tool builders of to-day have adopted a speed range of 1 to 2 as the standard, claiming thereby that they can produce motor driven machines cheaper, using a 1 to 2 motor with the decreased amount of gearing, than would be possible were a constant speed motor used, and that the machine tool may be produced cheaper than would be the case were a greater range obtained electrically with a decreased amount of gearing.

This system has been consistently advocated by the engineers of the Westinghouse Electric & Manufacturing Company ever since that company entered into the motor driven field, and there are to-day many installations in which motors having a speed range of 1 to 2 on a single voltage are operating with entire satisfaction. The horsepower output is constant throughout the whole speed range and the commutation is all that could be desired. The controller has but one armature voltage to handle, while the field current is comparatively small and may be handled without difficulty.

A natural extension of this system leads to the 3-wire, 2-voltage system, using equal voltages on either side of the neutral wire. The method of obtaining these voltages is shown in illustration, and it should be noticed that no rotating balancers are necessary. The rotating balancing set, while a comparatively small machine, can not be particularly efficient, and operating as it does all day, itslosses in the course of a year represent an appreciable amount. Its elimination, aside from the compilation which it introduces into a system, is, therefore, desirable on the ground of economy. On the 3-wire system, 120 and 240 volts are available at the motors, and, because of the fact that the speed of the motor varies approximately as the voltage applied to its terminals, it is evident that on the 120 volts a speed range of 1 to 2 by field control may be obtained, that after the motor has reached the highest speed on 120 volts, its armature may be thrown on 240 volts, and a further speed range of 1 to 2 may be obtained, giving a total range of 1 to 4. The system of distribution used is the Edison Three-Wire system, which involves a minimum amount of copper for the transmission of a given horsepower, and the controller handles but two voltages in addition to the field current. By decreasing the minimum speed, with the consequent increase in the size of the motor, a greater speed range than 1 to 4 may be obtained; it is questionable, however, whether a greater speed range is economical for any class of machine tool work. Under the ratings given by the Westinghouse Electric & Manufacturing Company the horsepower which may be obtained from a motor operated on the 3-wire 2-voltage system is constant throughout the whole speed range. The application of motors operated on the 3-wire system to the driving of all classes of machine tools requiring variable speed gives increments in speed between the successive steps of the controller of about 12 per cent, which is considered fine enough for even the most modern practice involving the use of high speed steels and machine tools adapted to their use.

For group driving, so-called, constant speed motors may be operated from the 240 volt circuit obtainable when a 3-wire generator is used, but it should be noted in this this connection that these motors are capable of a certain amount of speed variation by means of rheostats placed in their fields; for example, on certain sizes as much as 50 per cent variation in speed may be obtained, that is, the line shaft may be speeded up 50 per cent merely by the insertion of a rheostat in the field of the driving motor. With the rapid change in manufacturing conditions, such as the introduction of high speed steels, it is frequently a matter of prime importance that the speed of the line shaft may be increased by small increments from time to time, thereby speeding up the driven machinery. This method has been used to advantage, and the production has been known to increase in spite of the opposition of the various machine tool operators.

This system adapts itself well to illuminating purposes; the lights, standard 110-120-volt lamps, being operated between the neutral and either outside wire of the 3-wire circuit. By the use of the 3-wire circuit, it is possible to so balance the motors on either side of the neutral when running on the lower voltage, that the quantity of current flowing through the neutral wire will be a minimum; if the motors were so distributed as to draw exactly the same amount of current from either side of the 3-wire system, the neutral wire would carry no current whatever. This condition is, of course, ideal but can be approximated very much more closely with the 3-wire balanced system than is possible with any of the so-called multi-voltage systems.

The broad question of motor driving and systems of motor driving is one of the most important which confronts railroad mechanical men to-day, and it is hoped that this contribution may serve somewhat in assisting in its solution.

A Rapid Production Vertical Turret Lathe

THE Bullard Machine Tool Co. of Bridgeport, Conn., have recently developed a new vertical lathe or boring machine for the purpose of handling heavy face-plate work of all descriptions. The superiority of the vertical mill over the horizontal for this class of work has been, beyond a doubt, fully demonstrated by expereince.

Not only is a more rigid frame, or bed, permissible in the vertical construction, and larger spindle sizes and greater power made possible, but the added weigh of the work resting directly on the spindle thrust bearing tends to preserve, rather than to destroy, the alignment. There is also an obvious freedom from chatter and vibration-elements, rendering impossible rapid work of good quality, in the vertical type, as compared with the horizontal, which can be readily appreciated when the heavy overhanging parts of the latter are considered. This very point of overhanging is one of the strongest arguments in favor of the mill, as the time, which, in the lathe is consumed in setting a heavy overhanging piece, is, in the mill added to the actual time in which the machine can be cutting. The result is a large increase in production.

In the horizontal turret machine are usually combined a turret slide, having a longitudinal movement only, and an ordinary lathe carriage. The latter in many instances interferes with the proper operation of the turret and renders necessary the use of long, unsupported boring bars and extended tool holders. The turret, having no cross movement, is of value in a limited field only, and requires an equipment of expensive special tools which in many cases results in no saving in time.

Taper boring, except with special equipment, is practically impossible in the horizontal turret lathe, and thus the range of the machine is considerably abridged.

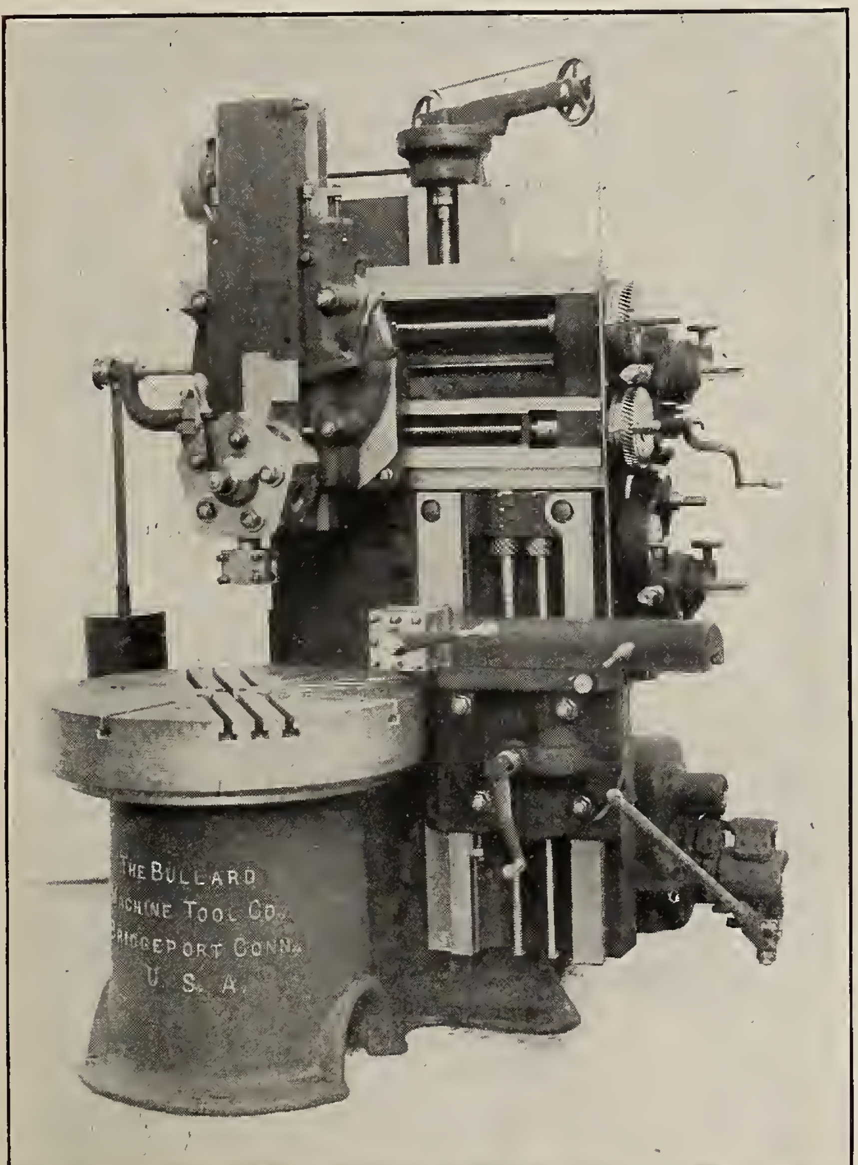


FIG. 1—FRONT VIEW BULLARD MACHINE TOOL CO.'S VERTICAL TURRET LATHE.

The design of the Bullard patent vertical turret lathe includes features heretofore found only in the horizontal type, improved upon and incorporated with the most advantageous points of the vertical construction dictated by an experience of more than twenty years in the manufacture of vertical boring and turning mills. The result is a universal manufacturing machine in which the following features stand preeminent:

1. The vertical construction with its large spindle and great power, insures ease and rapidity of chucking heavy work.

2. The turret slide which is rigid and powerful, having both cross and vertical feeds, and which may be swiveled to 45 degrees either side of the center for taper boring and turning. The turret is of such construction that either single point tools or simple form tools may be used to the best advantage.

3. A side head, carrying a four-faced turret tool holder, which not only has all the advantages which are conceded to the carriage of the horizontal machine, including vertical and cross feeds; but may be swiveled for angular facing up to 40 degrees either side of the horizontal. Its construction is such that it in no way interferes with the turret slide, nor are long boring bars and extended tool holders required on its account.

4. A driving mechanism, which includes an exceptionally efficient mechanical speed change, operable

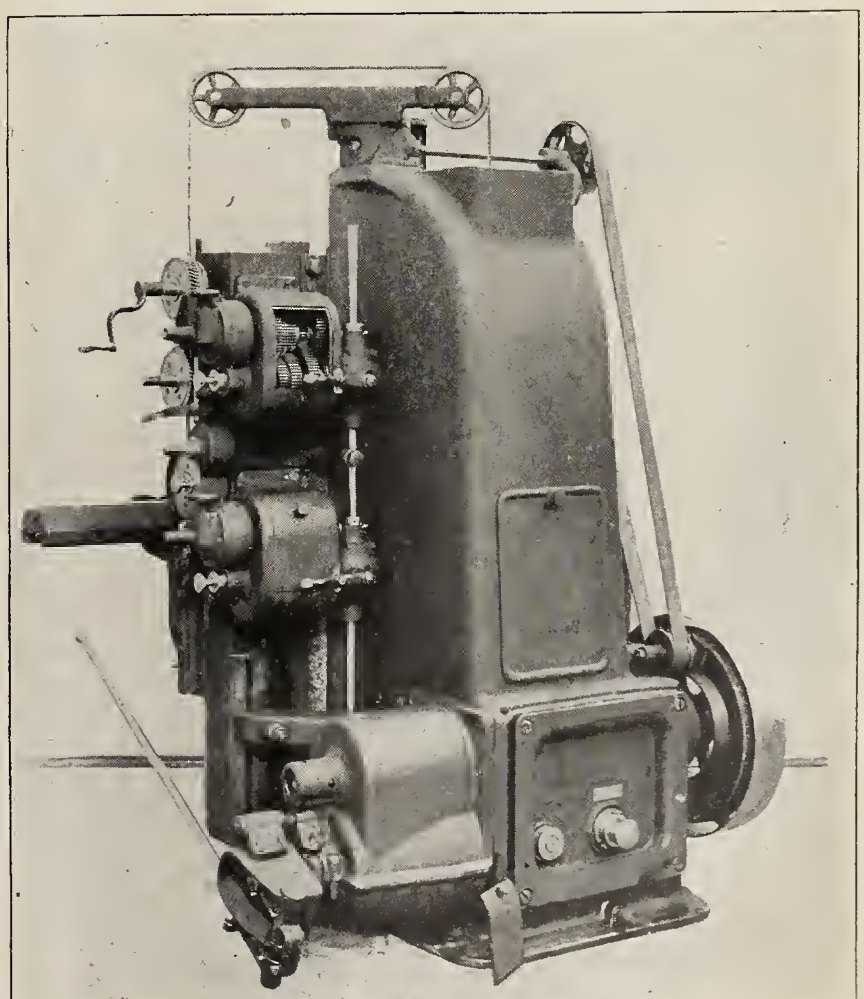


FIG. 2—REAR VIEW BULLARD MACHINE TOOL CO.'S VERTICAL TURRET LATHE.

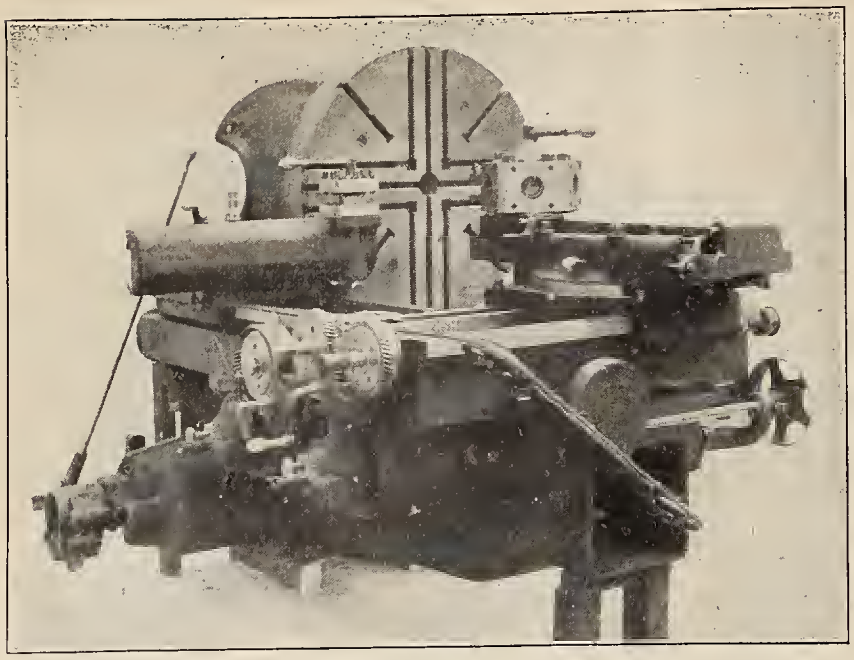


Fig. 3—Top view of the Bullard Machine Tool Co.'s vertical turret lathe.

by lever at front of tool, from which are derived fifteen geometrically progressive table speeds. The single driving pulley is of large proportions and need not be brought to rest to stop the table, as there is an intermediate point between each speed when the direct acting brake may be applied.

5. Feed works independent for either head, having eight feeds, any one of which may be instantly obtained by turning star wheel to proper point on direct reading index plates. Pull gears on feed rods have been entirely eliminated, worm gears, keyed to the rods, having superseded them. Changes from cross to vertical feed, or vice versa, are made by engaging a centrally located drop worm. This feature alone is of great value, saving much time.

6. Safety points have been so arranged in the feeds that carelessly permitting the heads to run together results in no damage or delay. This device in no way weakens the feeds and is not in use when threading attachment is engaged.

Both heads may be operated jointly on work of small diameter without interference, this feature presenting the greatest advantage in the machine, and resulting in an incalculable increase in output. Being independently counterbalanced the effort required for rapid handling is reduced to a minimum.

The rails and saddles are square locked throughout, all adjustments for wear and re-alignment being made by taper wedges.

The lubricating system is most complete, all high speed shafts being bronze bushed and self oiling. The entire strain of gears in the drive and feed works is constantly immersed in oil, as is the table spindle; sight cups being so placed that the oil level may be constantly maintained.

Though having great weight and power, convenience of operation has been considered of prime importance. All operations and movements are controlled from the front of the machine and the effort required of the operator is reduced to a minimum.

The problem of using the new tool steels to their fullest capacity has, in this machine, been solved for some time to come, and we believe that the radical departure from old ideas will merit the approbation of the mechanical man who is looking for the latest and best in machine tool design.

New Steel Cars for the Metropolitan West Side Elevated Railroad, Chicago

THE American Car & Foundry Company recently built some steel cars for the Metropolitan West Side Elevated Railway of Chicago. The floor plan shows the usual arrangement of seats for this class of traffic, that is, there are longitudinal seats along the sides with the exception where there are four cross seats on each side. There are no end platforms, but the passenger passes directly through sliding doors into the interior of the car. There is a small space on each platform for the guard to stand when operating the doors. This space is also used for passing from one car to another.

The cars are 47 ft. 3¾ in. long over all. The width is 8 ft. 6 in.; the height from top of rail to top of roof, 13 ft. 2 9-16 ins., and the height from top of floor to top of side plate 6 ft. 9 in. The underframe is made up of 6-inch channels forming the side sills, which are connected across by 6-inch "I" beams.

The principal longitudinal beam is formed by the deep steel girder which forms the outside finish of the car below the windows. This plate girder is 37 in. deep and

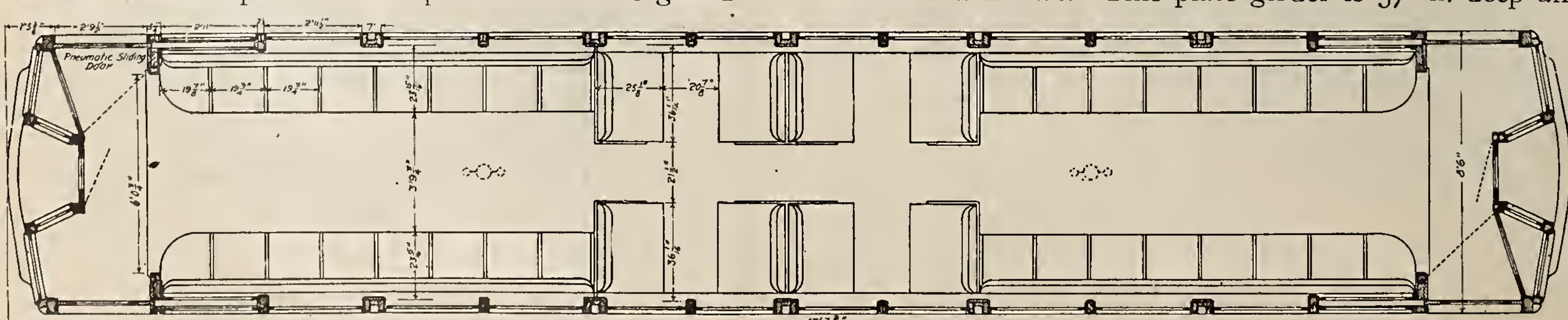


Fig. 2—Floor plan steel cars, Metropolitan Rail road, Chicago.

¼ in. thick. The lower portion is riveted to the 6-in. channels, forming the side sills. The upper part of the plate is riveted to a 3½ x 2½ x ⅜ in. angle which forms the bottom of the window sill. The plates are stiffened by two deep gusset plates ¼ in. thick, on each side. These braces are covered by the cross seats in the car. The posts between the windows also act as stiffeners for the side plate as they are carried down to the floor and riveted to the plate. The posts are composed of 2 x 2½ x ¼ in. angles. The side plate is an angle 3 x 4 x ⅜ in., to which is riveted a steel facia plate 11½ x ¼ in. The roof and upper deck framing are formed by longitudinal angles and angle carlines.

The floor is composed of steel plate laid on the 6-in. "I" beams. On top of this plate are 2 x 2 x ¼ in. angles, and on these is laid the regular wooden floor. The space between the wood and the steel plates is filled with mineral wool.

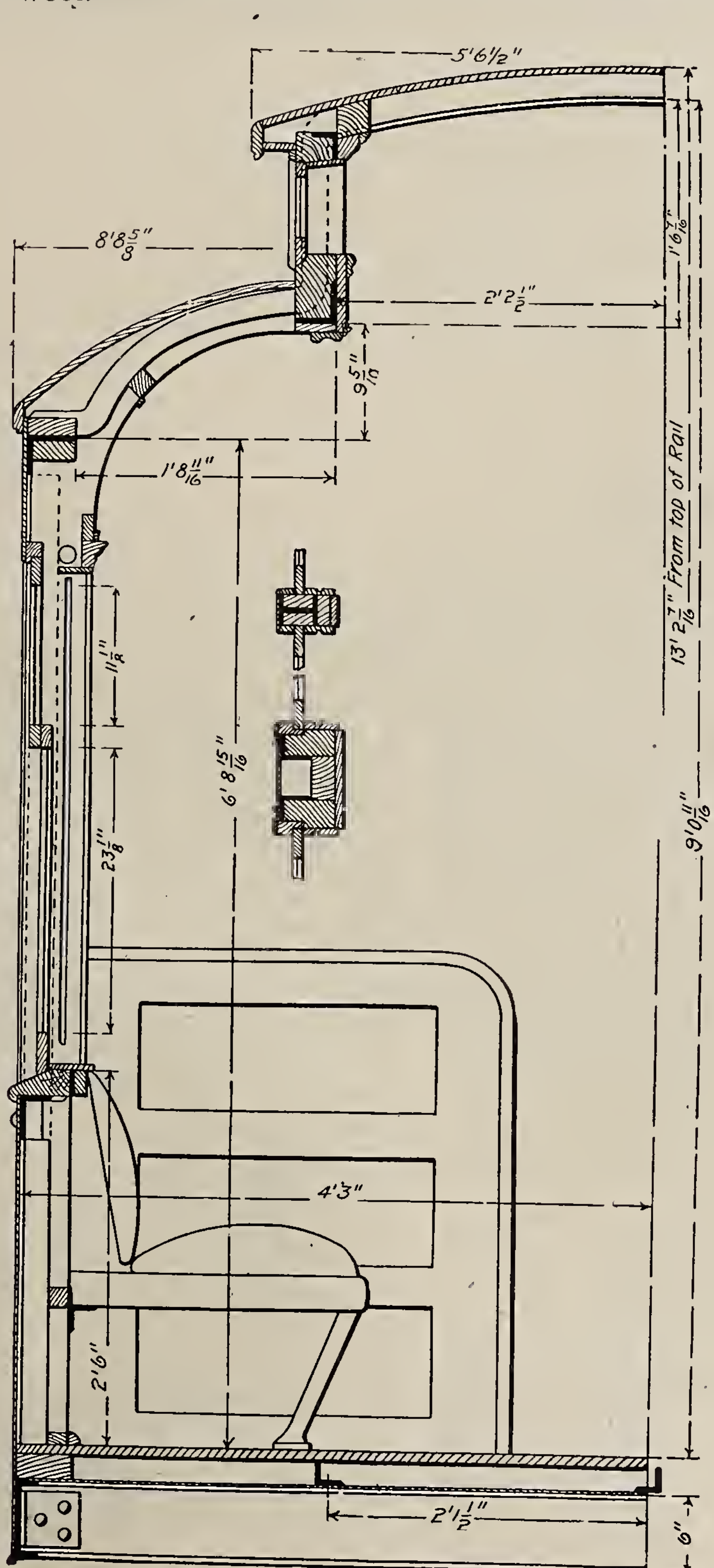


Fig. 3—Cross-section of steel cars, Metropolitan West Side Elevated Railroad, Chicago.

Fig. 4—Interior view steel cars for the Metropolitan West Side Elevated Railroad, Chicago.

The inside finish of the roof is made of 1-16 in. steel, which forms the head lining. The roof on the outside is covered with wood and canvas. The seat frames are of pressed steel, similar to those used in the New York subway cars.

The total weight of the car is 60,000 pounds. The trucks are built entirely of metal and have steel tired wheels. The cars are equipped with an improved form of the Westinghouse brake, which was designed specially for electric cars used in trains and fitted with the multiple control equipment.

This design of car was worked out under the direction of W. S. Menden, chief engineer of the Metropolitan West Side Elevated Railroad.

Railway Storekeepers' Association

The second annual meeting of the Railway Storekeepers' Association will be held at the Auditorium Hotel, Chicago, Ill., on Monday, May 22, 1905, convening at 10 a. m.

The regular subjects are:

General Store-house. Does It Pay? By W. F. Jones.

Scrap: Handling at Shops and on Road; Crediting Same. By W. G. Tubby.

Shop Time-Keeping. By A. E. Johnson.

General Diffusion of Store Department Information, Casting Lists, Circulars, etc. By C. F. Balch.

Reclaiming of Wheels and Wheel Records. By R. E. Dickinson.

The following topical subjects have been selected from those suggested by the various members, and will be taken up locally after treating the foregoing subjects.

Requisitions and invoices: Checking of same.

Should usable material recovered from scrap dock be charged back to stock?

Best practice of delivering material to piece workers. Should this be under the supervision of the piece-work inspector?

Method of keeping check on material distributed along the line—wheels and axles, brasses, air hose, etc.

Duties and jurisdiction of a railroad storekeeper.

FIG. 1—NEW STEEL CARS FOR THE METROPOLITAN WEST SIDE ELEVATED RAILROAD, CHICAGO.

To what department should the general storekeeper be responsible, and why?

How far should his jurisdiction extend over those handling supplies at the more remote points?

System of inspection within their territory by storekeepers.

Form of blank for purchase requisition and purchase invoice.

Should storekeepers receive the original and triplicate copies of purchase invoices?

Accounting for labor and material in manufacture of bolts at shops and the charging of this material.

Practice at storehouses governing the delivery of supplies during the night and on Sundays, or other than during regular working hours at shops.

Drifting Valve

THE Wabash Railroad Company have discarded the use of relief valves on their slide valve engines, have done away entirely with by-pass valves on both compound and piston type of locomotive and have substituted the drifting valve described and illustrated herewith. The arrangement is not an experiment, for the reason that they have had it in operation for the last twelve months and have at the present time over 150 engines running in all kinds of service equipped with this device.

Their large modern type of fast passenger engines are giving remarkably good satisfaction because of the saving in lubrication, fuel and repairs. This is noticed especially in the reduced number of brasses requiring to be filed and fitted up at terminal points.

In descending a grade, where the throttle is closed, there is a slight decrease in the momentum of the engine, the result of which is a retarding motion in the machinery and other parts of the locomotive. The effect of the drifting valve at such times is to slightly accelerate the speed, which overcomes the above tendency.

This device is also used on other roads besides the Wabash, and has the approval of some of the ablest mechanical men as to its saving in lubrication and other manifold advantages.

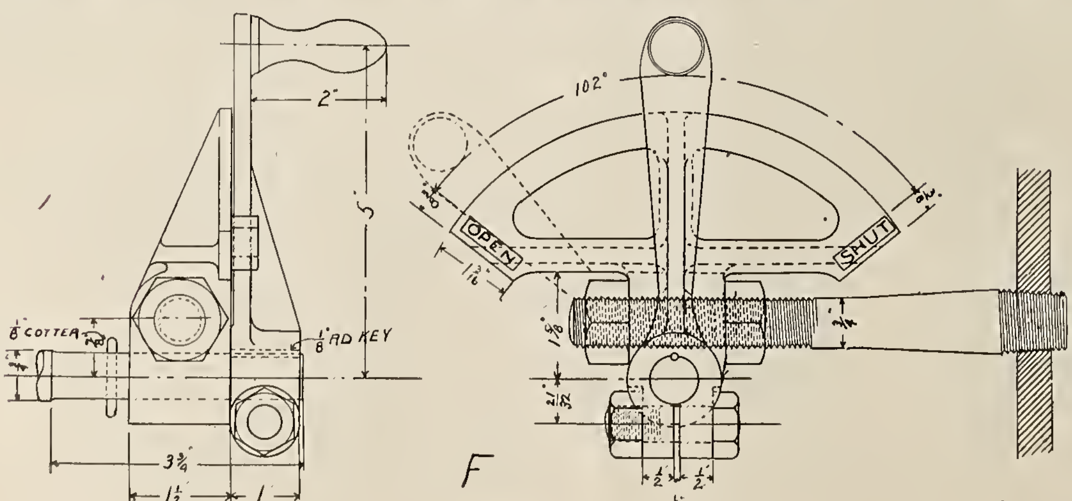


FIG. 2—OPERATING HANDLE, DRIFTING VALVE, WABASH RAILROAD.

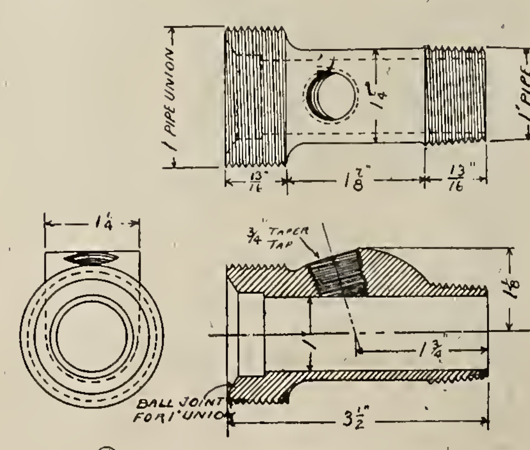


FIG. 3—OIL CUP ATTACHMENT, DRIFTING VALVE, WABASH RAILROAD.

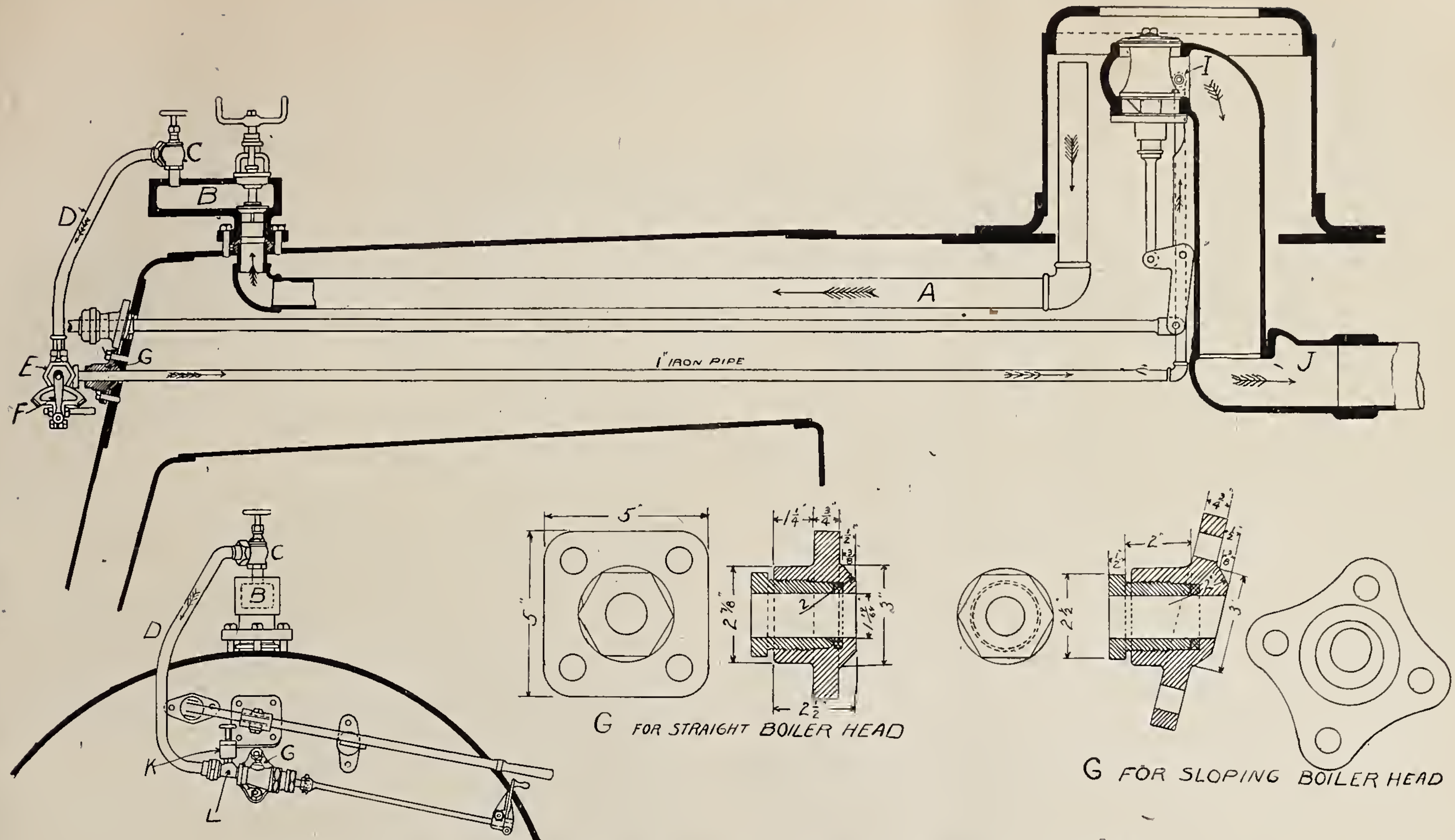


Fig. 1—General view of drifting valve, Wabash Railroad.

The oil cup attachment is for the purpose of lubricating the steam chest and cylinders at any time if it should become necessary through the failure of the regular lubricator. This cup may also be used for the introduction of graphite in new cylinders, or for the use of coal oil for cleaning compound or other cylinders.

The description of the valve is as follows:

A is a steam pipe leading from steam dome of locomotive boiler to turret B, to which is attached a globe valve C, connecting with what is termed a drifting valve E by pipe D. Drifting valve E is operated by handle working in quadrant F, which opens or shuts valve E. To valve E is attached pipe H running through stuffing box G (which can be made for either straight or sloping boiler head). Pipe H is connected with throttle box at I. The object of this arrangement is to take dry steam from the dome as indicated by the arrows on the drawings and introduce it into the cylinders through the connections mentioned and dry pipe J. Globe valve C regulates the supply of steam from turret B and the engineer controls the steam by handle F through drifting valve E. When the engine is running or drifting with the throttle valve closed, the position of the reverse lever need not be disturbed. While the engine is in motion the drifting valve is open and when the engine is standing at stations the valve is shut. They claim that by the introduction of steam to the cylinders in small quantities when engine is drifting, assists in the lubrication of cylinders and valves, saving at least 25 per cent in oil; also the thermal condition of the cylinders is increased and condensation reduced, thereby making a saving in the fuel expense. The operation of this valve relieves compression by destroying vacuum, keeps the engine running smoothly without reaction, making a great reduction in repairs. The suction of smoke and cinders into steam chests and cylinders and the consequent cutting of valve seats and cylinders, is corrected. It is also a great saving in preventing the metallic packing from being knocked down and broken.

While this drifting valve is doing splendid work on simple engines, it is especially adapted to the compound and piston valve type. With the use of this drifting valve all by-pass, over-pass and relief valves are taken off entirely, and practical demonstration proves an increased efficiency in locomotives so arranged and equipped.

OIL CUP ATTACHMENT TO DRIFTING VALVES.

K is an oil cup used for oiling main valves of locomotives while drifting in case of failure of lubricator. To operate cup, close valve C and open cup K and oil will be drawn into steam chest and cylinders by suction.

While engine is standing, close valve C, open cup K and fill pipe H full of oil, then close cup K and open valve C and oil will be immediately carried into steam chests and valves by steam pressure from boiler.

L is a nipple providing a convenient place for the attachment of oil cup K, the same being so designed that the oil cup may be always tapped in vertically.

We are indebted to Mr. J. B. Barnes, superintendent of motive power and machinery of the Wabash Railroad, for the above description and drawings.

Personals

Mr. R. F. Hoffman has resigned as assistant to the general superintendent of motive power of the St. Louis & San Francisco, and the office has been abolished.

Mr. A. W. Wheatley, formerly general master mechanic of the Northern Pacific at St. Paul, Minn., has been appointed superintendent of shops of the Chicago, Rock Island & Pacific at Moline, Ill.

Mr. James Coleman has resigned as master car builder of the Central Vermont, and Mr. A. Buchanan, Jr., superintendent of motive power, has also been appointed superintendent of the car department.

Mr. George Austin, formerly division foreman of the Atchison, Topeka & Santa Fe at Arkansas City, Kan., has been appointed general boiler inspector of the entire system, with headquarters at Topeka, Kan.

Mr. H. M. Muchmore, formerly division foreman of the St. Louis & San Francisco at Ft. Smith, Ark., has been appointed master mechanic of the Paris & Great Northern, with headquarters at Paris, Tex.

The jurisdiction of Mr. J. F. Deems, general superintendent of motive power, rolling stock and machinery, of the New York Central & Hudson River, has been extended over the Michigan Central and Cleveland, Cincinnati, Chicago & St. Louis.

Mr. R. L. Langtim, formerly mechanical engineer of the Denver & Rio Grande, has been appointed mechanical engineer of the Cincinnati, Hamilton & Dayton, with headquarters at Lima, O.

Mr. W. P. Sproul, formerly superintendent of shops of the Central of New Jersey at Elizabethport, N. J., has been appointed master mechanic of the Second division of the Atlantic Coast Line, at Savannah, Ga., to succeed Mr. F. S. Anthony, resigned.

Mr. L. L. Collier, master mechanic of the Newton & Northwestern, has resigned and has been appointed general foreman of the shops of the Chicago, Rock Island & Pacific, at Dalhart, Tex.

Mr. R. H. Rogers has been appointed master mechanic of the New York, New Haven & Hartford, with headquarters at South Boston, Mass.

Mr. F. Burke has been appointed traveling engineer and air brake instructor of the Duluth, Missabe & Northern, with headquarters at Proctor, Minn.

Mr. Samuel Millican has been appointed superintendent of motive power and machinery of the Houston & Texas Central, Houston East & West Texas, and Houston & Shreveport, vice Mr. S. R. Tuggle, resigned.

Mr. H. M. Curry, formerly division master mechanic of the Northern Pacific at Staples, Minn., has been appointed general master mechanic, with headquarters at St. Paul, to succeed Mr. A. W. Wheatley, resigned. Mr. Wm. Lincoln has been appointed to succeed Mr. Curry as division master mechanic.

Mr. Jacob Schilling, formerly general foreman of roundhouse and machine shop of the Wabash at Decatur, Ill., has been appointed master mechanic of the Chicago, Peoria & St. Louis, with headquarters at Peoria, Ill.

Mr. William Cockfield, formerly locomotive and car superintendent of the Interoceanic Railway of Mexico, has been appointed locomotive superintendent of the Mexican Railway, with headquarters at Orizaba, Mex., to succeed Mr. J. N. Muir, resigned.

Mr. George W. Smith, superintendent of motive power of the Chicago & Eastern Illinois, has been appointed superintendent of locomotive and car department of the Missouri Pacific, with headquarters at St. Louis, Mo.

Mr. Thos. Nichols has been appointed foreman of machine shops of the Baltimore & Ohio at Lorain, O., vice Mr. W. F. Ryan, resigned.

Mr. A. J. Poole, formerly division master mechanic of the Seaboard Air Line at Savannah, Ga., has been transferred to Atlanta, Ga., as division master mechanic.

Mr. W. C. Bewley, formerly general foreman of shops of the Wabash at Forest, Ill., has been transferred to Delray, Mich., in a similar capacity, succeeding Mr. Eugene McCann, resigned on account of ill health.

Mr. J. F. Robinson, general foreman of shops of the Seaboard Air Line at Savannah, Ga., has been appointed acting master mechanic at that point.

Mr. J. M. Ashley has been appointed road foreman of engines of the Seaboard Air Line at Atlanta, Ga.

Mr. S. T. Park, master mechanic of the Chicago & Eastern Illinois, has been appointed acting suprintendent of motive power, with headquarters at Danville, Ill., succeeding Mr. G. W. Smith, resigned.

Mr. J. J. Connor, roundhouse foreman of the Houston & Texas Central at Hearne, Tex., has been appointed general foreman at Houston, Texas. Mr. John Schillings has been appointed roundhouse foreman at Hearne.

Mr. Charles W. Allen has been appointed assistant to the superintendent of motive power of the Philadelphia & Reading, in charge of the shops on the Reading and Lebanon divisions.

Mr. C. H. Weaver, air brake instructor of the Lake Shore & Michigan Southern, has been appointed supervisor of air brakes on that road, the Lake Erie & Western, Indiana, Illinois & Iowa, and the Lake Erie, Alliance & Wheeling. Mr. T. F. Lyons has been appointed air brake instructor on the same roads, and Mr. L. L. Dixon has been appointed assistant air brake instructor.

Mr. C. I. Lewis has been appointed master mechanic of the Arizona & Colorado, Cananea Yaqui River & Pacific, Maricopa, Phoenix & Salt River Valley and the Gila Valley, Globe & Northern railroads, with headquarters at Globe, Ariz.

Mr. C. E. Gossett, formerly road foreman of equipment of the Chicago, Rock Island & Pacific at Dalhart Tex., has been appointed master mechanic of the St. Louis division, with headquarters at Eldon, Mo.

Mr. Frederick Baker, chief joint car inspector of Kansas City, died on Fbruary 13, aged 44 years. Mr. Baker was an active member of the Chief Joint Car Inspectors and General Car Foremens Association of America, being a member of the executive committee at the time of his death.

The American Railway Appliance Exhibition

In the accompanying illustrations are shown the plan of the exhibit grounds, the elevation and the floor plan of the main exhibit building of the railway appliance exhibition which is to be held at Washington in connection with the International Railway Congress. The site of the exhibition is on the Washington monument grounds, in accordance with the special act

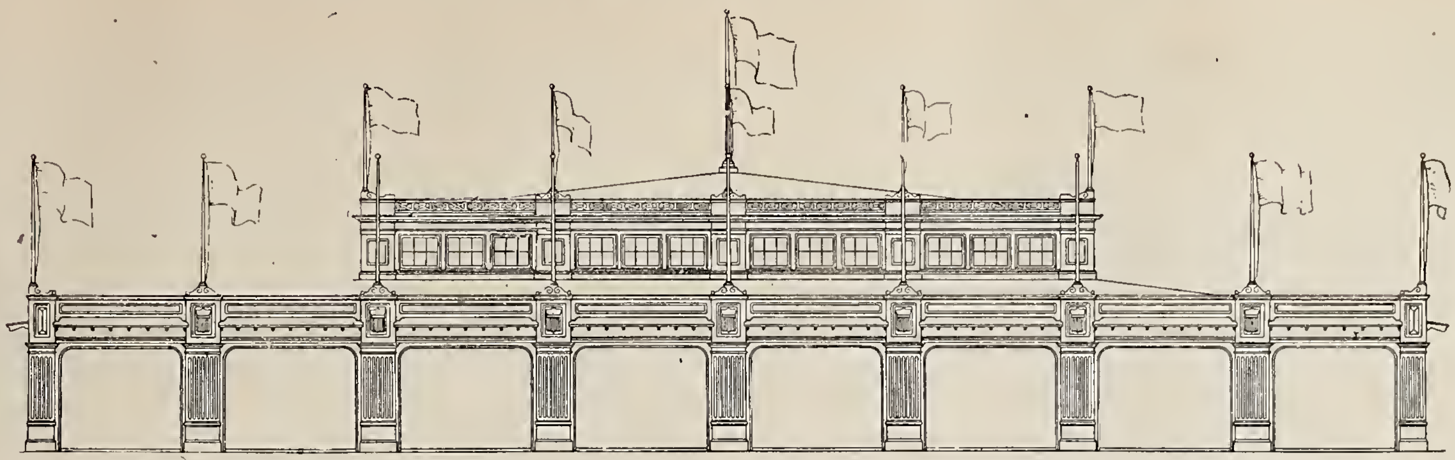


FIG. 1—ELEVATION AMERICAN RAILWAY APPLIANCE EXPOSITION BUILDING, WASHINGTON, D. C.

of Congress. The main entrance to the grounds will be at Fifteenth street, where an imposing gateway is already erected, and the entrances at Fourteenth and Sixteenth streets. The main exhibit building, which is being erected to accommodate the smaller exhibits, is located at the Sixteenth street end. This building will be 160 by 200 feet and divided as shown in accompanying floor plan. The doorways are 12 feet high and may be closed in stormy weather by canvas curtains.

In the entire exhibit grounds there is something over 200,000 square feet, and it is evident from the applications already in that the space will be more than taken, one exhibitor alone having applied for 100,000 square feet, and another for between 4,000 and 5,000 square feet. The list of names of the exhibitors given below indicates the wide interest which is being taken in the exhibition of American railway supplies.

Mr. George A. Past, 160 Broadway, New York City, chairman of the general committee of arrangements, will gladly furnish any interested with full information regarding exhibit space, etc.

LIST OF MEMBERS OF THE AMERICAN RAILWAY APPLIANCE EXHIBITION.

Acme White Lead & Color Works, Detroit, Mich.
Adams & Westlake Company, Chicago, Ill.
American Brake Co., St. Louis, Mo.
American Brake Shoe & Foundry Co., New York.
American Car & Foundry Co., New York.
American Hoist & Derrick Co., St. Paul, Minn.
American Lock Nut Co., Boston, Mass.
American Locomotive Co., New York.
American Railway Supply Co., New York.
American Steel Foundries Co., New York.
Anglo-American Varnish Co., Newark, N. J.
Armstrong Bros. Tool Co., Chicago, Ill.
Ashton Valve Co., Boston, Mass.
Automatic Air & Steam Coupler Co., St. Louis.
Baldwin Locomotive Works, Philadelphia, Pa.
Barbour-Stockwell Co., Cambridgeport, Mass.
Barnett Equipment Co., Newark, N. J.
Barney & Smith Car Co., Dayton, O.
Beaver Dam Mall. Iron Co., Beaver Dam, Wis.
Beckwith-Chandler Co., New York.
Benjamin Atha & Co., Newark, N. J.
Berry Bros., Ltd., Detroit, Mich.
Besley & Co., C. H., Chicago, Ill.
Bettendorf Axle Co., Davenport, Ia.
Bordo Co., L. J., Philadelphia, Pa.
Bowser & Co., S. F., Fort Wayne, Ind.
Brown, Harold P., New York City.
Brown & Co., Inc., Pittsburg, Pa.
Brown Hoisting & Conveying Co., Cleveland, O.
Buckeye Steel Castings Co., Columbus, O.
Bucyrus Co., South Milwaukee, Wis.
Buda Foundry & Mfg. Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Cambria Steel Co., Philadelphia, Pa.
Camel Co., Chicago, Ill.
Philip Carey Mfg. Co., Cincinnati, O.
Carnegie Steel Co., Pittsburg, Pa.
Chenoweth & McNamee, Brooklyn, N. Y.
Chicago Car Heating Co., Chicago, Ill.
Chicago Pneumatic Tool Co., Chicago, Ill.
Chicago Railway Equipment Co., Chicago, Ill.
Cling-Surface Co., Buffalo, N. Y.
Coe Mfg. Co., W. H., Providence, R. I.
Consolidated Car Heating Co., New York.
Consolidated Ry. Elec. Lighting & Equip. Co., New York.
Continuous Rail Joint Co., Newark, N. J.
Curtain Supply Co., Chicago, Ill.
Damascus Brake Beam Co., St. Louis, Mo.
Davis Co., John, Chicago, Ill.
Dickinson, Paul, Chicago, Ill.
Dilworth, Porter & Co., Ltd., Pittsburg, Pa.
Dressel Railway Lamp Works, New York.
Duff Mfg. Co., Pittsburg, Pa.
Edwards Co., O. M., Syracuse, N. Y.
Electro-Dynamic Co., Bayonne, N. J.
Elliott Frog & Switch Co., East St. Louis, Ill.
Empire Safety Tread Co., Brooklyn, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Falls Hollow Staybolt Co., Cuyahoga Falls, O.
Farlow Draft Gear Co., Baltimore, Md.
Flannery Bolt Co., Pittsburg, Pa.
Foster Engineering Co., Newark, N. J.
Frost Railway Supply Co., Detroit, Mich.
Galena Signal Oil Co., Franklin, Pa.
General Electric Co., New York.

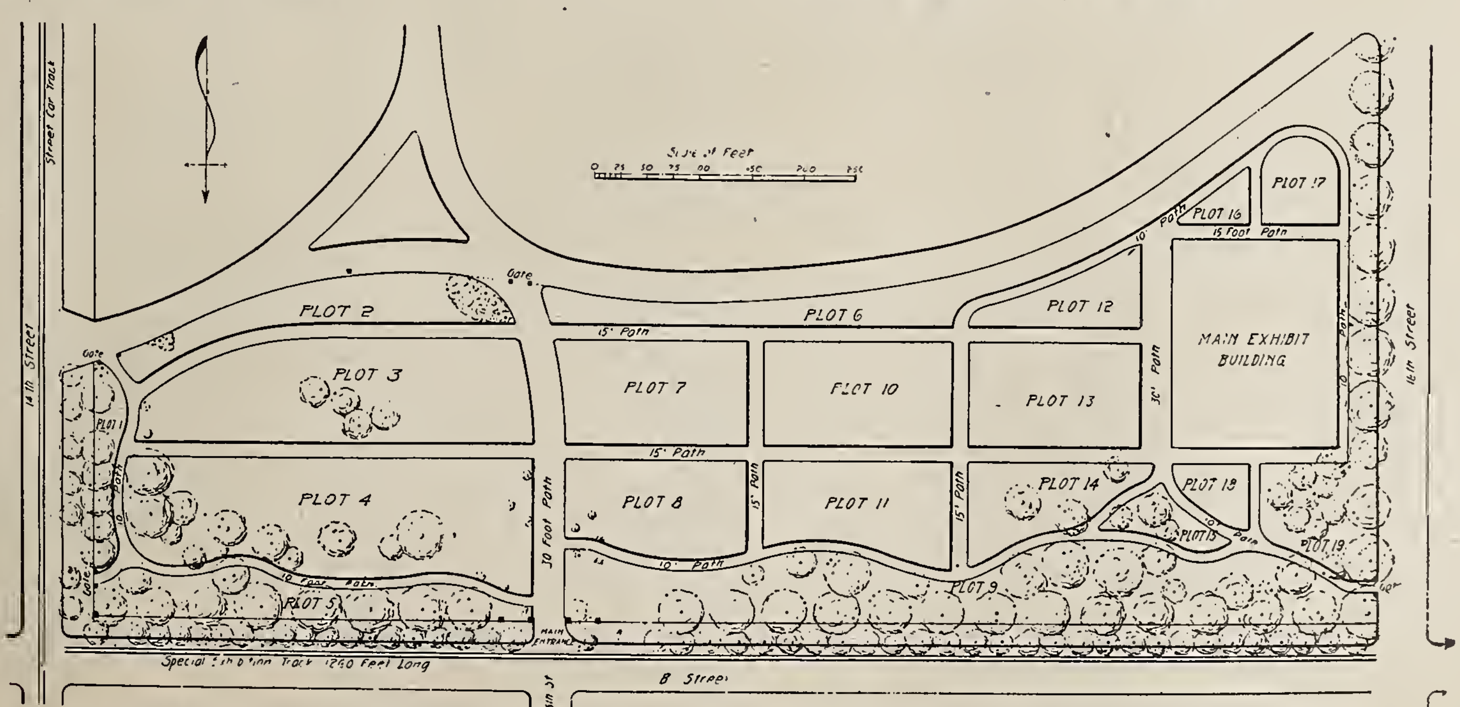


FIG. 2—GROUND PLAN AMERICAN RAILWAY APPLIANCE EXPOSITION, WASHINGTON, D. C.

General Railway Signal Co., Buffalo, N. Y.
Gold Car Heating & Lighting Co., New York.
Goldie, Wm., Jr. & Co., Pittsburg, Pa.
Goldschmidt Thermit Co., New York.
Goodwin Car Co., New York.
Gould Coupler Co., New York.
Hale & Kilburn Mfg. Co., Philadelphia, Pa.
Hartford Rubber Works, Hartford, Conn.
Heywood Bros. & Wakefield Co., Wakefield, Mass.
Independent Railroad Supply Co., Chicago, Ill.
Ingersoll-Sergeant Drill Co., New York.
International Correspondence Schools (Railway Department), Chicago, Ill.
International Nickel Co., New York.
Jenkins Bros., New York.
Johns-Manville Co., H. W., New York.
Jones & Laughlin, Pittsburg, Pa.
Justice & Co., Philip S., Philadelphia, Pa.
Keith Mfg. Co., Sagamore, Mass.
Kendrick, Thos., Glenwood Springs, Colo.
Lackawanna Steel Co., New York.
Lawrence Switch Co., Duluth, Minn.
Lehigh Portland Cement Co., Allentown, Pa.
Lindenthal, Gustav, New York.
Lodge & Shipley Mach. Tool Co., Cincinnati, O.
Lowe Bros. Co., Dayton, O.
Lucas & Co., John, Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
McConway & Torley Co., Pittsburg, Pa.
McCord & Co., Chicago, Ill.
Macleod & Co., Walter, Cincinnati, O.
Mahoney R. R. Ditching Machine Co., Vincennes, Ind.
Major, A., New York.
Manning, Maxwell & Moore, New York.
Masury & Son, John W., Brooklyn, N. Y.
Mechanical Rubber Works, Cleveland, O.
Mechanical Rubber Co., Chicago, Ill.
Merritt & Co., Philadelphia, Pa.
Moran Flexible Joint Co., Louisville, Ky.
Morden Frog & Crossing Works, Chicago, Ill.
Municipal Engineering & Contracting Co., Chicago, Ill.
Murphy Varnish Co., Newark, N. J.
Nathan Manufacturing Co., New York.
National Lock Washer Co., Newark, N. J.
National Malleable Castings Co., Cleveland, O.
New York Air Brake Co., New York.
New York Belting & Packing Co., New York.
Norfolk Creosoting Co., Norfolk, Va.
Oliver Machinery Co., Grand Rapids, Mich.
Pantasote Co., New York.
Peerless Rubber Mfg. Co., New York.
Pennsylvania Steel Co., Philadelphia, Pa.
Perry Side Bearing Co., Joliet, Ill.
Pettibone, Mulliken & Co., Chicago, Ill.
Pittsburg Spring & Steel Co., Pittsburg, Pa.
Porter Co., H. K., Pittsburg, Pa.
Pratt & Letchworth Co., Buffalo, N. Y.
Pressed Steel Car Co., New York.
Pyle-Nat. Electric Headlight Co., Chicago, Ill.
Railroad Gazette, New York.
Railroad Supply Co., Chicago, Ill.
Railway Age, Chicago, Ill.
Railway Appliances Co., Chicago, Ill.
Ry. Equipment & Publication Co., New York.
Railway Master Mechanic, Chicago.
Ramapo Iron Works, Hillburn, N. Y.
Rand Drill Co., New York.
Rodger Ballast Car Co., Chicago, Ill.
Safety Car Heating & Lighting Co., New York.
St. Louis Car Co., St. Louis, Mo.
St. Louis Expanded Metal Fire Proofing Co., St. Louis, Mo.
St. Louis Malleable Castings Co., St. Louis, Mo.
Schoen Steel Wheel Co., Philadelphia, Pa.
Sherwin-Williams Co., Cleveland, O.
Simplex Railway Appliance Co., Chicago, Ill.
Southern Exchange Co., New York.
Standard Coupler Co., New York.
Standard Steel Car Co., New York.
Standard Steel Works, Philadelphia, Pa.
Star Brass Mfg. Co., Boston, Mass.
Storrs Mica Co., Owego, N. Y.
Symington Co., T. H., Baltimore, Md.
Trojan Car Coupler Co., New York.
Underwood Typewriter Co., New York.
Union Spring & Mfg. Co., Pittsburg, Pa.
Union Steel Casting Co., Pittsburg, Pa.
Union Switch & Signal Co., Pittsburg, Pa.
U. S. Metal & Mfg. Co., New York.
Van Dorn Co., W. T., Chicago, Ill.
Verona Tool Works, Pittsburg, Pa.
Victor Stoker Co., Cincinnati, O.
Weber Railway Joint Mfg. Co., New York.
West Disinfectant Co., New York.
Western Tube Co., Kewanee, Ill.
Western Wheeled Scraper Co., Aurora, Ill.
Westinghouse Air Brake Co., Pittsburg, Pa.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.
Westinghouse Machine Co., Pittsburg, Pa.
Westinghouse Traction Brake Co., St. Louis.

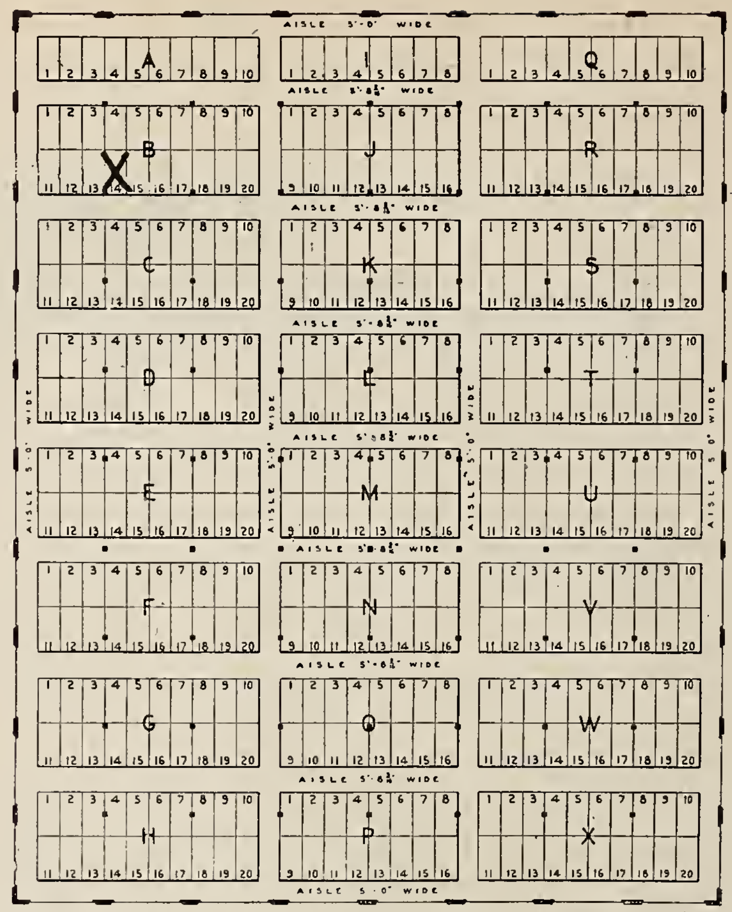
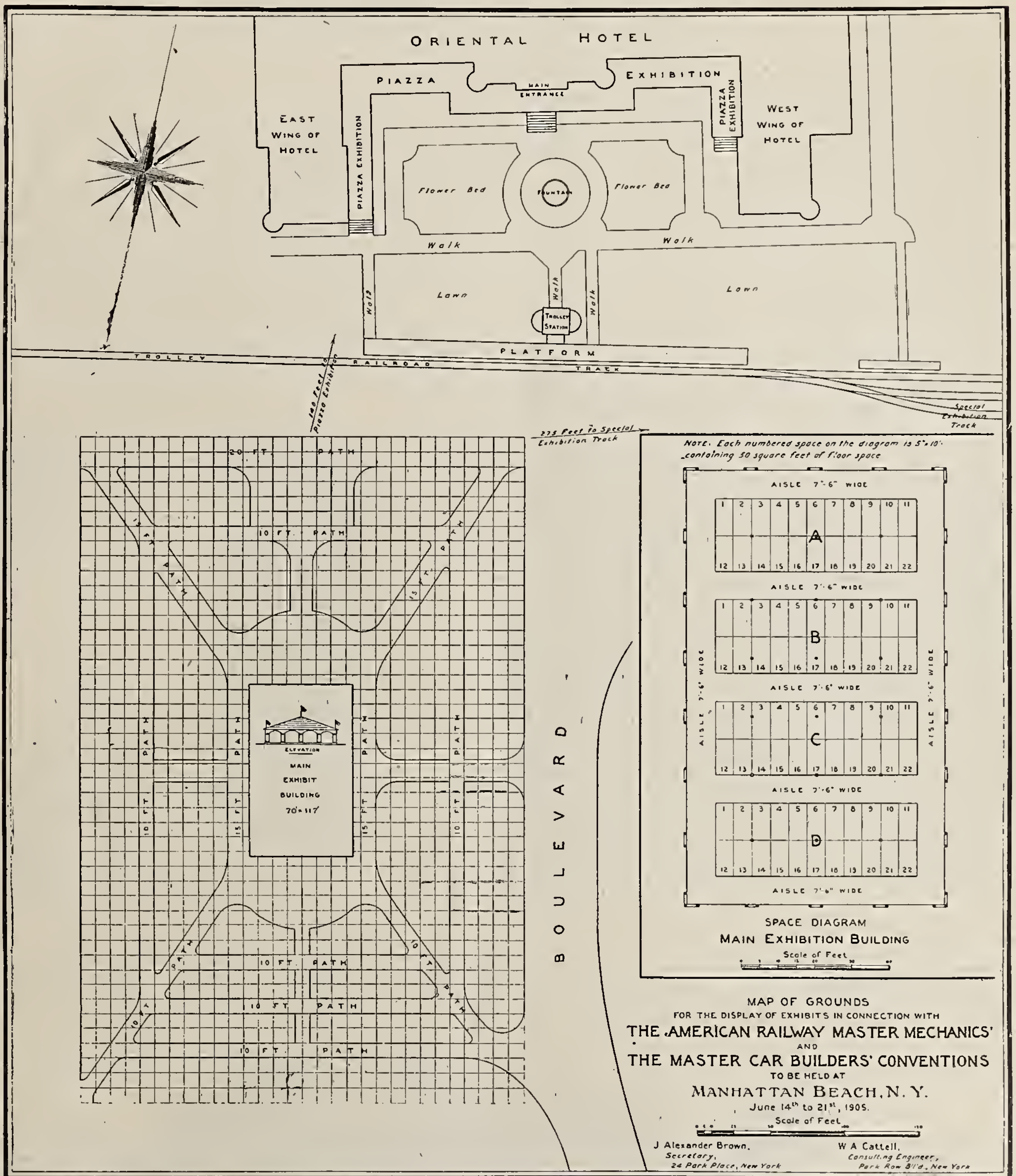


Fig. 3—Floor plan Main Exhibit Building, American Railway Appliance Exposition, Washington, D. C. Section B, Stall No. 14, indicated by cross, will be the headquarters of the Railway Master Mechanic.

Wharton, Wm. Jr., & Co., Inc., Philadelphia, Pa.
Wheel Truing Brake Shoe Co., Detroit, Mich.
Wood & Co., R. D., Philadelphia, Pa.
Wyman & Gordon, Worcester, Mass.
Yale & Towne Manufacturing Co., New York.
American Engineer & Railroad Journal, New York.
Ashcroft Manufacturing Company, New York.
Booth Water Softener Company, New York.
Bradley & Sons, Osgood, Worcester, Mass.
Cleveland City Forge & Iron Company, Cleveland, O.
Cleveland Frog & Crossing Works, Cleveland, O.
Coe, W. H., Manufacturing Company, Providence, R. I.
Commonwealth Steel Company, St. Louis.
Consolidated Safety Valve Company, New York.
F. W. Devoe & C. T. Reynolds Company, New York.
Ewald Iron Company, St. Louis, Mo.
Franklin Railway Supply Company, Franklin, Pa.
Fuller Bros. & Co., New York.
Hall Signal Company, New York.
Hayden, N. L., Manfacturing Company, Pittsburg, Pa.
Homestead Valve Company, Pittsburg, Pa.
Jones & Co., B. M., Boston, Mass.
Keefer Railway Tie Company, Cincinnati, O.
Magnus Metal Company, Buffalo, N. Y.
Mason Regulator Company, Boston, Mass.
Middletown Car Works, Middletown, Pa.
Morse Twist Drill & Machine Co., New Bedford, Mass.
National Railway Publication Company, New York.
Niles-Bement-Pond Co., New York.
Railway & Locomotive Engineering, New York.
Raymond Concrete Pile Company, Chicago, Ill.
Scranton Bolt & Nut Co., Scranton, Pa.
Underwood & Co., H. B., Philadelphia, Pa.
United and Globe Rubber Manufacturing Companies, Trenton, N. J.
United Injector Co., New York.
Westinghouse Automatic Air & Steam Coupler Co., Pittsburg, Pa.
Wood, G. S., Chicago, Ill.
Ajax Mfg. Co., Cleveland, Co.
American Steam Gauge & Valve Co., Boston, Mass.
Converse & Co., W. W., Palmer, Mass.
Franklin Mfg. Co., Franklin, Pa.
Hill, Clarke & Co., Boston, Mass.
International Creosoting & Construction Co., Galveston, Tex.
Kennicott Water Softener Co., Chicago, Ill.
Matthews-Northrup Works, Buffalo, N. Y.
Midvale Steel Co., Philadelphia, Pa.
Norton Grinding Co., Worcester, Mass.
Prosser & Son, Thomas, New York.

Railway & Engineering Review, Chicago, Ill.
Robins Conveying Belt Co., New York.
Rostand Manufacturing Co., New Haven, Conn.
Sellers & Co., William, Philadelphia, Pa.
Tyler Tube & Pipe Co., Washington, Pa.
Universal Railway Supply Co., Baltimore, Md.
Williams, Brown & Earle, Philadelphia, Pa.
James G. Wilson Manufacturing Co., New York.

Master Mechanics' and Master Carbuilders' Convention of 1905



The permanent organization of the Railway Supply Men's Association, which was effected several years ago at Saratoga, has resulted in a much more efficient service for the supply men who exhibit at these annual conventions. All possible information this year has been sent out from the secretary's office, and the businesslike manner in which all matters relating to exhibits at the coming convention reflects great credit on those who have this in charge.

The latest announcement sent out by Secretary Brown gives a diagram showing the layout proposed for the Master Mechanics' and Master Car Builders' Conventions to be held at Manha tan Beach, June 14th to 21st, 1905. We reproduce the diagram herewith. A map of New York City and vicinity, showing the location of Manhattan Beach and the transportation facilities for reaching the headquarters of the convention has also been issued.

The American Railway Master Mechanics' Association annual convention, 1905, will be held at Manhattan Beach, Long Island, June 14th to 16th, inclusive, and Master Car Builders' Association annual convention, 1905, June 19th to 21st, inclusive, the headquarters will be Oriental Hotel, Manhattan Beach, Long Island. Reservations for the Oriental Hotel and the Manhattan Beach Hotel (both hotels being under the same management) should be addressed to the Manhattan Beach Hotel and Land Co., 192 Broadway, New York City. Reservations for rooms at the Brighton Beach Hotel (which has agreed to the same rates as the Oriental and Manhattan Beach Hotels) should be addressed to George L. Parker, care Grand Hotel, Broadway and 31st street, New York City. Applications for rooms should be made direct to the above mentioned hotels in every instance.

All information relating to exhibits, space, the size, location, etc., will be furnished on application to J. Alexander Brown, Secretary, 24 Park Place, Room 17, New York City.

Extra Heavy Ten-Inch Outside Moulder

The half-tone engravings represent a late improved extra heavy ten-inch moulding machine, manufactured by the H. B. Smith Machine Co., Smithvill, N. J., which will plane or work mouldings on all four sides as thick as four inches, and dress flooring and sheathing up to full width of machine. And it will plane two sides of timbers 10x12 inches. It is particularly well adapted for car shops, large moulding mills, and for working hard woods. This moulder was exhibited at the World's Fair, St. Louis, where it helped to bring about the gold medal.

The frame is cast entirely whole, not bolted together, hence is perfectly rigid. It is heavy, wide and long, which gives ample room for long and wide belts, and is of such design as to

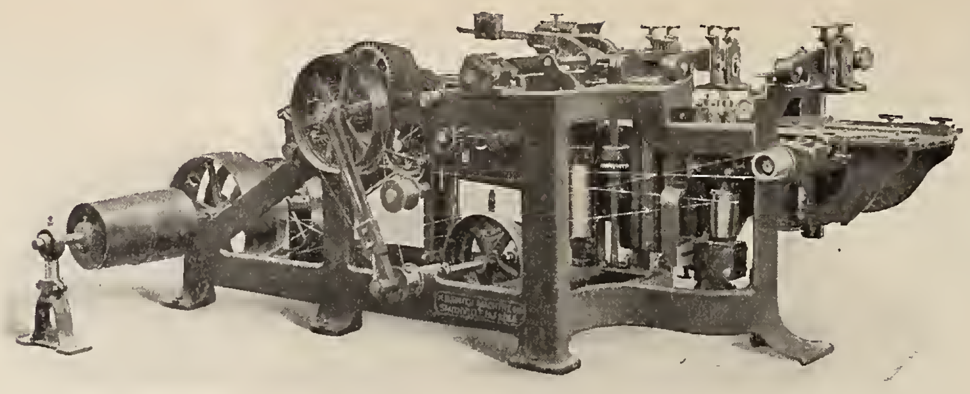


Fig. 1—Rear view of extra heavy 10-in. moulder.

give substantial support to all of the working parts, and to allow of convenient access to the inside vertical head.

The table is wide and very heavy, having long gibbed bearings or ways, and is adjustable up and down by a screw which rests on ball bearings and operated by a crank in front. It drops 12 inches for the deeper class of work, and clamps firmly to the frame in three places so as to make the machine practically as rigid as an inside moulder.

The feed is most powerful, consisting of four five-inch feed rolls, all driven and expansively geared. The weighting of the rolls is done in a superior manner, a spring intervening between the weight-lever, and rolls so as to minimize any shocks in starting heavy cuts. Raising the weight-lever lifts the feed rolls for withdrawing stock and they may be retained in a lifted position by the prop if desired. The upper rolls have parallel lift and adjust to change the angle with the face of the machine. There are four rates of feed, viz.: 18, 26, 35 and 47 feet a minute, which are controlled by a binder, conveniently operated by a hand lever.

The cutter-head spindles are all of high carbon steel. The top or main arbor is 2 inches in the bearings, 1¾ inches for the head and 1½ inches for the outside support; under-head journals are 1¾ inches. Side spindles are 1¾ inches in the bearings and 1½ inches where heads go. Both vertical head-stocks are attached to the table and have independent lateral, angular and vertical adjustments, which are made and rigidly locked in position from the front. The outside cutter-head is fitted with a weighted chip breaker. The horizontal spindles have longitudinal adjustment, and the upper mandrel is provided with a belt tightener for regulating the tension of the belt.

The spindle bearings are an improved modification of White's patent clamp boxes, shown plainly on both front and rear views of the half-tones. The caps can be adjusted by a sensitive touch of the fingers and clamped firmly in position desired. These bearings are equally important for the vertical spindles, in which case the pull of the belts is against the head-stocks. The outside support to main spindle has vertical adjustment.

The chip-breaker and pressure-bars are all adjustable, and the pressure feet may be set at angles to suit the work. The pressure-bars over the under cutter head have an outside bearing or support which by a clamp-bolt is held firmly to the table and frame. All bars and chip breakers are readily removable for sharpening cutters. The table beyond the under head drops down for this purpose.

The under cutter-head has adjustment to regulate the depth of cut, and the end of bed after the under head has adjustment to fit the cut as well as being raised and lowered with the head, when it is once set to the cutters. Therefore, it is right for light or heavy cut when set for the cutters in use, without further attention.

The pulleys are of generous size to give good width of belt and not excessive belt speed. They are turned carefully and balanced in the plane of rotation and will therefore run true at any speed.

All screws for adjusting or clasping hold-downs, pressures or springs, etc., are provided with hand wheels, stationary wrenches or handles. The spring posts are held solidly by an improved cast steel clamp, which is much superior to the old method of a set screw against the post, and easier to repair in case it becomes necessary to renew one of the screws.

The cutter heads furnished with the machine are all four slotted, lipped and made of high carbon steel. There are four heads, one to each arbor and all of the same cutting circle (6-inch), thus allowing an interchange of cutters on the different heads.

The belting required is top head, 15 ft. 9 ins. long x 6 ins. wide; bottom head, 20 ft. 9 ins. long x 4 ins. wide; outside head, 16 ft. 4 ins. long x 4½ ins. wide; inside head, 18 ft. 3 ins.

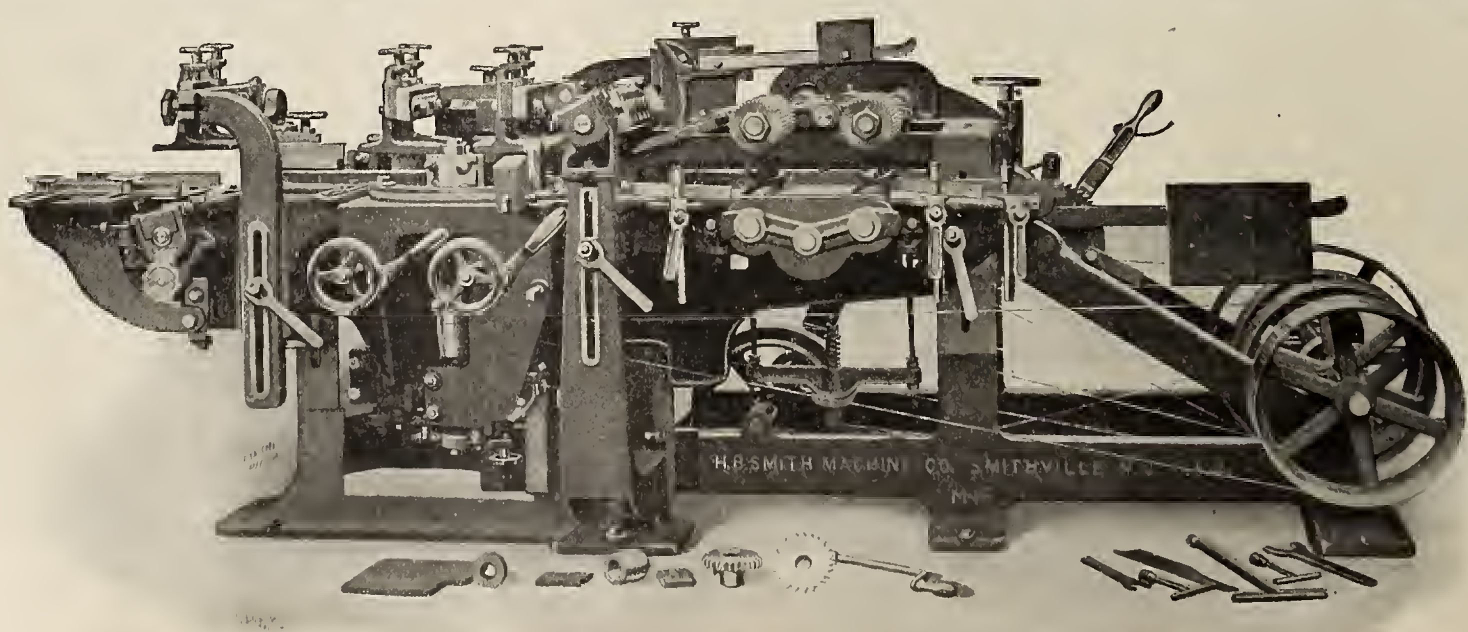


Fig. 2—Front view of extra heavy 10-in. outside moulder.

long x 4 ins. wide; one feed belt, 12 ft. long x 2½ ins. wide; one feed belt 7 ft. 10 ins. long x 3 ins. wide.

Model.	Size Width of Cut.	Works.	Weight in Pounds.	Av. H.P.
105A	12 in.	4 sides	6,000	7 to 12
106A	10 in.	4 sides	5,600	7 to 10

The Jackson Belt-Lacing Machine

The saving to the manufacturer of time and money, when slight advantages are so often attended by most important results, occupies the best thought of business men the world over. Because belting is such an important item in every shop, inventors have labored to devise a cheap and quick method of effective and durable lacing.

The Jackson belt-lacing machine, manufactured by the Diamond Drill & Machine Co., Birdsboro, Pa., under the Jackson patents, has solved, through the wire coil clasp lacing, a vexing problem. Recent improvements have brought this machine to the maximum of usefulness. It will not only save money in the cost of lacing, but will reduce to a minimum loss caused by the stoppage of machinery. It is obvious that the oftener the machinery is stopped, and the greater the time it takes to lace belts, just so much heavier will be the time charges of the men for which no adequate return can be secured. This

Jackson Belt Lacing Machine.

saving is evident when a six-inch belt can be laced complete in three minutes.

The cost of the wire lacing is 75 per cent less than that of older methods. The cost of lacing a 5-inch belt is one cent, and of a 10-inch, two cents. These machines will lace belt up to 24 inches wide and ⅝ inch thick.

The lacing forms a flexible joint. Tests of 2½-inch belts have shown that the wire coil will stand a tensile strain of 1,900 lbs. without breaking or pulling apart. Another advantage is that the belt can be connected or disconnected in a moment. This is a great convenience when belts of varying length are required, or when it is desirable to have a reserve belt in readiness. The Jackson machine is simple in construction. The rolls and gears are of hard tool steel. All the parts are interchangeable and can easily be replaced without the return of the machine to the factory. The net weight of the 6-inch machine is 150 lbs., and 296 lbs. for the 24 in.

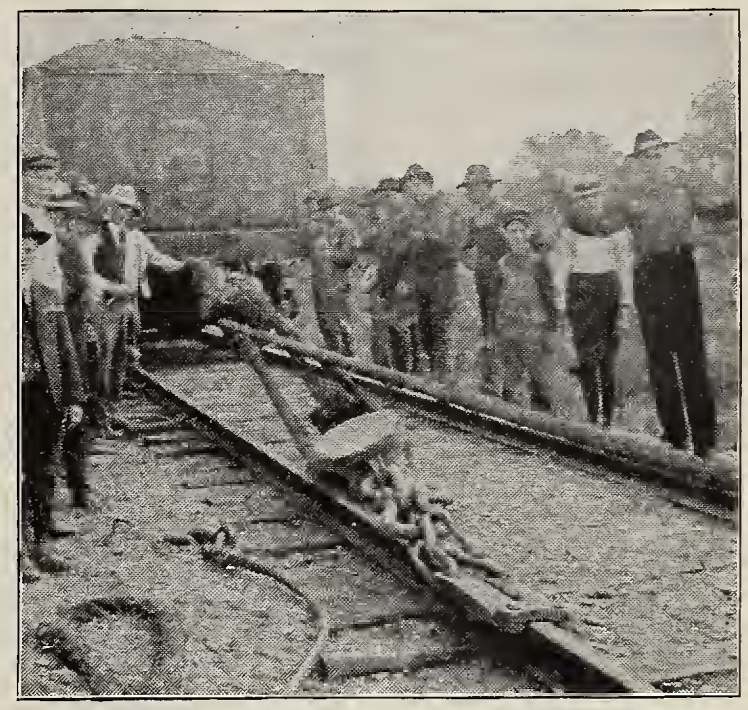
Burgess Rail Anchor

The illustration shows a Burgess rail anchor, as manufactured by B. Burgess, Danville, Ill. This anchor has been adopted by many railroads in the United States and Canada and has given good results. It received the highest award given by the international jury at the St. Louis Exposition.

The anchor comprises two arms, one cross brace with two pivotal rivets and four links. The two arms each have a shoulder or gib on the inside that engages the ends of the rail splices under the ball of the rail. The two arms are pivotally connected by the cross braces, making the anchor self-adjusting to the fish plates or rail splices. The free ends of the arms each have two links to receive a clevis, to which blocks and tackle are attached. It is to be noticed that only one rail is used and the anchor can be applied only at the splices.

To apply the anchor the arms are opened to allow the shoulders or gibs to pass over the ball of the rail immediately in front of the splices, then the arms are closed and the gibs come in contact with the ends of the splices. After blocks and tackle are attached all is ready for a pull. Splices having from four to six bolts are sufficient to pull a derailed locomotive or loaded car back on the rails.

The anchor weighs 107 pounds and will resist a strain of 200,000 pounds. It can be applied or removed in a minute, and will be good for several generations. This device should prove a great time saver in case of a wreck or derailment, or



Burgess Rail-Anchor.

in any case where an achor is required. It does away with the necessity of planting a dead man and wrapping chains around the rails, which bunches the ties and bends the rail. This device does not injure the track and will fit any size rail from fifty-six to one hundred pounds per yard.

Notes of the Month

The Locomotive Appliance Co. has changed their office from the Chemical building, St. Louis, to the Old Colony building, Chicago, Ill.

The Farlow Draft Gear Company, of Baltimore, Md., have moved their offices in the Continental Trust Building from the temporary office which they had to secure after the Baltimore fire last February.

Messrs. Mordey and Dawbarn, consulting engineers, 82 Victoria street, London, England, will receive proposals for furnishing steel rails and other railroad supplies for use of tramways in Johannesburg, Transvaal colony.

It is stated that Mr. Church and Charles Cleveland, of Chester, Nova Scotia, have discovered the long lost and much sought for process of hardening copper. A sample of their hardened copper has been tested and seems to be as hard as steel, a penknife failing to make any impression on it.

The Stockbridge Machine Company, of Worcester, Mass., have made arrangements with the Niles-Bement Pond Company for the sole agency of their shapers in New York, Boston, Chicago and London.

The Swiss government has granted permission for the building of electric tramways on the following lines: Castagnola to Lugano, Menziken to Emmenbrucke, Munster to Rothenburg, Au to Berneck, Altorf to Fluelen, and a cable railroad from Interlaken to Heimwehfluh.

The April issue of Graphite has a large number of illustrations of notable bridges and buildings in different parts of the world. It also has seasonable talks on good paint and good painting. A copy of this publication may be obtained free of charge by writing to the Joseph Dixon Crucible Co., Jersey City, N. J.

The firm of John F. Allen, 370-372 Gerard avenue, New York City, who build the Allen portable pneumatic riveting machines have just shipped two of their riveters to each of the branches of the American Car & Foundry Company, at St. Louis, Mo., and Madison, Ill., making four machines in all. The shipment is of interest as this makes exactly fifty riveters of the Allen make which the American Car & Foundry Company now have in use in their various plants.

Mr. E. B. Boye has been appointed manager of the Cleveland office of Manning, Maxwell & Moore. Mr. Boye, who will be located in the Williamson building, has been connected with the Chicago branch of the same firm for the past five years. He is well versed and thoroughly posted on the various makes of machine tools and their uses, and his long experience in this line of business will be of great benefit to those purchasing tools.

The Southern Pacific Company has been making a series of experiments with a motor car which is driven by electric motors at the axles, the current being furnished by dynamos, direct connected to large Diesel oil engines, located in the car.

The British East Indies in the fiscal year 1903-4 imported metals (exclusive of gold and silver), and articles manufactured of same, including rolling stock for railroads, to the value of $53,064,396, exceeding the imports of the year 1902 by $6,400,000. Great Britain, Germany and Belgium are the principal countries supplying the East Indies with iron and steel ware and metallic goods in general. The United States, as the greatest producer of metals and metallic wares, should come next to England in supplying the East Indies in this line of goods.

The United States Council-General at Bogota, Columbia, has recently received a great many requests for catalogues of various kinds of American goods, such as watches, knives, shoes, rifles, shotguns, revolvers, and all kinds of sporting arms and ammunition, engineering goods, and drawing instruments. He has established a public reading room here, which is open to the public from 2 to 4 o'clock each afternoon, except Saturday and Sunday. If American manufacturers and merchants will send him their different catalogues they will be placed on file in this room, and it will be seen that the greatest good possible results therefrom.

In Japan there were, in 1902 and 1903, 9 government schools, 795 public schools (that is to say, supported by local authorities), and 51 private establishments, besides 3 institutes established by the government for the training of technical teachers. The Japanese, however, have long recognized that schools, colleges, and universities are not the only—indeed, are not the chief—means of educating men who will be useful in advancing the welfare of their country, and they have been in the habit of sending their best men—students, professors, manufacturers and merchants—to the various countries of the world for the purpose of enlarging their experience.

Since the purchase of the New York & Ottawa Railroad by the New York Central Railroad Company the latter has determined to rebuild the road between Cornwall and Tupper Lake, which will be operated under the Vanderbilt system. The change is necessary to make the New York & Ottawa tracks suitable to the heavy rolling stock of the New York Central. The roadbed of the New York & Ottawa is in good condition for the small engines in use, but the change contemplated will make the bed suitable for the largest class of engines. This road and the Rutland will insure to the Central an immense trade from Ontario Province. It will also place Cornwall in advance as an export town.

German papers report that the well-known chemist, Maneuvrier, at Paris, has made the discovery that adulteration of wine with water, other liquids, and with solids can be detected through the aid of the telephone. Two glasses, one filled with the wine to be tested and the other with a like quantity of wine known to be pure, are placed upon an apparatus resembling a scale and a telephone connected with both liquids. If both wines are pure no sound is heard in the receiver, but if one contains water a noise is produced until a pointer is moved to a given place on the dial plate, whose movement renders the conductivity of the liquids uniform. The gradation on the dial where the pointer stops shows the quantity of extraneous matter in the wine.

The McConway & Torley Co. of Pittsburg, Pa., have just issued a supplement to the Car Interchange Manual, containing abstracts of the decisions of the M. C. B. Arbitration Committee, cases 668 of May, 1904, to 682 of December, 1904, inclusive. This pamphlet is prepared with a gummed insertion so that it may be pasted in the back side of the Manual, issued in 1904, to make a complete abstract of all the decisions of the Arbitration Committee up to December 31, 1904. They will be very glad to mail a copy of the pamphlet to anyone desiring it to complete their 1904 Manual. They also have copies of the complete Manual for 1904, containing all the decisions, which they will supply, free of charge, to any clerks or car men who may find it useful in their work.

By an arrangement betwen the British postoffice department and the Marconi Company every telegraph office in the United Kingdom now receives messages for transmission by the Marconi wireless system from the Marconi coast stations to ships at sea fitted with the Marconi apparatus. Under the wireless telegraphy act no one can use a wireless telegraph system in Great Britain without authority from the postmaster-general. The postmasters at various offices are kept informed of the movements of ships carrying the wireless apparatus and the locality of the shore station through which messages may be sent, and anyone desiring to send a message to a ship at sea by wireless telegraphy may do so by handing the message into a telegraph office and paying 13 cents per word. There must be paid, however, a minimum of $1.57 for each telegram.

The steady development of the British colonies in South Africa and the increase of population there cause a growing demands for building materials and of machinery for making brick, sewer pipes, tiles, etc. There are good prospects for the sale of implements and material required for mining, as also for electrical and plumbing purposes. Municipalities are introducing electric-lighting plants and waterworks. There is a lively demand for automobiles, pumps, tubing, barbed wire, and construction iron for buildings. During 1903 England exported to South Africa machinery to the value of $11,667,360. The exports of German machinery to South Africa during the same year amounted to $1,107,396. Owing to the destruction of the workshops of the South African Railway Company at Bloemfontein, a large number of machines will be required.

The interurban railway system of Los Angeles-Pacific Railroad Company is one of the most extensive in the country, embracing nearly 200 miles of up-to-date lines. The company owes its growth largely to the energetic and untiring work of the president and manager, Mr. E. P. Clark, who was one of the pioneer railway men of Southern California. The system covers thoroughly the territory lying south of the Santa Monica mountains and between Los Angeles and the ocean. Most of the lines have been double-tracked and are constructed in conformity with the best steam railroad practice. About a year ago a new central steam plant was installed at Vineyard about five miles west of Los Angeles and from this station transmission lines at 15,000 volts carry the power to several sub-stations located at intervals over the system. It is to increase the capacity of this central station and to supply additional power for the operation of the lines in Los Angeles that made necessary additional machinery, which was purchased from the Crocker-Wheeler Company, of Ampere, N. J.

The Circuit Court of Appeals in Philadelphia, before Acheson, Dallas and Gray, circuit judges, in which the Cleveland Pneumatic Tool Co. were appellants against the Chicago Pneumatic Tool Co. on a case brought by the Chicago Pneumatic Tool Co. against the Cleveland Pneumatic Tool Co. in the United States Circuit Court of Pittsburg for infringement on handle suit, said complaint was sustained by Judge Buffington and the case appealed by the Cleveland Pneumatic Tool Co. Judge Dallas handel down an exhaustive opinion on March 6th, entirely exonerating the Cleveland Pneumatic Tool Co. from any infringement, his decision being that the court below erred in its dceision in granting an injunction against the Cleveland Pneumatic Tool Co. This decision does away entirely with the claims of the Chicago Pneumatic Tool Co. that they controlled everything in handles for pneumatic tools.

John F. Allen, builder of the widely known Allen riveting machines, 370-372 Gerard avenue, New York City, is in receipt of a letter from their Glasgow agents, John Turnbull, Jr., & Sons, which tells of an interesting demonstration of the Allen machines in Glasgow, as follows: "With regard to the 84-in. boiler riveter, we have been demonstrating it in a shipyard outside of Glasgow and the work done, which was on two boiler plates were perfectly satisfactory; and the plates were closed in good style. Our clients have secured a government contract in Malta and they are anxious to use the riveters on the caissons which they will build there. With this in view we advertised extensively that a demonstration was to be made and we invited, by letter, most of our shipbuilders and boilermakers in and around this city. We also managed to secure the presence of a government inspector. The machine was put to work on a line of rivets, after which the plate was sawed in two and the government inspector was perfectly satisfied with the manner in which the machine had driven the rivets and the way the plate were closed."

The present trend of invention in England is undoubtedly in the development of motor cars, oil engines for driving them, and in speed gears, speed indicators, and other accessories. This fact is given added importance by a new order of the local government board increasing the maximum limit allowed for an unladen motor car to 5 tons and to 6½ tons, including trailer, whereas formerly the weight allowed the car was 3 tons and with trailer 4 tons. The total weight of car and load is limited to 12 tons. These new regulations, which will come into force March 1, practically relate to freight motor cars only, and not to passenger and pleasure automobiles. Liverpool is the headquarters of the movement for the use of freight motor cars to compete with railroads. Heretofore the limit allowed for the weight of the cars and the load has handicapped the movement, but the new regulations are expected to give a great impetus to the development of the freight motor-car industry. And here would appear to be an opening for American inventors and manufacturers in this line.

According to recent German returns the tin production of the world amounted to 93,093 tons in 1903, an increase over the preceding year of 2,916 tons. According to these returns, 75 per cent of all tin comes from southeastern Asia, the following being the estimated output of the several colonies and countries: Malacca, 54,797 tons, Banca and Billiton, 20,060 tons; Bolivia, 9,500 tons; Australia, 4,191 tons; Cornwall, 4,150 tons; all other places, 395 tons. Although the production of tin has increased regularly from year to year, the output is not sufficient to supply the demand, as the stock on hand in the most important tin markets has constantly decreased. The United States consumes 43 per cent of the total tin production; Great Britain, 28 per cent; the other European countries, 22 per cent, and India and China together, 7 per cent. It is surprising that the United States, which during recent decades has made such enormous progress in exploiting its mineral resources, is not yet a factor in the production of tin, although considerable deposits are said to exist in South Dakota, Wyoming, and in North and South Carolina. A year ago one tin mine was opened in South Carolina.

There has been considerable discussion on the subject of air openings under locomotive grates in regard to the damper openings on recently built locomotives being gradually reduced. There is a direct loss of heat when the air supply is not adequate, and a large saving in fuel can be accomplished by increasing the damper openings in locomotives. For perfect combustion it requires eight pounds of oxygen for every pound of hydrogen and 2 2-3 pounds of oxygen for every pound of carbon. With the dampers of a modern locomotive contracted, how is perfect combustion to be attained? By staying the fire-box with hollow stays with an inside diameter of ⅛ inch and not over 3-16 inch. Sufficient air does not pass through the grates and one dare not have an excess over the fire-bed, but the amount that will pass through 1,000 or more hollow staybolts will furnish oxygen for the perfect combustion. As the air passes through the hollow staybolts the risk of burning is decreased, expansion of the bolt is lessenned and the cracking of the sheets is reduced. The exhaust of the locomotive drawing a current of air through the hollow bolts keeps the hole open and thereby presents a double opportunity for the detection of breaking staybolts.

The Duff Manufacturing Company, Pittsburg, Pa., have received another contract for a large quantity of Barrett track jacks for the Government Railways of Russia. This is the third contract for this source within the year, received by the Duff Company, and the Barrett jacks have been adopted exclusively, by the Russian government for their railroad work. It will be recalled that the first contract for Barrett track jacks was to cover the requirements of the Siberian Railways and were rushed forward to facilitate the government in preparing that road for the transportation of troops to the seat of war. At the time this contract was announced, it was regarded as an important award, in that it showed, contrary to reports, that Russia would buy American material. It will be remembered that, at the outbreak of the Japanese-Russian war, there was a report circulating through the press that Russia would not purchase American-made machinery and tools on account of the American people siding, apparently, with the Japanese. The Duff company have also supplied the Barrett track jacks to the Japanese railways and it was a marked coincidence at the time, that on the same day the first Russian contract was received, a large consignment of Barrett jacks was ordered forward by Japan.

For purposes of ascertaining the efficiency of machinery, tires, consumption of gasoline, and other points of practical interest concerning the working in actual use of motor cars, the Automobile Club of Birmingham, England, a national organization, offered some months ago to supervise trials of individual motor cars for from 4,000 to 5,000 miles. The trials were to be carried out under the care of officials selected by the club, who would note the cause and duration of all involuntary stops, and report the general behavior of cars under severe use upon the road. A number of motor cars have undergone the test, and one light car and one motor omnibus are now making 5,000-mile runs. So far, none of the manufacturers who submitted their products have had cause to regret the risk they took in the reputation, etc., of their cars. Owing to the severity of test, doubtless some of the manufacurers will make improvements in minor details. The accomplishments of cars in touring use can be regarded as of more importance than upon a racing track. The distances covered are about 200 miles per day and the 20 miles legal limit of speed must not be exceeded at any time. The motor cars must be returned at night to a garage selected by the club, where, after being cleaned and such minor adjustments made as seem reasonable, they are to be intrusted for the night to the keeping of selected officials.

Owing to the greatly increased traffic of the interurban railway system of the Los Angeles-Pacific Railroad Company, the officers of that company have decided to increase the capacity of their central power house at Vineyard and to install an additional sub-station in Los Angeles. The new electrical equipment has been contracted for with the Crocker-Wheeler Company, Ampere, N. J., through its Pacific coast managers, the Abner Doble Company, of San Francisco. The contract comprises one 1,200 KW, three-phase, 50-cycle, 2300-volt, engine type generator with a speed of 125 R. P. M.; one 300 KW motor-generator set; one 400 KW motor generator set; three 400 KW transformers; three 160 KW transformers; three 120 KW transformers, and a 60 KW engine type exciter. The 1200 KW alternator will be of the Crocker-Wheeler Company's new revolving field type, similar in construction to the three 4,000 KW alternators recently ordered by the California Gas & Electric Corporation. The Los Angeles generator will be driven by a 2,000 HP compound-condensing McIntosh & Seymour engine. The motor-generator sets will consist of 2300-volt synchronous motors driving 600-volt direct-current railway generators. The transformers will be built for 15,000 volts of the primary and 2300 volts in the secondary and will be of the new water-cooled and oil-insulated type recently brought out by the Crocker-Wheeler Company.

About two years ago the practicability was discussed of opening a special trade school for metal working at Solingen, Germany, in which talented young people might have an opportunity to work out for themselves new designs and models and suggest new ideas for the many-sided products of Solingen. With the energetic aid of some of the large manufacturers and the granting of the necessary means by the city common council such a school was opened about three months ago with a force of experienced instructors under a director, who is a practical and highly educated man. He takes hold of the work with animation, and with the aid of several able assistants is intent on making the school a model one as well as of value to local industry. The number of entrance applicants was so large that a great part could not be considered, and it is already necessary to look for larger quarters. An inspection shows that the school contains apartments for drawing, modeling, a working room for engravers and chiselers, a special room for the models, and an apartment for the director. In the room for drawing, the walls are decorated with plaster-cast models, drawing plates of castings, and exhibition work of pupils, consisting of models of various scissors, spoons, sword scabbards, designs for doors, locks, etc., some of them made to order for manufacturers who are interested, and all executed in an attractive manner. Special interest was attracted by a new model for shears and an artistic advertising placard. Busy hands were active in the modeling room copying from plaster-cast models and from nature. In the engraving line very good work is being done. It may be well to say that it is hoped that the different manufacturers of weapons will loan the school models, with the object of inspiring the students with new ideas, and also that the instructors and scholars shall be allowed to visit the factories, some of which have already lent a helping hand in this respect and placed models, neatly arranged, in cabinets, at the disposal of the school.

Technical Publications

Transactions of the American Society of Mechanical Engineers, Vol. XXV, 1904.

Contents: "The Money Value of Technical Training," "Slide Rules for the Machine Shop as Part of the Taylor System of Management," "Is Anything the Matter With Piece-Work?" "Suggestions for Shop Construction," "What Are the New Machine Tools to Be?" "Air Motors and Air Hammers—Apparatus for Testing," "A Method for Determining Rates and Prices for Electric Power," "Improvement in Valve-Motion of Duplex Air-Compressors," Tests of a Direct Connected Eight-Foot Fan and Engine," "A Series Distilling Apparatus of High Efficiency," "The Pressure Temperance Curve of Sulphurous Anhydride (SO_2)," "The Pitot Tube," "Construction and Efficiency of a Fleming Four Valve Engine, Directly Connected to a 400-kw. Generator," "A Compact Gas Engine, Beam Type," "Tests of a Compound Engine Using Superheated Steam," "Standard Unit of Refrigeration," "Report of Committee on Specifications for Boiler Plate, Rivet Steel, Steel Castings and Steel Forgings," "Use of Superheated Steam and Reheaters in Compound Engines of Large Size," "Commercial Gas Engine Testing and Proposed Standard of Comparison," "Road Tests of Consolidation Freight Locomotives," "Testing Locomotives in England," "Report of Alloys' Research Committee, Effects of Strain and of Annealing," "Experiments With a Lathe Tool Dynamometer," "Power Plant of the Tall Office Building," "Some Theoretical and Practical Considerations in Steam Turbine Works." "Different Applications of Steam Turbines," "Locomotive Testing Plants," "A Rational Basis for Wages," "Cast Iron Strength, Composition, Specifications," "Potential Energy of Prime Movers," "Middlesborough Dock Electric and Hydraulic Power Plant," "Refuse Destruction by Burning, and the Utilization of Heat Generated." "Power Plant of Tall Office Buildings," "Steam Turbine in Modern Engineering," "De Laval Steam Turbine," "Burning of Town Refuse," "Robert Henry Thurston a Memorial."

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

Meeting of the Advisory Committee

The Advisory Committee of the Master Car and Locomotive Painters' Association met, as per notice in our January issue, at the Imperial Hotel, New York City, Feb. 25, 1905, at 10 a. m. There was a full attendance of the committee, as follows: A. P. Dane, Boston, Mass., chairman; C. E. Copp, Lawrence, Mass., B. E. Miller, Scranton, Pa., C. A. Cook, Wilmington, Del., and J. W. Houser, Chambersburg, Pa. Mr. Dane promptly called the meeting to order and appointed the writer secretary and anounced that all visiting members were invited to participate in the proceedings, of whom we noted the following present: President, J. F. Lanferseik; first vice president, H. M. Butts; second vice president, J. H. Kahler; D, A. Little, J D. Wright, F. A. Weiss, R. J. Kelley, John Gearhart, H. W. Forbes and G. H. Gehman.

The following subjects were suggested by various members and, after some discussion, adopted and the following program prepared for the next convention, to be held at Cleveland, Sept 12-15, 1905. It was thought best to withhold the names of committee assignments until such time as the secretary shall have received their acceptances.

1. The Renovation of Coach Window Shades, particularly those most generally used, such as "Pantasote," etc., with a view to increasing their life.
2. Piece Work: Its Advantages and Disadvantages from the Standpoints of both Employer and Employe.
3. The Best Material and Method of Construction of Paint Shop Floors that Give Best Results from the Painter's Point of View.
4. Are You Burning off Your Passenger Equipment Before it is Necessary?
5. The Preservation of Steel Cars from Decay. What new Developments has the Past Year Brought Out?
6. Essay: The Car and Locomotive Painter of Today.
7. Economy and Durability Considered, to what extent may Enamels, or Varnish Colors, be Employed as to Finish for Car and Locomotive Equipment, Exterior and Interior?
8. Are Locomotives Properly Cleaned While in Service? If so, by What Materials and Methods?

QUERIES.

1. How do you remove old paint from front ends of repaired locomotives?
2. What oil do you use for rubbing down car interiors when newly varnished?
3. Is not there some other way that can be devised to clean car glass in shops than by hand?
4. Is paint removing from car exteriors by chemicals practicable and economical?
5. Does your road use metal train numbers in front of headlights? If so, what color are then painted and why?
6. What is your opinion of painting the exterior of carsash body-color?

Chairman Dane received a letter from Jas. A. Gohen containing the following suggestions for changes in the by-laws: "Sec. 4 of Art. 10 to read. Application for membership must be made at the regular annual meeting. Such application to be endorsed by two active members. If no objection is made, such applicant shall be enrolled as a member. Art. 12, Sec. 1, to read: Members in arrears for dues shall not be entitled to sit in convention, or take any part whatever in the proceedings. Sec. 2. Any member who is in arrears for two years shall be declared delinquent by the secretary before the close of the meeting, such declaration to be a part of the record. Members so declared delinquent shall be dropped from the list and shall not be reinstated until all arrearages are paid and then only should no objection be offered by the members."

Mr. Gohen's letter was not read to the meeting because the chairman thought he had left it at home, but afterward found it in his pocket. However, the substance of it was stated, and though no legal action could be taken there, it was voted to recommend that suitable steps be taken at the next convention to carry out Mr. Gohen's sentiments regarding rigorous dealing with delinquent members.

There were some ten or more supply men present who arranged a lunch for all in the hotel upon adjournment at 12:30, and provided tickets for the entire party to the matinee of "The Shepherd King" at the New York theatre. It was an enjoyable and profitable meeting, and seemed like an annual convention in miniature (minus souvenirs).

C. E. Copp, Secretary.

Subjects for Next Convention

The subjects for discussion at the next convention prepared by the Advisory Committee, whose report appears elsewhere in this issue, will, we think, commend themselves to the attention and interest of all our members and hope that the secretary will have no trouble in receiving the acceptances of those assigned to prepare papers upon them so that we can publish the entire list of the committees in an early issue.

Convention subjects can hardly be expected to be new each year. The association has been running thirty-five years and holds its thirty-sixth annual convention at Cleveland next September. As its discussions are confined to some phase of cleaning and painting car and locomotive equipment, with some eight or ten subjects each year, besides usually a list of queries, we think our mechanical superiors will grant that we have been rather fertile in thought and in resouces not to thresh over more old straw than we do, or else they must admit what is rather a well-known fact, that the car and locomotive painting trade is a field prolific with difficulties and new ideas constantly arising. The deviltries of paint and varnish are as numerous as the sins of the moral code; and when the preachers all get through hammering at us and close their Bibles for good it will be time for us to quit telling one another "what we know about"—painting. Even they, so it is said, put their old sermons in at the top of the barrel as they preach them and take new (?) ones out at the bottom, and so they appear to be new and fresh to their hearers. That is about the best we can do. We may dress an old subject up in new clothes, but it is largely the same thing. But we do not need to worry about this; the times are continually changing and the style and the requirements of the work are continually evolving new difficulties and responsibilities. Moreover, we ourselves are, sad to relate, passing away and our places are being filled with new and younger men, who will want to be taught in the things that are new to them, no matter how old they may seem to us. Children's children have to learn of their dadies and grandaddies all about politics and piety, and it would not seem strange to include paint in the list; of course, adding to this fund of information handed down to them what they themselves find out as they go along, perhaps discarding some of the old and appropriating the new, and thus the whole is kept ever new and profitable.

So some of our readers need not be restive if we do occasionally repeat ourselves in our discussions. There are but few subjects that have been treated as exhaustively that they are worn out. If a fellow can't see anything in them, perhaps he needs to step up a few more rungs in the ladder nearer the top. Our companies who pay the bills perhaps may think there may be some ways that some dollars might be saved still farther, even in car and locomotive painting, if we do not. "Well, then let them give us passes to go to the convention to talk it over, instead of having to pay our fare." We expected you would say that, and we do not much blame you; but that does not help the situation any. A clam does not shut himself up in his shell at every cold draft. You cannot afford to stultify yourself if the railroads do. Maybe their souls are bigger than their opportunities. Let us hope so.

A new subject comes up this year, anyway, and it is number one: "The Renovation of Coach Window Shades." While "down east" we have nothing to do with them, they being in the upholsterer's department, still others in the middle states do have this trouble and responsibility, and it is no more than right that they should hear and be heard upon it.

Steel car painting comes up again; like Banquo's ghost, it will not down. As long as some roads do not paint them at all, but let them rust on and rust out, we believe that this is a live subject; that there is something wrong somewhere that needs to be righted and the continual hammering on this subject will cause flakes of truth to drop down to those that want them as numerous as do the flakes of rust when the cars are hammered. Hammer away, "beloved brudderin."

"The Car and Locomotive Painter of Today" is altogether a different breed of cats from his ilk of other days, as we shall doubtless find out when the author of the essay reads his paper on that subject in Cleveland next September, if we have not discovered it before. We may then wonder whether or not we have kept step with the procession, or fallen out and are "taking the dust" of those young fellows who are going ahead.

In conclusion, let us do our best to make the 1905 convention the best ever. We are inclined to think that fewer subjects and a more thorough sifting and garnering of the wheat in them is the better way than to try to thresh over so much and rush through it in order to cover the list. It would have been better if this had been the practice long ago, but it is not now too late to remedy the evil.

A corner by Warner Bailey.

William B. Albright.

AMONG THE SUPPLY MEN.

WILLIAM B ALBRIGHT.

It was our intention to start this department in the January issue with the photo and sketch of that genial and popular railway salesman of the Sherwin-Williams Company, Mr. W. B. Albright, which we take pleasure in inserting herewith, but we failed to connect. Owing to sickness and death in his family, he wrote that he had neglected some of the things that should have been attended to in the regular routine of business, and expressed his regrets that the photo should not have reached us before.

Mr. Albright was born in July, 1855, and entered the employ of the Sherwin-Williams Company in 1881, and has been connected with that company ever since, being a director at the present time. He has been in the Railway Department, of which he is the Eastern Division Manager, for the past sixteen years, with offices at 66 Broadway, New York City, where he is always glad to meet his many friends.

Knifing Versus Block-Pumice Surfacing

The writer acknowledges a change of heart recently upon the above-named subject, having obtained suitable materials for the purpose of producing a good knifed surface and lately "caught on" to their proper use. That is to say, he believes in knifing for the bulk of passenger equipment, especially new sheathed cars; there are exceptions, of course, where a better surface is required, than can be produced in this way. Knifing can be done, with the proper substance, directly upon the primer on the wood-work of a car, after the primer and putty have been suitably cut down with sandpaper. And when the knifing has been properly done and all surplus surfaced removed by knifing off, as well as knifing on, in such a way as to show as few laps, or knife-marks as possible, and allowed to dry one day, then a sandpaper coating is applied with soft rubber-bound brushes (bristle brushes would make brush marks to be sandpapered out) which, when dry, will sandpaper down to a fine surface and hide any previous defects in the knifed surface.

Here, then, is a surfacer up to and ready for the color produced by only three coatings, including the primer, in contrast to six, if a guide-coat is used, by the old rough stuff and rubbing-down method, with much better results in durability, we opine, if the work is properly done with right materials. Here is a saving, then, of the materials and operations of three coatings upon the car, as well as much less work and slop in knifing and sandpapering the surface in place of rubbing it with pumice and water. And that bad feature is also eliminated of soaking surfacer and woodwork with water that has to be dried out before paint can be safely applied. Again, a less absorbent surface for the finishing coats of color and varnish is presented by a knifed surface than with a rubbed surface, with its consequent aptitude to look pebbly, and therefore greater brilliancy for the varnish. As the woodworkers now put it, so much time and labor in traversing and smoothing up the sheathing of the cars it presents a very level surface for the painter, and it seems fallacious for him to repeat the carpenter's efforts in labor in rubbing and scouring to get a surface that is already produced for him. The painter's work is to close the pores of the wood with an adhesive primer and level up this feature only, producing a suitable surface for the color. This, to the writer, seems to be the only up-to-date method. The extreme piano surface of two or three decades ago is no longer required upon the general run of passenger equipment today.

Having obtained his surface in this way and applied a preparation of color, containing some keg white lead and sufficient oil, he may now for baggage, mail, express and milk cars apply a coat of suitable enamel, or in other words, "varnish-color," and letter with varnish-color letters, and this class of cars are done without any varnish at all in a durable, presentable and serviceable manner by a five-coat method from the wood, including the priming. What say to this, master painters?

Advanced Method of Removing Germs and Rust from Railway Cars

The management of the Central Railroad of New Jersey has made another step of advancement through the recent installation of a system of car cleaning which has the universal approval of the health authorities along its line, and as it is practically the first transportation company to adopt it, the method may be of interest to our readers.

The old mehod of car cleaning with a whisk here and a dash there with a broom or duster, was not only unsanitary, but unsatisfactory, for the reason that it had the effect largely of removing dust and dirt from one section, and depositing it elsewhere; but under the new method, which is termed the "Vacuum Sweeping System," the dirt and dust is drawn from the car by suction through a pipe, and is gone forever. The New Jersey Central has erected an immense vacuum plant in its Jersey City yards, and for a distance of 3,600 feet has laid pipe varying from two to five inches in diameter, covering in all about three miles. At short intervals this pipe is tapped and from these cocks is run the flexible hose, which may be taken in the car either by door or window. At the foot of the hose is a metal pipe with a flat triangular end, along the base of which is an opening, and through which the dust and dirt is drawn by the vacuum or "drawing-in machine" located a distance away. The operator runs the slot opening over the cushions, carpets, curtains, woodwork, etc., and without any commotion of dust raising, every loose particle or germ is whisked away, everything being left clean and wholesome. The dust thus removed, before reaching the great "drawing-in machine" must pass through two dust separators, the first of which clears the air of 90 per cent, of the grit, dust and germs; the second separator or cylinder draws the air through water in which corrosive sublimate is used, and completes perfectly the purification. The New Jersey Central management has for a long time felt the necessity for a more sanitary method of car cleaning, and the Vacuum System, while reducing disease liabilities to a minimum, at the same time reduces the cost of cleaning and time consumed. Two cars can be thoroughly cleaned under the new system at the same expense of time and money as was formerly consumed in cleaning one, and this in connection with the increased sanitary value, is sure to cause its general introduction within a short time, not only by other transportation companies, but by theatres, hotels, places of public resort and even the home.

Notes and Comments

Errata.—In our last issue in third paragraph of "Notes and Comments," "Mr. J. W. Warden" should have read Mr. J. W. Marden. Also, eighth note under same head should have been Mr. C. E. Mance and not "Nance." Also, next to last line in last paragraph, page 110, should have had the word title and not "little."

It does not look as though the Laconia Car Co. would be out of a job this summer. They have 75 cars to build for the Brooklyn Hts. "L" road, 20 odd for the Manchester, N. H., electric road, 300 box cars for the Maine Central, a like number for another New England line, as well as 200 Pratt's patent coal and 100 gondolas for the latter road.

Mr. S. H. Walker, assistant foreman with D. A. Little at the Juniata Shops of the Pennsylvania R. R., has been elected mayor of Altoona, Pa., a city of at present about 60,000 population, and takes his seat April 1. This is a great honor for one of the brethren of the brush. If we ever have our convention there he ought to allow us to paint the town red and show us how to do it.

The Boston & Maine has just turned out of its Lawrence shops what is probably the heaviest piece of car equipment on its line, with the possible exception of Pullman sleepers. It is a 60-ft. mule-end mail car and weighs 96,700 lbs. So much iron and steel entering its construction as a government requirement against accident is what accounts largely for the increased weight; also six-wheel trucks. This is one of two such cars being made at these shops.

Mr. H. N. Turner, known at least to all of our convention attendants and readers, has severed his connection with the Acme White Lead & Color Works as their railway representative, having accepted a position as sales-manager of the Electro Stain Co., a close neighbor of the above concern in the same city. Mr. R. C. McIntosh, son of the Supt. Motive Power, C. R. R. of N. J., has taken Mr. Turner's place in the East.

It seemed impracticable to try to get the Advisory Committee's report into the March issue. It was held three days later than formerly, and we were informed that the paper was being made up Feb. 21, while the meeting did not come off until the 25th. Still space would have been held had we not notified the office that it would go over to the April issue on account of some further matters to be completed at a conference of Mr. Dane and the writer when they reached home.

Mr. J. Harris Lighty has, we are informed, made arrangements with the M. C. & L. P. A., through Secy. McKeon, for reporting the proceedings of the next annual convention to be held in Cleveland next September. This ought to give us even a better report than the last, which was a good one and promptly delivered, as he got the "hang of the schoolhouse" at the Atlantic City convention. He is a Philadelphia stenographer, doing court and convention work, with address 50 North Thirteenth St.

Flies are not the only things found in amber. In a big mass of clear amber dredged up out of the Baltic sea recently there was distinctly visible in its interior a small squirrel—fur, teeth and claws intact.—Boston Globe.

We regret the prospect of losing a valuable article for these columns from Mr. Wilbur F. Leach, Master Painter of the Minneapolis & St. Louis R. R., Minneapolis, Minn., on the subject: "Are You Burning Off Your Passenger Equipment Before it is Necessary?" Mr. Leach kindly offered to write such a paper for these columns, but being a member of the Advisory Committee we brought it up at the late meeting in New York and it was adopted as a subject and he appointed to prepare a paper on it to be presented at the next convention. Therefore it was thought advisable not to present the paper in these columns, as it would be a repetition and rob it of the freshness of its presentation there. Mr. Leach takes the affirmative of the above question, having come to that conclusion from experiments extending over a period of ten years.

Receiving a personal letter about other matters from Associate Butts, under date of March 11, we think the item therein relating to progress of the Committee on Uniform Stenciling should be given out and we take the liberty, quoting him as follows: "I have just got in from Buffalo, where I met our friends J. A. Gohen and B. E. Miller. We had a meeting of the Committee on Uniform Stenciling of Freight Cars. We met Mr. H. M. Carson, Supt. Motive Power of the Pennsylvania R. R. He is chairman of the Committee on Stenciling of the M. M. and M. C. B. Associations; is very much in sympathy with us in this matter. Our committee presented him with a copy of our recommendations on Uniform Stenciling which he will present to his association at their next meeting which will be held at Manhattan Beach next June. He thinks it will be adopted. We feel now as if the matter was in proper shape for definite action."

The N. E. R. R. Club gave its third annual Ladies' Night entertainment March 9. It was an entire departure from the other two held, in that it came off at the New American House instead of at Pierce Hall where the club meetings are held, and consisted of a nine-course banquet instead of an informal lunch, at which 300 covers were laid, and was interspersed with a high-class entertainment, in addition to the orchestra, of a professional cast, consisting of songs, impersonations, solos vocal and instrumental, humorous readings, etc., the whole winding up with a ball from 9:30 to 12 in the big banquet hall on the next floor above where the dinner and entertainment took place. It was a most enjoyable occasion and creditable to the committee, consisting of C. N. Woodward, F. A. Barbey and T. B. Purves, Jr.

While politicians, Congress and Parliament are talking "reciprocity" and fighting shy of it until noses enough are counted to insure their re-election, the manufacturing concerns are doing something to fight shy of the duties by establishing branch factories over the line to turn out their products there. The latest is the American Pressed Steel Car Company which, we are told, has established a branch in Canada called the Canadian Car Co., and has already orders for 25,000 cars; and Mr. James Coleman, late M. C. B. of the Central Vermont R. R., has resigned the latter position to become Gen. Supt. of Construction of this new concern. The Standard Varnish Company of New York and Staten Island is about to open a branch factory at Toronto. The Sherwin-Williams Company established one at Montreal some time ago and recently enlarged the same and reopened it with something of a celebration. Not long since we learned that the celebrated Fairbanks Scale Works at St. Johnsbury, Vt., were to plant a branch factory "just over the line." Their main plant is within fifty miles of the line.

Remarkable results are reported of some tests of a fireproof paint invented by a Mexican. The tests took place in the Mexican capital. Paper covered on both sides with the paint and thrown into a hot fire did not blaze up, but gradually charred. A stick of wood painted for half its length was put in the fire. The unpainted part was at once consumed, the other half remaining intact. Finally, a small wooden structure, protected throughout by the paint, was filled with highly combustible materials and set on fire. The fire blazed fiercely; when it had burned itself out the building stood in good shape, little injured by the intense heat. There should be a great field for such a paint, particularly if it can be made cheaply enough not to add too greatly to the cost of building. Not only would ordinary wooden buildings be made much safer; such horrible calamities as have occurred in recent years might be averted by thus protecting the highly inflammable woodwork of theaters and steamboats. Should really good fireproof paint be available for the purpose, it would be criminal not to use it in such instances. —Boston Herald.

Screws working loose in the arms, or "strikers," of the revolving backs to iron car seats have long been a source of trouble to railroads by claims for damages for tearing ladies' dresses on the aisle-ends and by marring the woodwork on the wall-ends every time the back is reversed. A practical device to obviate this trouble by doing away with visible screws has long been sought and something tried, but none has seemed to be successful until now. Mr. William Praddex, assistant foreman painter at the Lawrence shop of the Boston & Maine, has lately perfected a device that not only covers the eight screws which fasten the arms to the back, four at each end; but has also abolished the two pivotal screws at either end of the seat-frame upon which the back revolves. It is no fanciful, complex, impracticable thing, but a simple, straightforward, workable—almost automatic device. Aside from the pivotal attachments, which have been later developed, a seat has been rigged and worked in a short line train successfully for some time that reverses its seats about once an hour every day. Not to take into account the saving of damages to the cars and to passengers' clothes from loosened screws it would seem that in the shop alone there is economy in the use of this device, for the seat-backs can readily be removed from the car and replaced without turning a single screw; and another trouble is avoided—that of plugging overworked screw holes in seat backs. It is also applicable to wooden seats where the seat-arms are screwed to the backs. Unless upholstery work is to be done to the detached backs that portion of the device which is screwed to the back does not require removal at all. It appears to the writer that it would be well for those in charge of car departments who are interested in anything of this sort to look into the matter by personal inspection or by correspondence for it seems to be meritorious.

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago

TELEPHONE - - HARRISON 3357

Eastern Office: Room 714, 132 Nassau Street, New York City.

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent.

Vol. XXIX. CHICAGO, MAY, 1905. No. 5.

Contents.

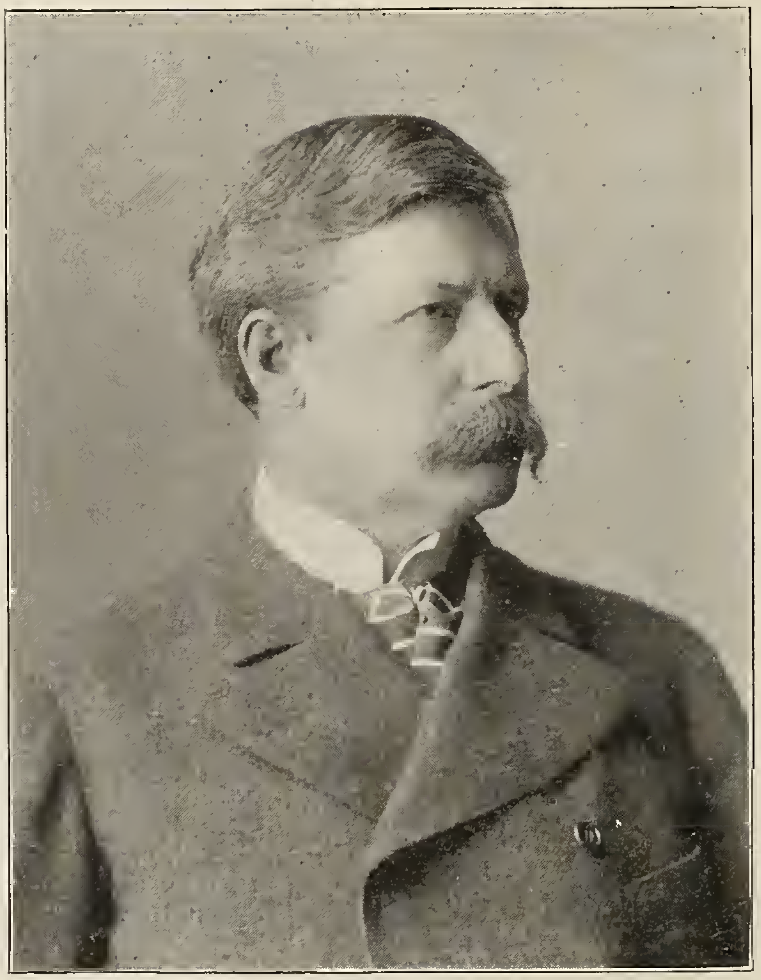
The Editorial and Business Offices of the Railway Master Mechanic will be located after May 1st in the Security Building, corner Madison Street and Fifth Avenue, Chicago.

BEGINNING with this issue we will illustrate a number of sand houses and appliances as used on a number of different railroads. Some time ago a master mechanic was showing his new sand house arrangement, which had just been installed, and made the remark that he had recommended the installation of it eighteen years ago, making the same recommendation every year for the eighteen years until he finally got the desired outfit. Suitable sanding apparatus, although very inexpensive, usually receives very little consideration. The sand box on a locomotive holds from one to two barrels of sand, and it is surprising to note that so large a number of roundhouses and terminals are so poorly equipped. A large number have only a sand stove of crude construction and the sand is carried in coal scuttles from the sand house to the engine, where it is handed to the engineer on the running board, who in turn elevates it to the top of the sand box. With the expenditure of a very small amount a drum could be constructed, which could be connected up with the train line of the engine, and the sand elevated directly into the sand box without any manual labor. This would not only save a lot of time but also the engine crew, who have practically all they can take care of in getting the engine over the road. If extra laborers are employed for this work their labors can be dispensed with, which is still a stronger argument in favor of some mechanical or pneumatic means of elevating the sand.

AT the March meeting of the Western Railway Club a very interesting paper on a plan for maintaining railroad repair shop machinery was presented and discussed. The paper brought out incidents where the output of shops were increased 50 per cent by substituting up-to-date tools in place of the obsolete ones. This was done with less than 10 per cent increase in the shop pay rolls. With the increased output of the shop the power was put in so much better condition that engine failures were reduced by two-thirds. Particular stress was put on improved tool holders and tool steel in the discussion of the paper. One shop was cited where tool holders reduced the value of alloy steel tools on a single lathe from $117 to $23; and in small tools and steels, with a better and larger supply of tools and steels, saved nearly $3,000 a month.

The value of high speed steels brought out records made in turning locomotive tires in which a set of 56-inch consolidation tires were turned in less than eight hours. This record was doubted, but if the doubtful ones would visit the Canadian Pacific shops at Montreal they could see one man turn 6 pair of 57-inch tires in ten hours and fifteen minutes on one wheel lathe. One stated that turning tires in 4.55 hours would be cheaper to them than putting in a $10,000 machine to do the work. The author of this statement evidently did not concur in the general trend of his own talk, as he strongly recommended replacing old tools with modern equipment.

Replacing old tools may be carried to extremes. In a great many cases the old equipment can be supplied with devices which will double the output of the machine. An incident of this kind was demonstrated in a small car shop when the car wheel lathe could not supply the wants of the shop. The foreman first speeded up the machines to the full capacity of high-speed steels and yet could not keep up with the work. He then noticed that too much time was consumed in putting in and taking out tools. A hydraulic tool holder was designed for the lathe which together with the high speed tool steel increased the output of the machine 50 per cent and made a net saving of 20 cents on a pair. This machine has turned out 10 pair of 36-inch steel tired wheels in nine hours.



MR. JAMES L. FRAZIER

GENERAL MANAGER CALIFORNIA NORTHWESTERN RAILWAY CO-

Mr. Frazier was born June 17, 1849, at Staunton, Va. He graduated from the University of Virginia in 1870 as civil engineer and entered the service of the Chesapeake & Ohio in the same year as assistant engineer of coustruction. From October 1874 to December 1877 he was assistant and resident engineer of the Cincinnati Southern; from June to September 1878 engineer of location of the Western Road of North Carolina; December 1878 to March 1880 resident engineer in charge of completion of the Cincinnati Southern Ry. across Tennessee; March to November 1880, resident engineer of construction Elizabethtown, Lexington & Big Sandy Rd.; November 1880 to May 1881 assistant engineer maintenance of way Alabama Great Southern Ry.; May to September 1881 engineer in charge of bridge department Mexican National Rd.; November 1881 to November 1882 engineer same department Louisville, Evansville & St. Louis Rd.; December 1882 to March 1883 engineer in charge of erection Louisville Bridge & Iron Co.; March 1883 to October 1884 chief engineer and superintendent road department Chesapeake, Ohio & Southwestern Rd.; October 1884 to April 1891 superintendent western division Newport News and Mississippi Valley Co.; August 1891 to August 1892 division superintendent Truckee division Southern Pacific Co.; August 1892 to November 1894 superintendent San Joaquin division; November 1894 to May 1904 superintendent coast division same company; May 1904 to date general manager California Northwestern Railway Co.

ON another page there appears a communication criticising an editorial presented in the January issue, concerning the surreptitious removal of parts from one locomotive to be applied to another for the purpose of supplying some one who has failed to order necessary equipment or having spoiled a job, wishes to cover it up instead of ordering a new piece. While we condemned the practice of stealing for the purpose of making a gang foreman's material account appear small, we recommended the consistent removal of parts from an engine in the back shop in order to supply a duplicate piece to an engine undergoing light running repairs in the round house, advocating a systematic record of all parts so removed.

Our correspondent seems to have overlooked the meaning of the first sentence of the editorial, wherein it is stated that the surreptitious removal should be discountenanced, and he proceeds to a consideration of the benefits to be derived from the systematic interchange of parts.

He asks where the line should be drawn in the practice of "robbing" one engine to keep another in service or to forward the completion of an engine nearly ready to leave the shop. Such a matter cannot be decided to a line, and is naturally dependent upon conditions. The point of argument is, however, the necessity of keeping some account of the parts taken in order that new material may be ordered and machined so as to cause no delay by the removal—the line being the difference between a systematic proceeding by which time is saved, and "stealing" by which one foreman's interest is advanced to the detriment of another.

We have in mind an instance where two gang foremen were converting two old class passenger engines into suburban engines. At the end of the month it was observed that one foreman had incurred a rather heavy expense for new material, while the other had converted his engine very cheaply. It was evident that something was radically wrong. Upon investigation it developed that much of the material ordered for Gang No. 1 had been applied to the engine in Gang No. 2 and the foreman of Gang No. 1 had to order additional material to replace that "stolen." Had there been a reason for rushing the engine in Gang No. 2 and a transfer had been arranged for by the shop foreman, there would have been no inconsistency in takng the parts of one engine to hasten the completion of the other.

It is unquestionably wise to use any of the parts of an engine shopped for heavy or general repairs to replace a duplicate piece or pieces on an engine which may be kept in service by such a course. But immediate steps should be taken to supply the parts in question in order that no delay may be occasioned to the engine whose parts have been so used. Such procedure is possible of successful results, but there is a difference between work of this nature and a man's presuming to dig freely through the piles of engine parts standing immediately outside of the shop until he finds pieces which he can use to his own advantage. One evidences careful management and systematic preparation for emergencies, while the other indicates a want of proper supervision.

We are not a little gratified that this editorial called forth discussion. Speaking generally, we feel that any discussion which impels exchange of experiences is always profitable.

Sand Houses and Appliances.

THE Erie Railroad uses two different kinds of sand driers and houses. Fig. 1 shows their steam drier. This consists of three hoppers joined in one continuous bin. The inside of the hopper is filled with steam pipes. As the wet sand, which is dumped or shoveled into the top, works its way downward it comes in contact with the hot steam pipes which dries it, and slowly drops into the hopper beneath. From the hopper it drops into the funnel, which is shown in detail in Fig. 7. The bottom of this funnel is connected to a pipe which leads into an air pipe. When air is passed through this pipe it takes the sand like an injector takes water and deposits it in the sand bin in the tower.

The other sand drier in use consists of a stove, as shown in Fig. 3. In this the sand is shoveled in the hood around the stove. As the sand dries it drops out through the holes in the iron ring at the bottom. This stove is usually placed over a funnel-shaped receptacle. The receptacle has a sieve in it to catch any gravel that may be in the sand. Below the receptacle and joined to it is a reservoir, the opening to which is controlled by a handle near the stove. This arrangement works as fol-

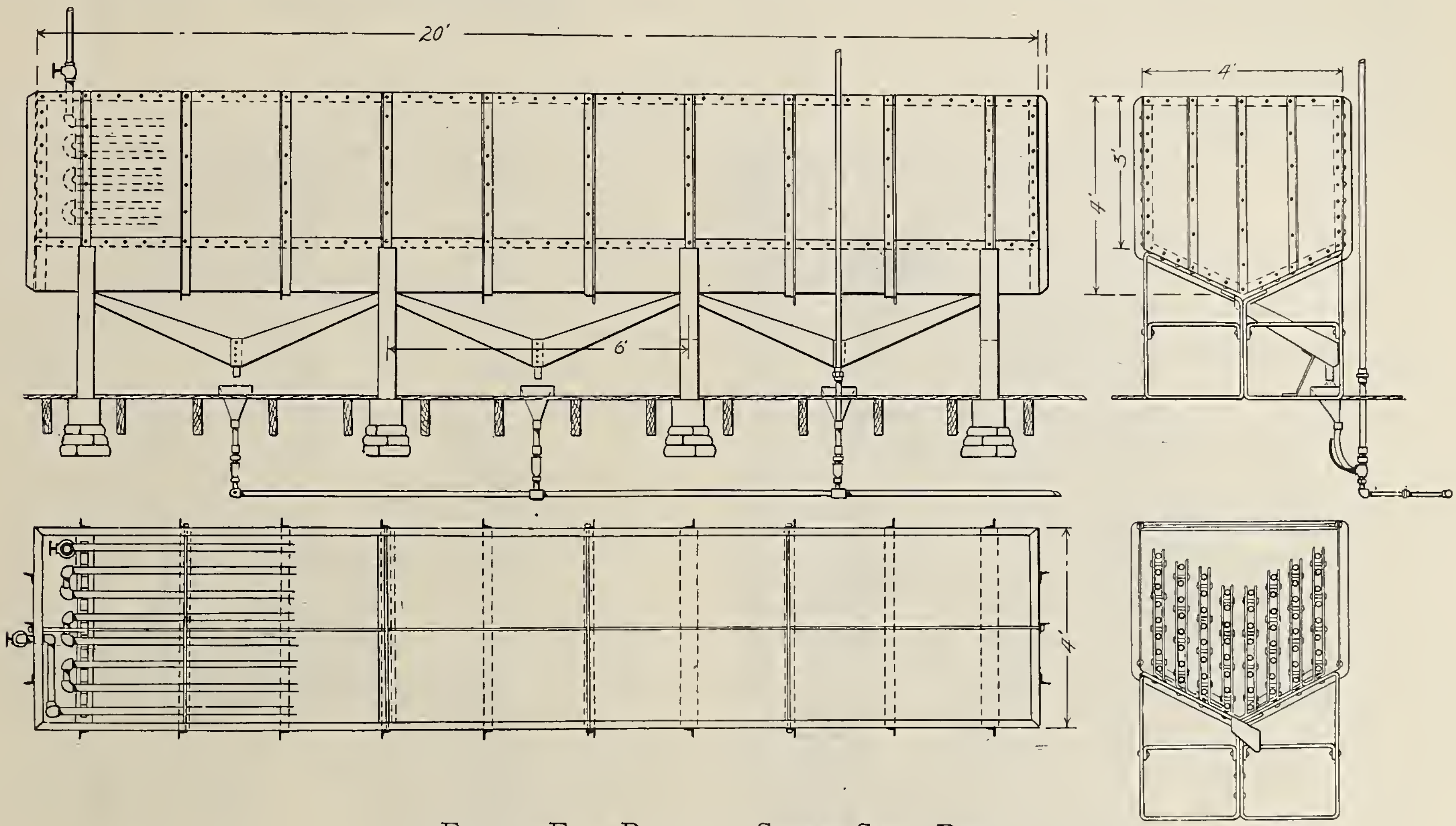


FIG. 1—ERIE RAILROAD STEAM SAND DRIER.

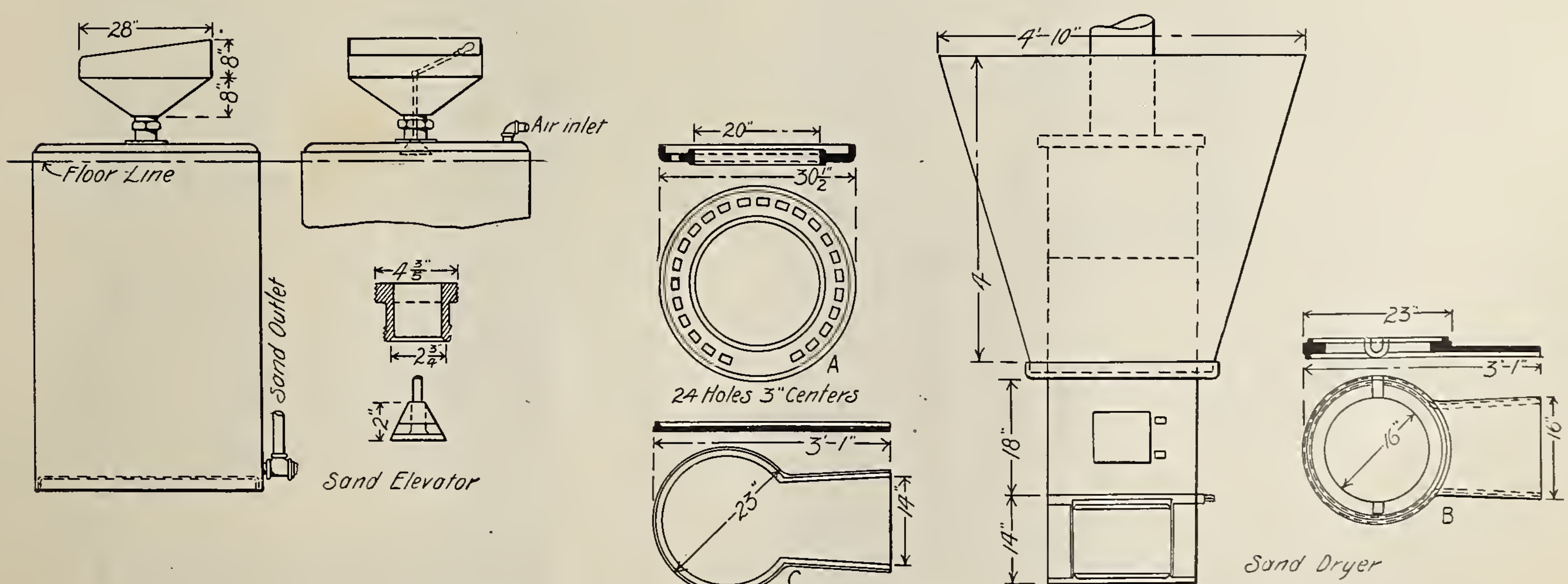


FIG. 3—ERIE RAILROAD STOVE SAND DRIER AND ELEVATING DRUM.

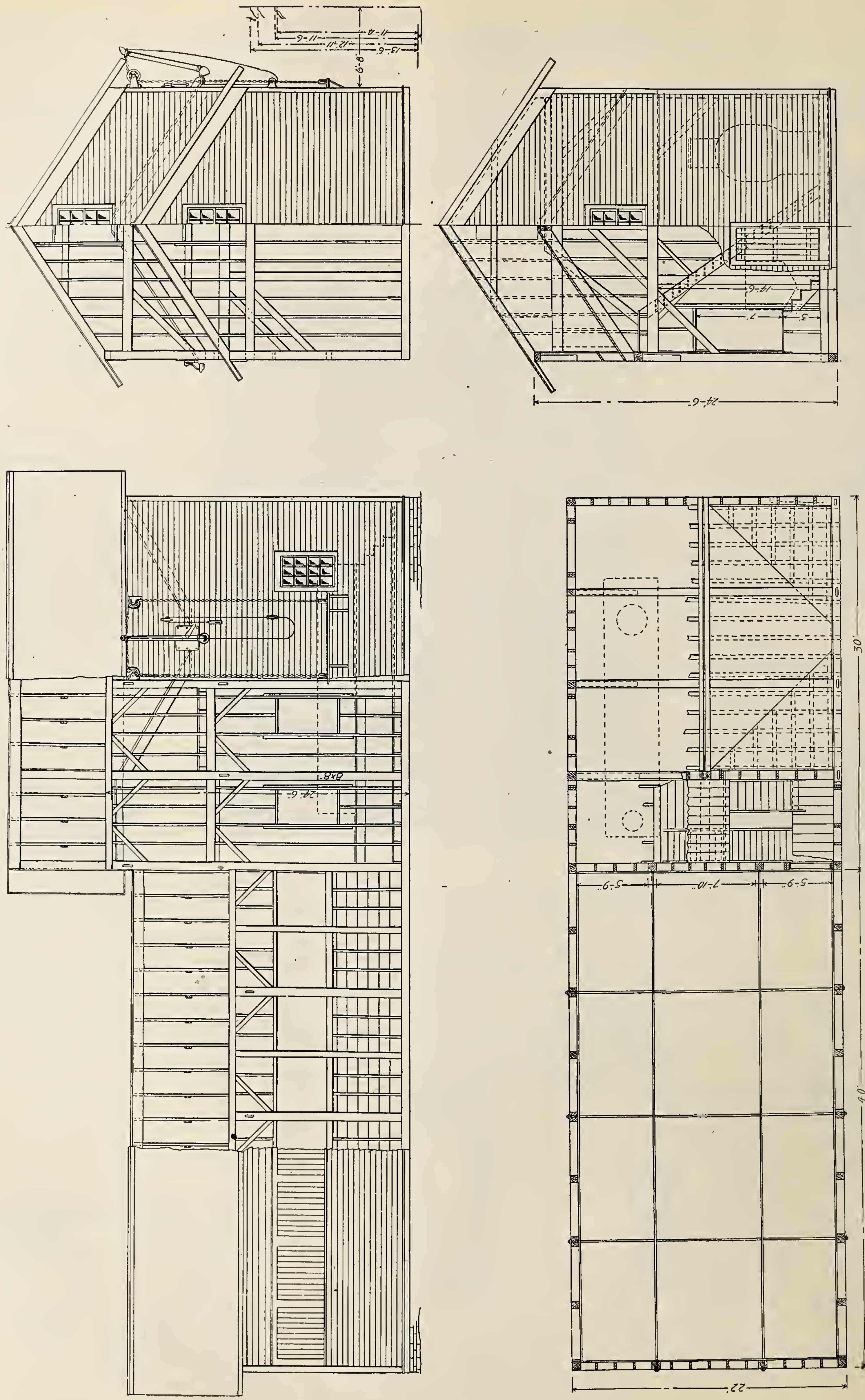


Fig. 2—Erie Railroad Arrangement of Sand House.

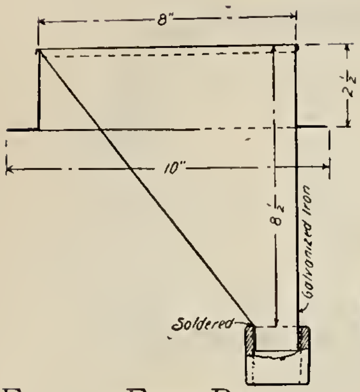


FIG. 7—ERIE RAILROAD HOPPER FOR SAND DRIER.

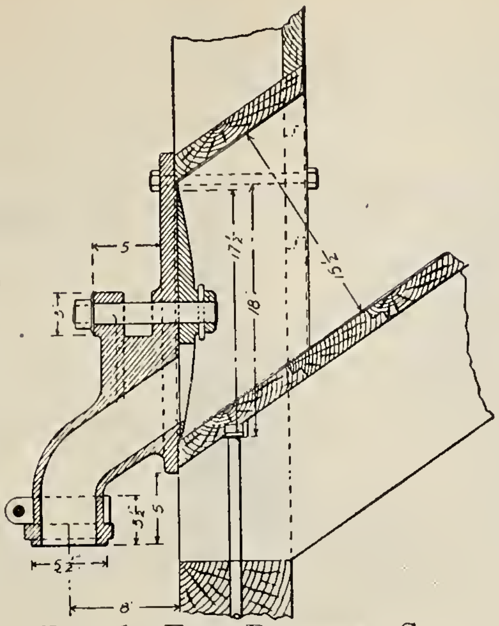


FIG. 6—ERIE RAILROAD SAND VALVE IN STORAGE BIN.

lows: Sand is allowed to fill the reservoir by gravity; then the valve at the top is closed and the air pressure turned on. This pressure forces the sand through the pipe at the bottom and elevates it to the sand bin.

The two kinds of sand houses in use are shown in Figs. 2 and 4. In Fig. 2 the wet sand is stored at the left, where it is easily shoveled from cars through the openings at the side. From this it is moved in wheelbarrows to the drying room alongside. The drying room may have either of the driers described above. Fig. 2 shows

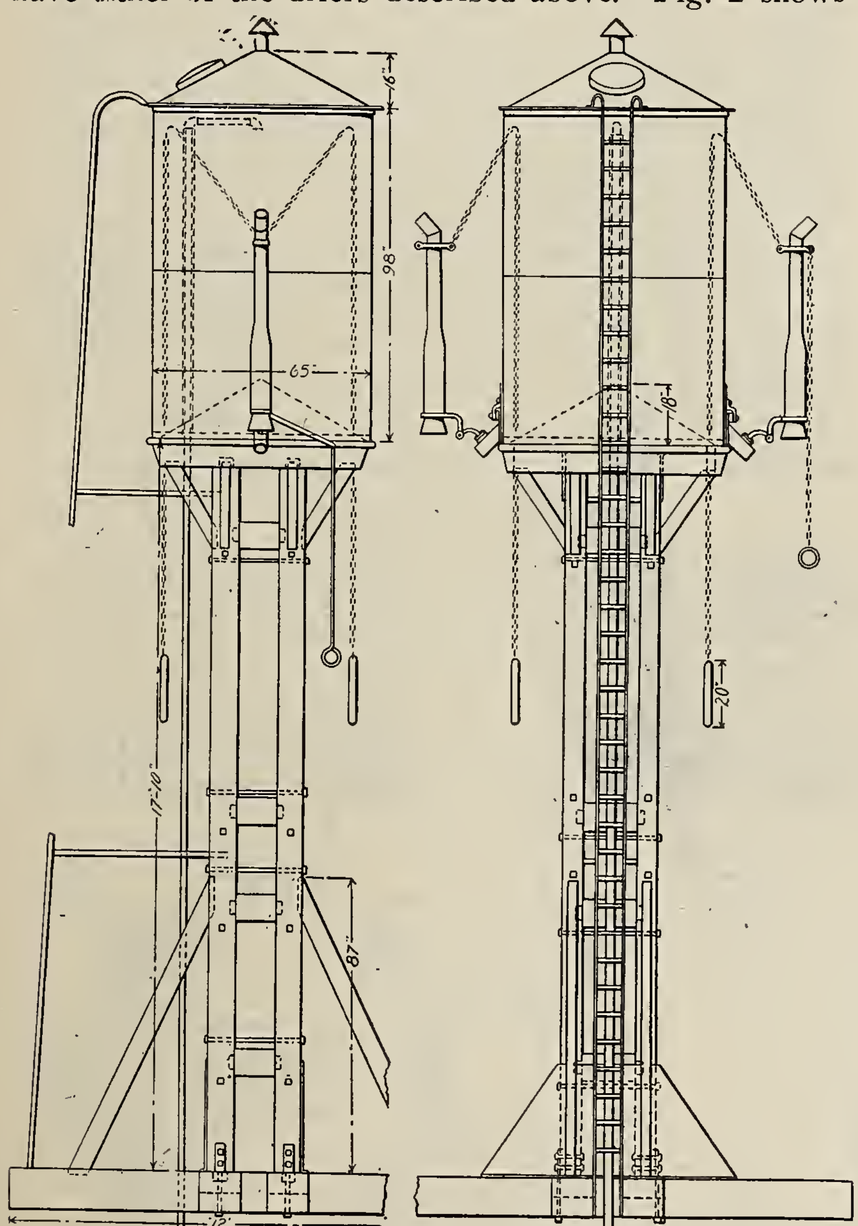


FIG. 4—ERIE RAILROAD SAND TOWER.

the steam drier and boiler. The storage bin is directly above the drying room.

Fig. 4 shows a narrow sand tower for use when there is litte room for spreading the tracks. In this case the drying and wet sand rooms may be placed at any convenient point.

Fig. 6 shows the sand valve in the storage bin. This consists of a circular cast iron plate with a hole at one side and fastened in the middle by a bolt. This circular disk is revolved to open the valve.

We are indebted to Mr. G. W. Wilden, mechanical superintendent, for the above information.

The Cincinnati Northern uses two kinds of sand elevators. Figs. 8, 9 and 10 show one form. In this sand is stored in a bin as shown in Fig. 9, from which it is transferred into a steam drier as shown in Fig. 10. This has two sets of netting at the bottom to remove pebbles, etc. After the sand gets through the second netting it drops into a bin which slopes under a bucket elevator. The elevator drops the sand into the storage bin directly above the drier.

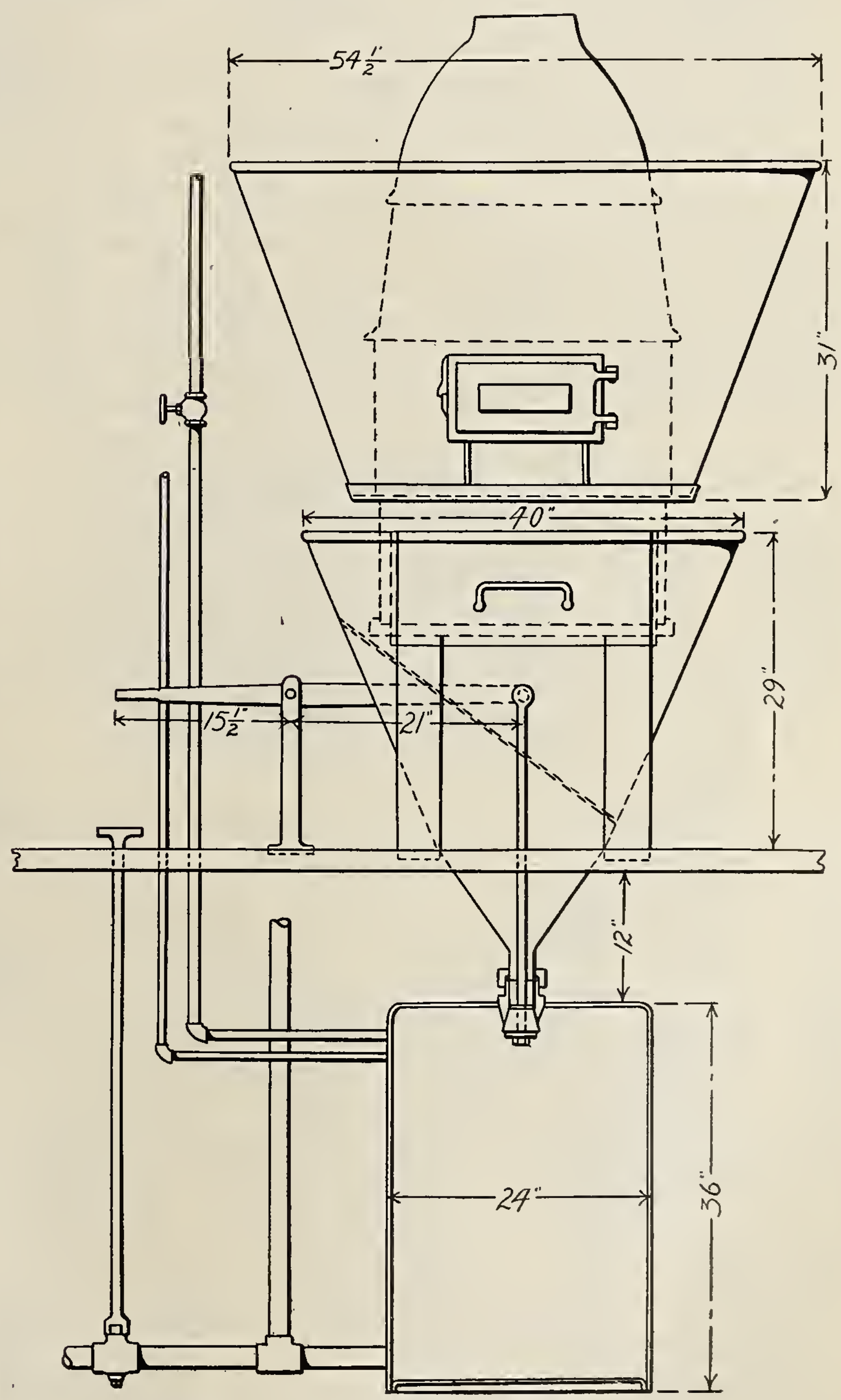


FIG. 5—ERIE RAILROAD SAND STOVE AND ELEVATING DRUM.

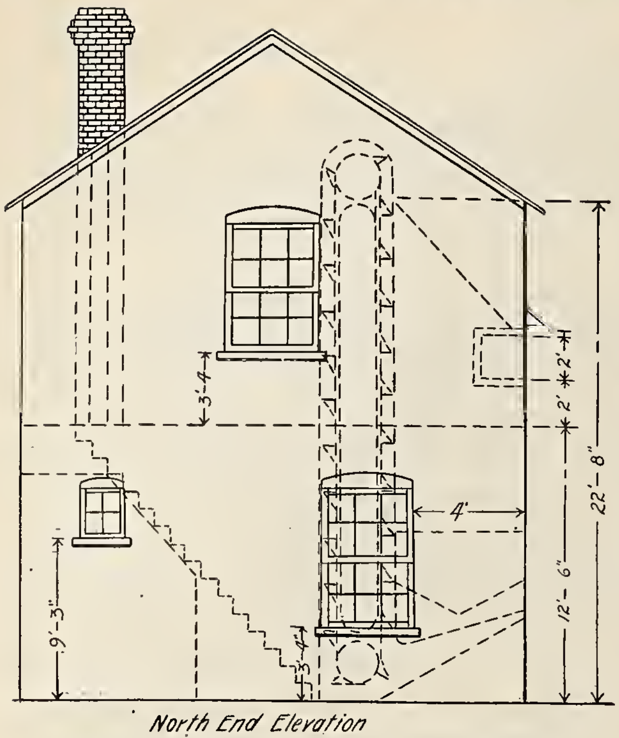


Fig. 8—Cincinnati Northern—Elevation of Sand House.

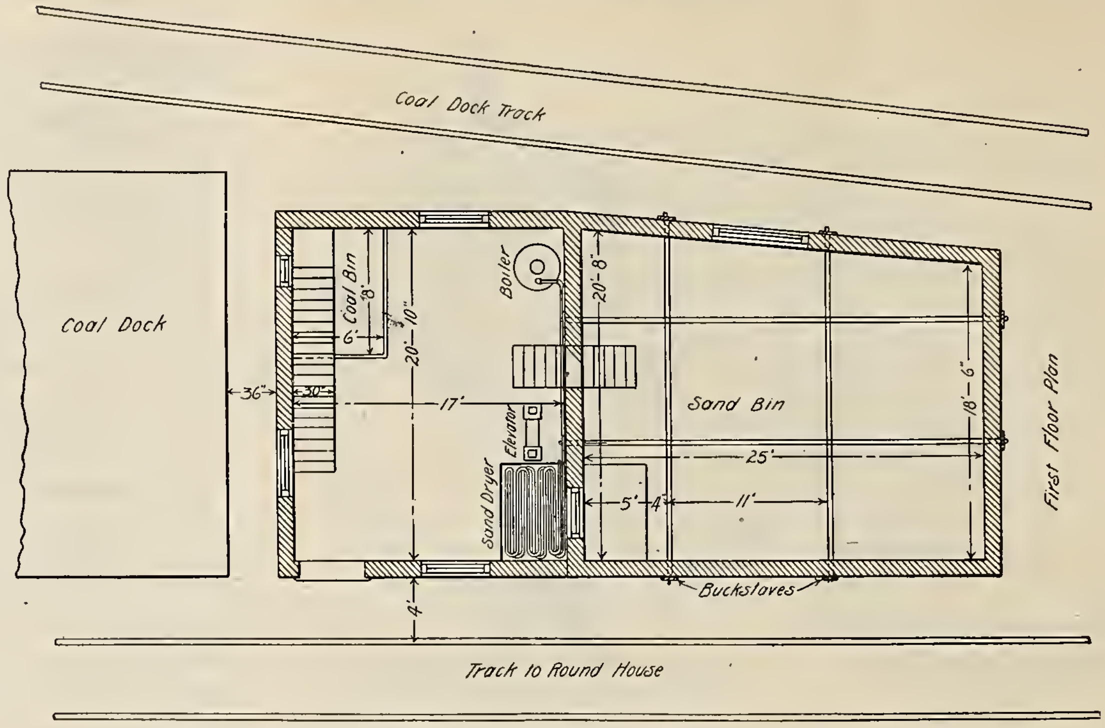


Fig. 9—Cincinnati Northern—Plan of Sand House.

The other form of elevator is shown in Fig. 11. This device is automatic in operation and works as follows:

The sand is dried in any suitable drier and delivered to drum by gravity. The hoist consists of a drum and a system of weights and levers. The drum shown in Fig. 11 will hold 800 lbs. of dry sand, and the weights are adjusted to balance the drum when half full of sand, so when the drum is full it is 400 lbs. heavier than the weights, and when empty the weights are 400 lbs. heavier than the drum. A 2-in. pipe extends straight up from bottom of drum to top of storage bin in sand house tower, securely fastened to this pipe, and 1½ inches below the casting on top of drum is a half rubber ball which forms an air-tight joint when drum settles down on it, the pipe being securely fastened at the top with a spring rigging not shown in cut. The nipple on bottom of drier is 4½ inches inside, which a 1-in. space allowed the 2-in. pipe loose fit on nipple, so the drum is free to move up and down. A ½-in. nipple is screwed into top of drum, to which is fastened an air hose, the valve of which is connected to lever by rod. On each of the levers is a weight adjuster, which is so adjusted with a spring and screw that the drum is held in extreme position, either up or for sand to pass into drum. The casting on drum is a down, until it is either full or empty.

In operation the drum is held in its uppermost position by the weights, which give maximum opening for sand, and also holds the air valve closed. When the drum is

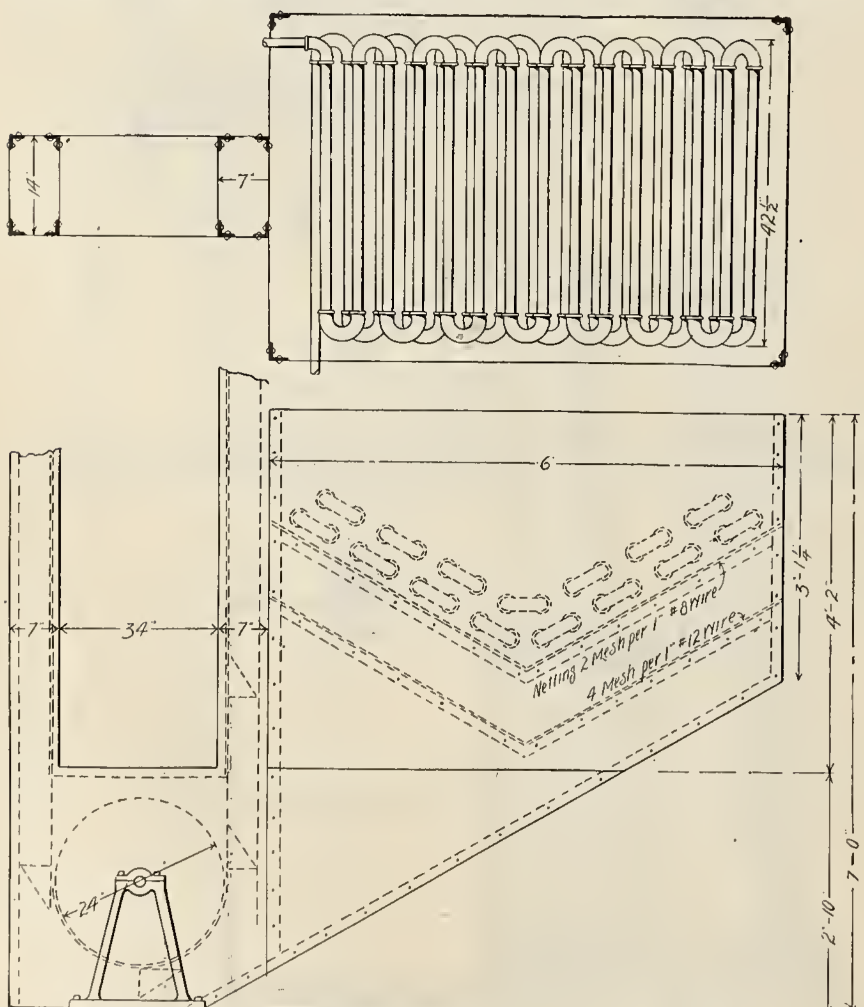


Fig. 10—Cincinnati Northern Sand Drier.

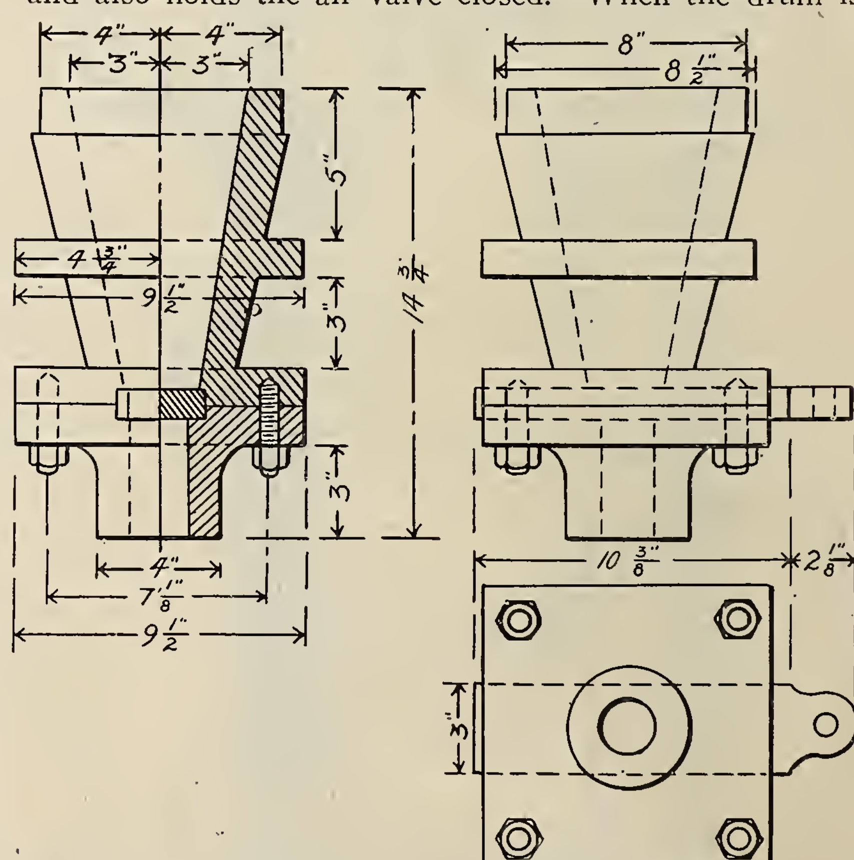


Fig. 12—Cincinnati Northern—Detail of Sand Valve in Tower.

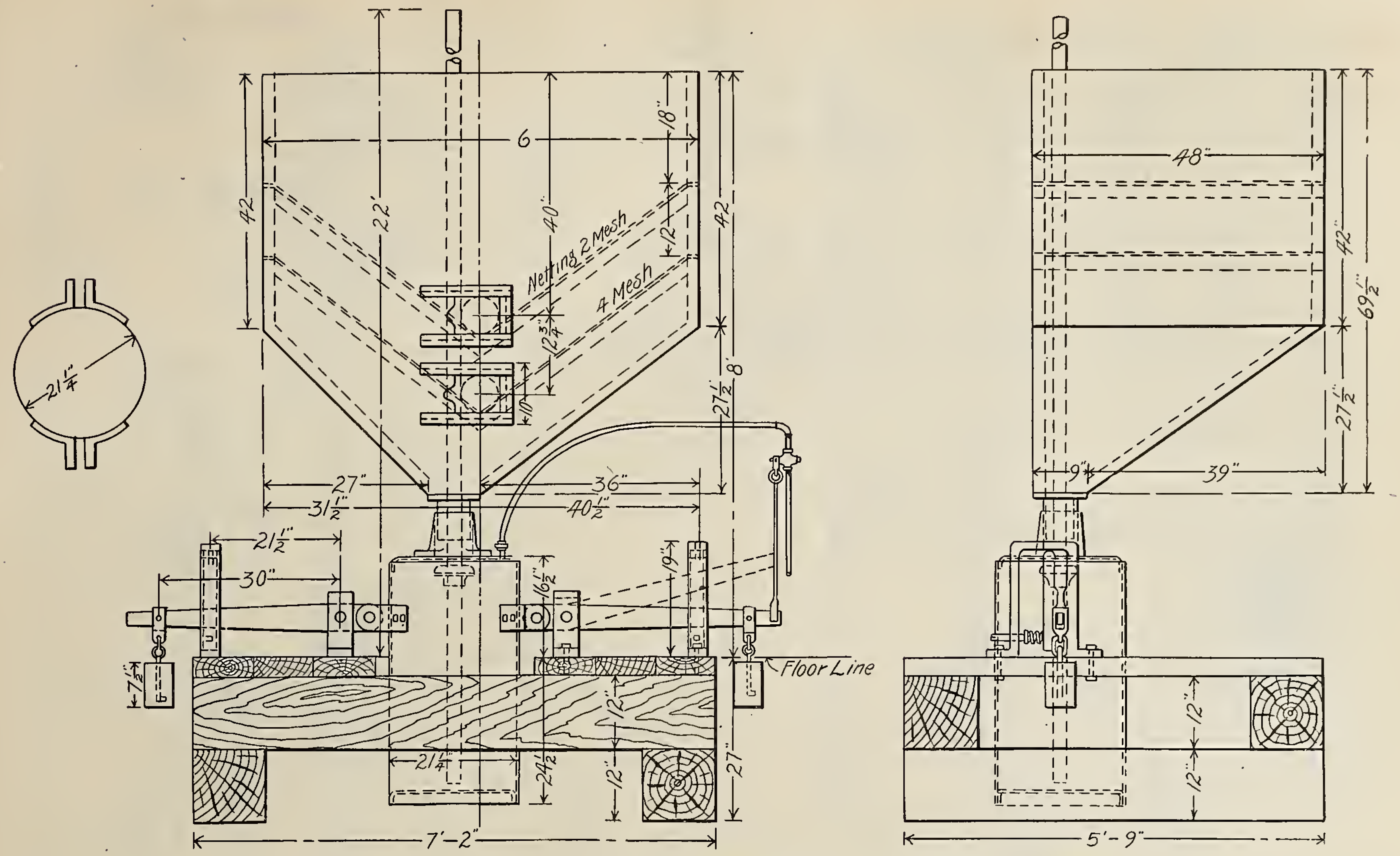


FIG. 11—CINCINNATI NORTHERN—AUTOMATIC SAND ELEVATOR.

full it drops down on the rubber ball, making an air-tight joint at sand inlet, and at the same time the outer end of lever moving upward opens the air valve, letting the air into top of drum, which forces the sand up through the 2-in. pipe into storage bin. When the drum is empty the weights pull the levers down, raising the drum, opening sand inlet and closing air valve, thus making it practically automatic.

The sand valve used in the storage bin is shown in Fig. 12. This has a slide which pulls out to open the valve.

We are indebted to Mr. A. H. Watts, master mechanic, for the above illustrations and description.

The plan and elevation of the Lake Shore & Michigan Southern are shown in Fig. 13. The wet sand storage bin is not shown in the engravings, but may be placed at either end of the drying room. The sand is dried in stoves as shown in Fig. 16. These are placed over hoppers as shown in Fig. 15. The hoppers have a screen near the bottom to remove any pebbles that may be in the sand. When the sand falls through the screen it goes into the opening as shown in Fig. 14.

The elevating device is automatic. The valve at the top of the reservoir consists of a rubber ball fastened to a rod which connects to a piston in a cylinder above. When the reservoir is full of sand the operator turns on the air in pipe marked to operating lever. This admits the pressure on the bottom side of the piston and raises it, closing the valve in the reservoir. When the valve is closed the piston uncovers the opening in the cylinder leading down to the reservoir. The sand is then forced through the 2-in. W. I. pipe to the storage bin above.

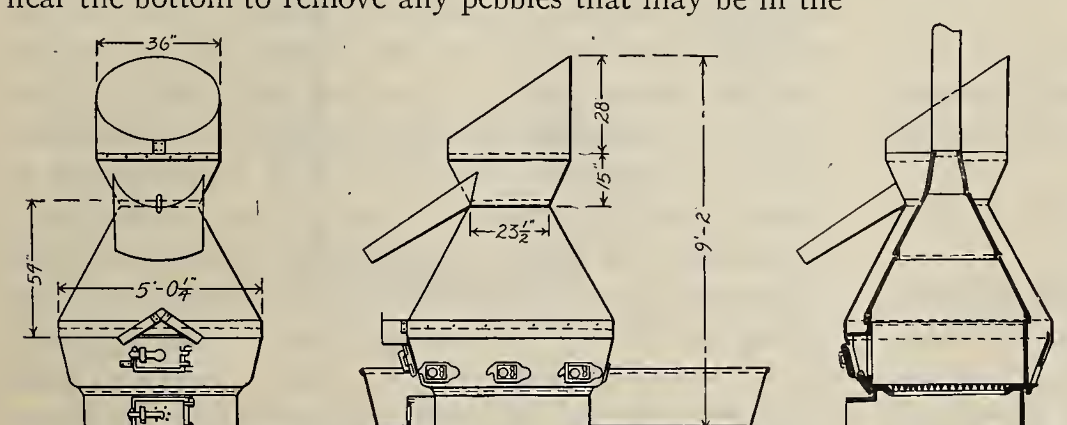


FIG. 17—L. S. & M. S.—SAND VALVE IN TOWER.

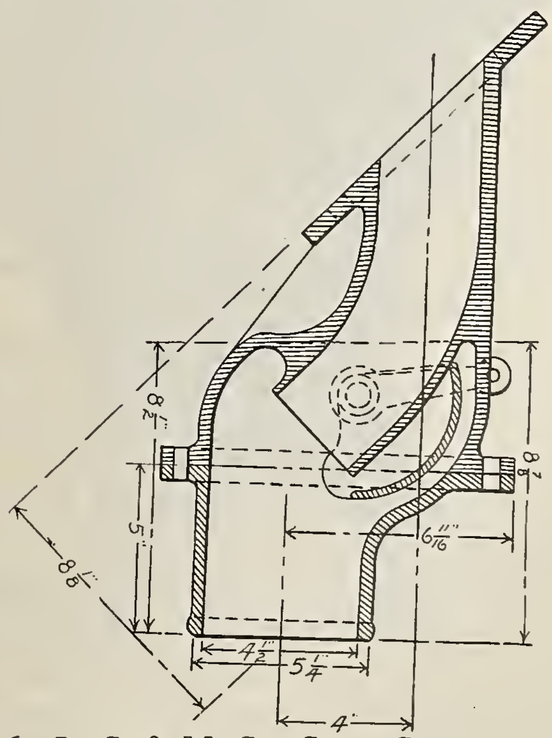


FIG. 16—L. S. & M. S.—SAND STOVE.

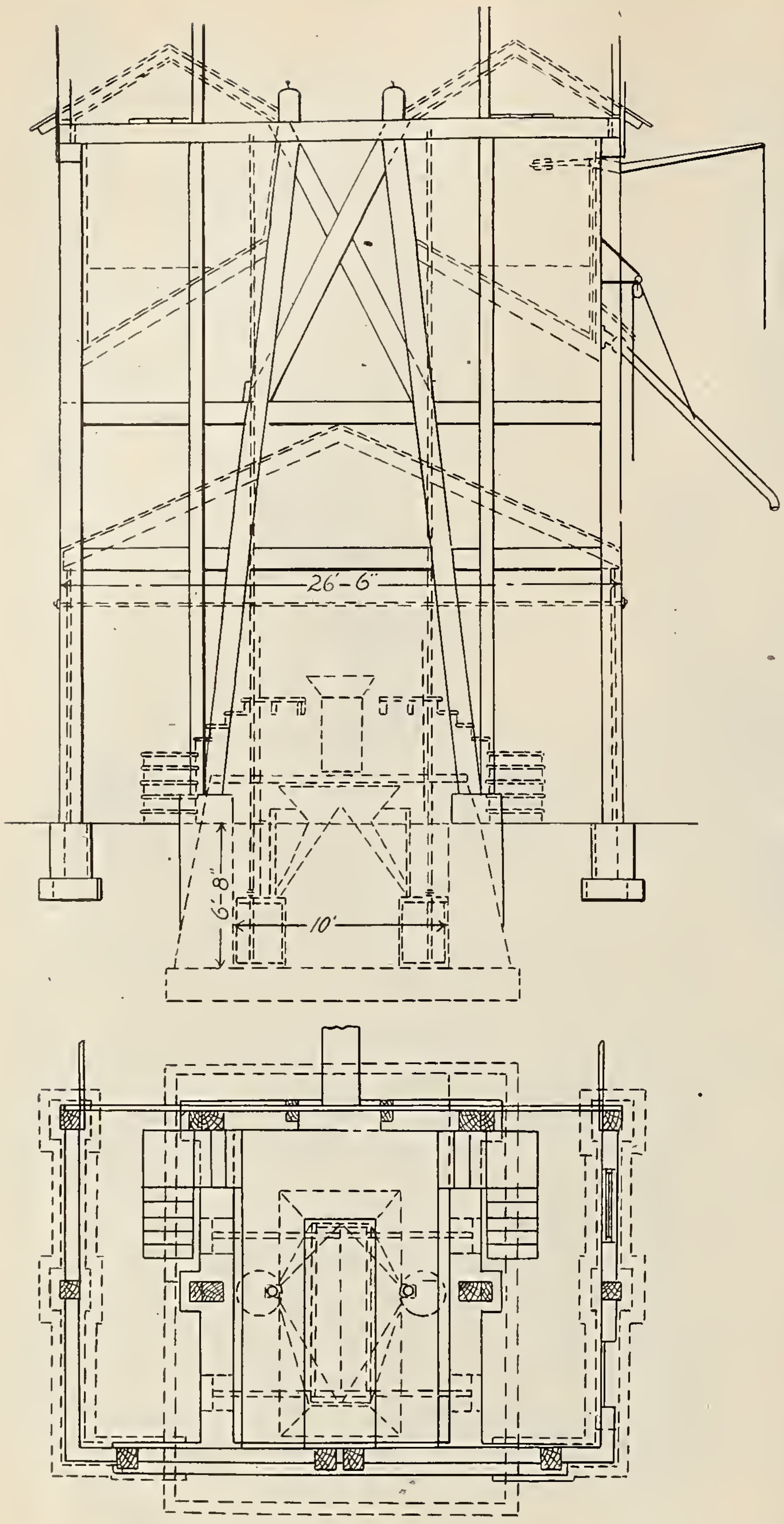


Fig. 13—L. S. & M. S. Plan and Elevation of Sand House.

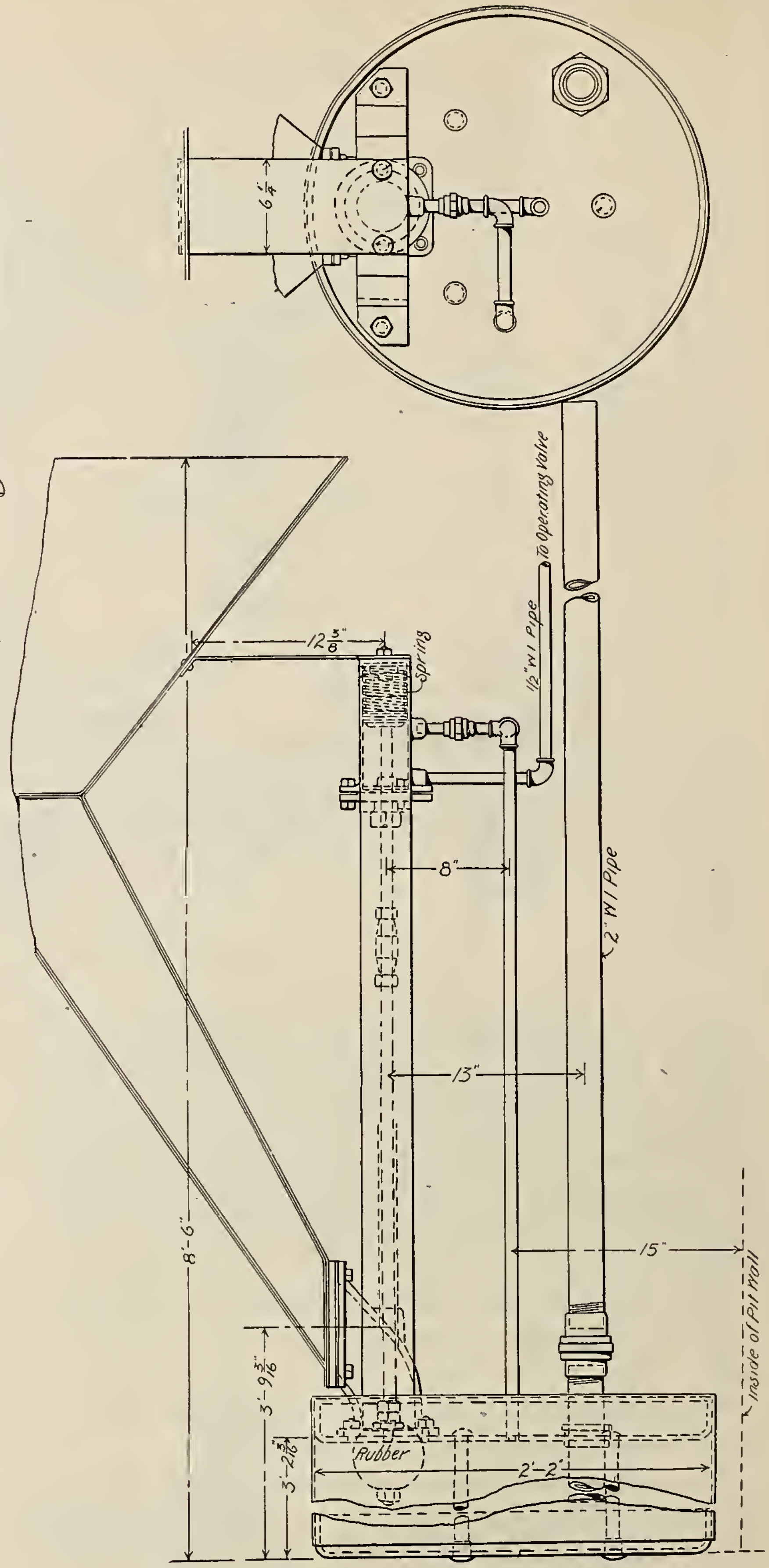


Fig. 14—L. S. & M. S. Elevating Device.

When the operating valve is closed the pressure beneath the piston is released and a spring forces the piston down, opening the valve for admitting more sand to the reservoir.

The sand valve for the storage bin is shown in Fig. 17. It is controlled by a rope from below. It opens by removing the bucket-shaped casting from beneath the opening in the outlet.

We are indebted to Messrs. H. F. Ball and R. B. Kendig for the above illustrations.

The sand house arrangement of the Chicago & Northwestern is shown in Figs. 18, 19 and 20. Fig. 18 shows the plan. In this sand is brought into the wet sand bins on tracks as shown. These tracks extend up to the sand stoves, of which there are three. The sand when dried in the stoves is allowed to drop on the floor; it is then shoveled on screens to remove the pebbles, etc. This arrangement is shown in elevation at the right of the floor plan and also in Fig. 20. The fine sand collects in bins below the screen and the pebbles fall on the floor again. From this temporary bin the sand goes to a reservoir by gravity, and from there by means of an air injector to the storage bins above. This injector consists of a large pipe tapping into the reservoir and a smaller air pipe projecting into the end of the larger pipe. When air is admitted under pressure it will create a vacuum, which draws the sand into the larger pipe until it comes in contact with the air jet, when it is forced to the bin above.

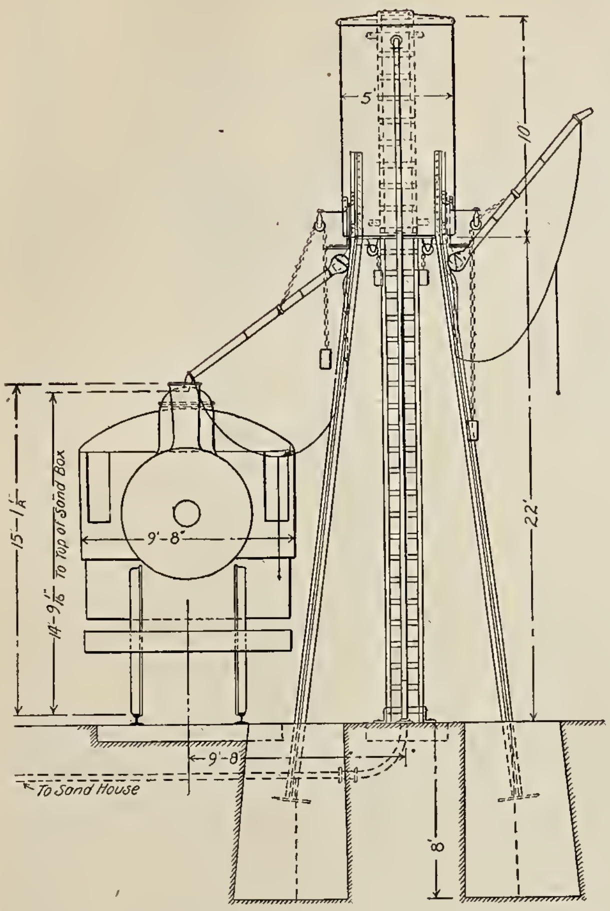


Fig. 19—C. & N. W. Sand Tower.

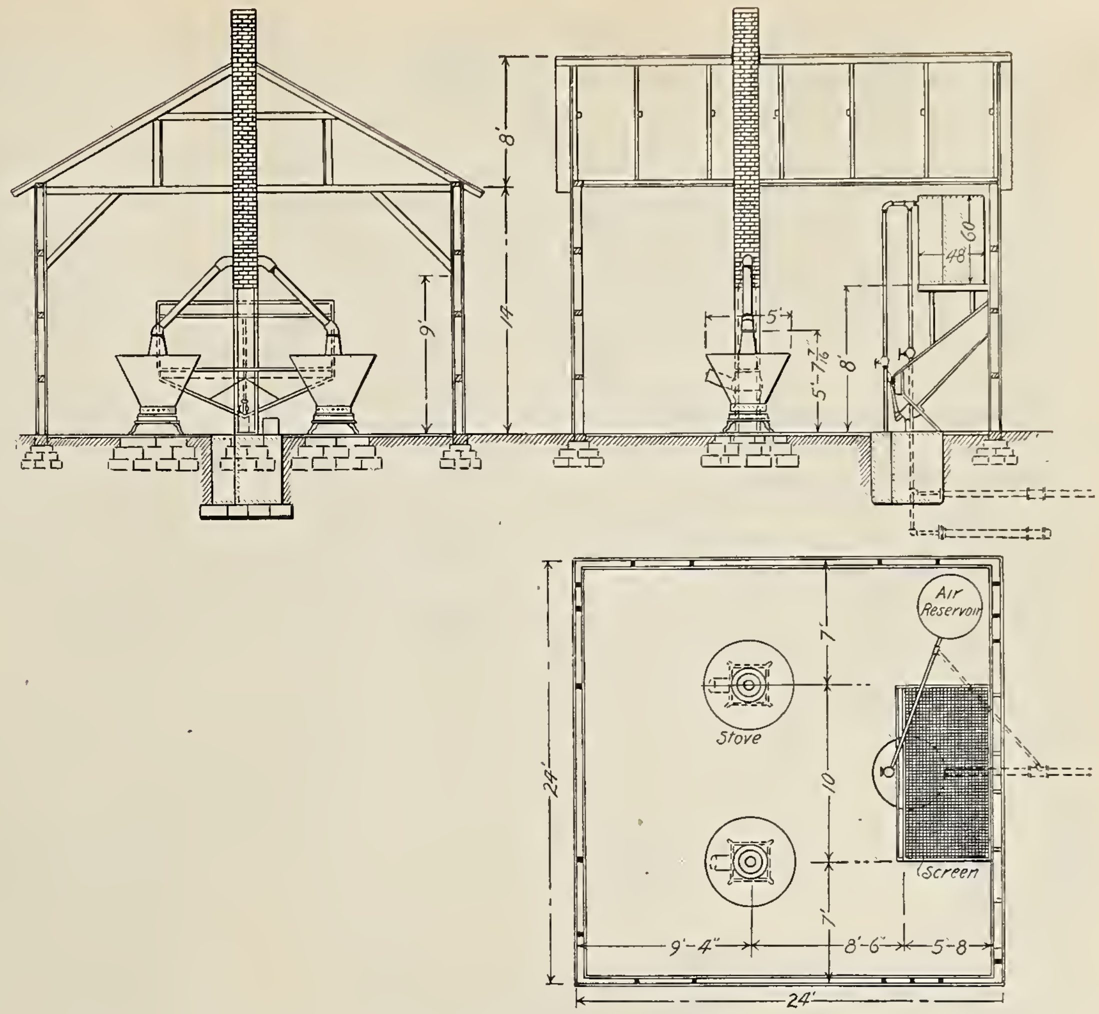


Fig. 20—C. & N. W.—Plan and Elevation of Sand House.

The sand tower, which is a separate structure, is shown in Fig. 19. This is simply a storage bin set on old rails. This form of bin can be used where the tracks are fairly close together and thus save space in a place where it is generally needed badly.

We are indebted to Mr. H. T. Bentley for the above illustrations.

Figures 21 and 22 show one of the types of the Clark "Perfect" sand driers, which are manufactured by the Parkhurst & Wilkinson Company, of Chicago. This sand drier received the premium as the best sand drier at the National Exposition of Railway Appliances, and it is in extensive use not only throughout the United States but in Canada, Europe and South America. These driers are built in the fashion of an hour glass, the wet sand being shoveled against the stove and as it dries it is allowed to run out through apertures in the perforated ring which surrounds the bottom of the hopper. The amount of sand that will pass through this machine in a given time is variable and depends largely upon the conditions under which it is used; that is to say, how wet the sand is when

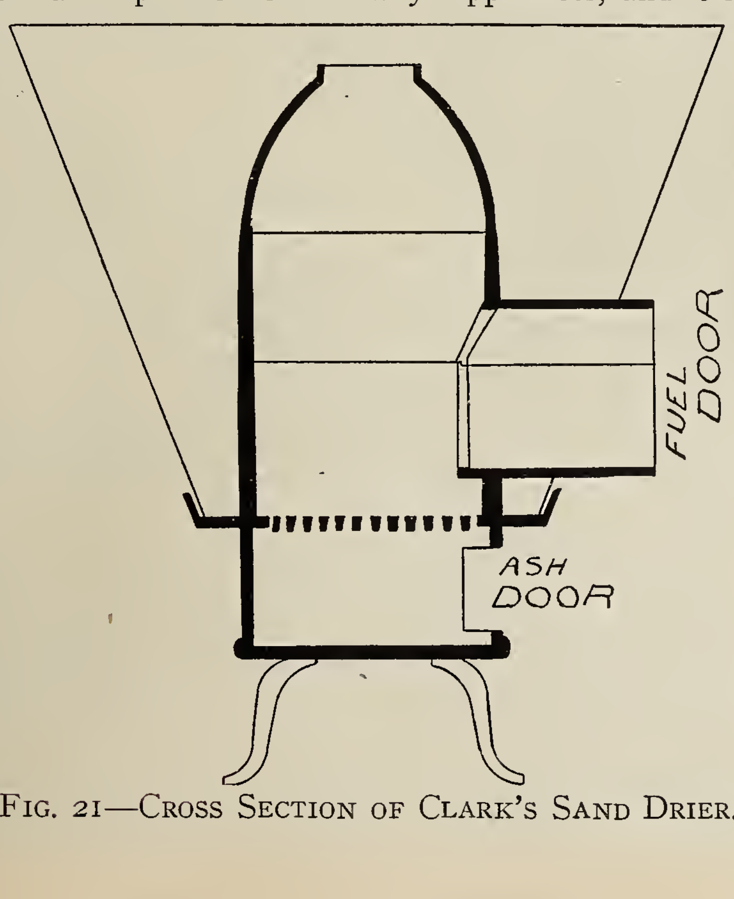


Fig. 21—Cross Section of Clark's Sand Drier.

Fig. 22—Exterior View of Clark's Sand Drier.

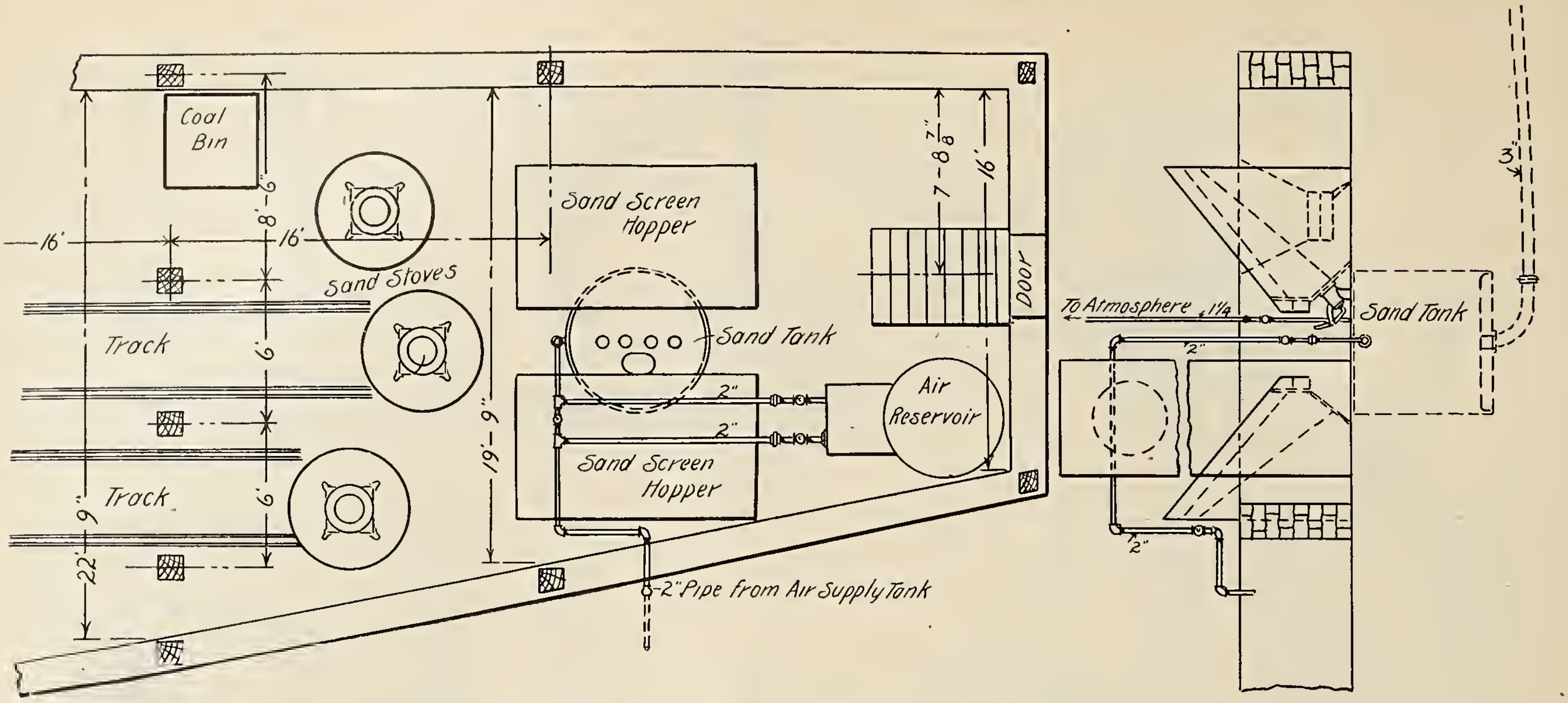


FIG. 18—C. & N. W.—PLAN OF SAND HOUSE.

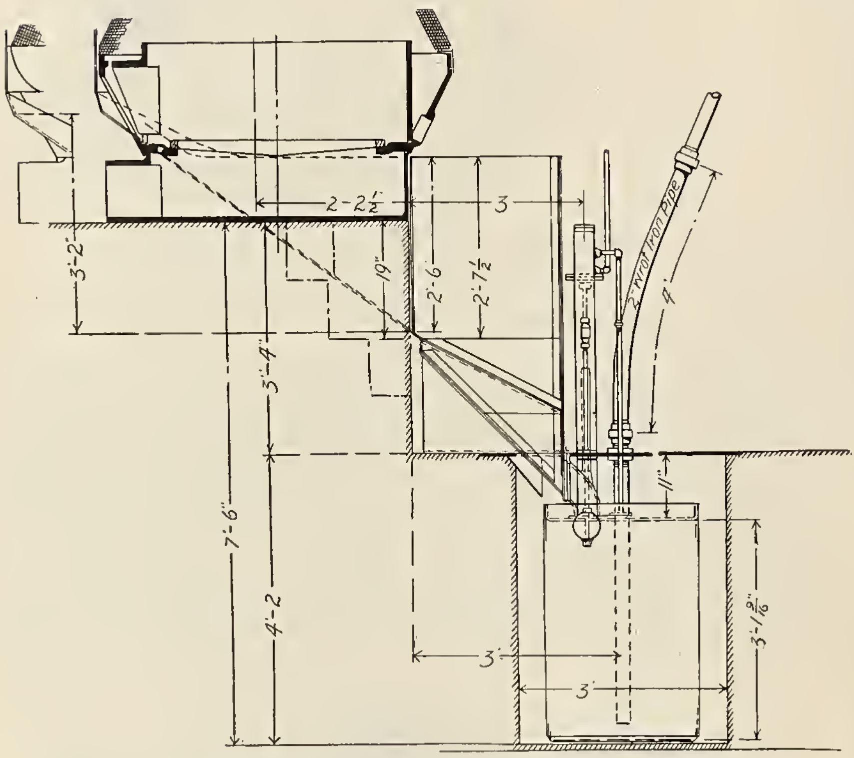


FIG. 15—L. S. & M. S.—SAND HOPPER AND ELEVATING DRUM.

it is put in the hopper and also the intensity of the fire maintained in the stove. The furnace is arranged to use any kind of solid fuel such as hard or soft coal or wood. These driers are for use with clear sand only, as earth or clay will merely bake and will not discharge itself from the machine. These driers are claimed to be the best ever put upon the market for preparing sand for use on locomotives and street cars.

Stealing Locomotive Repair Parts

Editor, Railway Master Mechanic:

In the January issue of Railway Master Mechanic I note your objection to "robbing" engines, as it were, of parts for other engines in shop undergoing repairs and your statement recommending this practice to supply running repair parts. We all have our opinions on these matters and an expression of the various said opinions generally has good results. The question had arisen with me: Where are we going to draw the line on running repairs? I believe it to be generally conceded that where a running engine requires a minor small part that the better method of obtaining an exact duplicate is to remove it from another engine of the same class which might be awaiting or undergoing extensive repairs. This method can be used as to the smaller parts and up to and including parts of large dimensions. We will take for an instance that an engine in service has a broken driving wheel which has reached a dangerous point, the engine being in fairly good condition otherwise; there is an engine in shop of the same class getting new side sheets, new cylinders or some equally heavy repairs; is it not the proper thing to do, to use this engine's wheels, boxes and rods rather than to hold engine until a new pair of wheels can be gotten ready to replace the broken ones?

I have seen this thing done and done so quickly that a disabled engine was out of service only twenty-four hours, missing one round-trip. We might go farther in this regard of heavy running repairs, using a pair of cylinders, say, taking into consideration of course that cylinders required were detached from their original boiler on account of putting on new smoke box. While I am not agreeing with your opinion expressed in the issue mentioned in any way only that it is good practice to "rob" the necessary parts to keep engines in service. I would like to ask: Where will you draw the line?

As to taking parts from one engine for another of the same class in shop, if this was to be prohibited in many shops, the output of repaired locomotives would be decreased very considerably.

A very large proportion of railway shops do not have a foundry in connection with the local plant and are dependent upon monthly requisitions for their stock of castings; possibly a telegram will hurry one of these requisitions so that it will be delivered within a month, otherwise, perhaps three months will elapse before the required material is in sight (the delay many times being due to lack of co-operative effort between the stores and mechanical departments). I am sure, Mr. Editor, that you will not recommend holding an engine in shop three months waiting for a driving box, when there are several engines in shop of the same class, some of them requiring heavy repairs. You, no doubt, have seen an instance in your experience similar to the following: An engine arrives in the night with a damaged pilot, which will require two days' labor to repair, this engine is due to leave in three or four hours and the night force haven't the time to romove a pilot from another engine and reapply to engine mentioned, but they go into the shop and find one which is ready to put onto an engine due to leave shop the following day, they not caring anything about the shop dates take and use the pilot. Now is it not the proper method to pursue for the gang foreman who has lost the pilot to immediately remove one from an engine in shop and apply to the completed engine rather than to hold engine until repairs are made to the one removed in roundhouse? Our first railway education teaches us to keep the rolling stock in earning condition. Where is the difference whether we keep the machine as a whole in service, or whether when the machine is disabled we keep its detail parts in service by applying to another engine? You mention an instance which has occurred, and does occur at present, that of employes of a railway shop taking a part from one engine and applying it to another without consulting any one in authority. This would denote, should say, a very careless management on the part of the gang foreman. If he is a good gang foreman he will see the engine being robbed in his own gang and other gang foremen will likewise see if another gang is taking material from their respective gangs.

I dare say that there will be more difficulty in keeping an engine intact where there is a disposition to prevent robbing than there will be where it is a customary practice, as in the former case the employe encouraged by some gang foreman will actually steal the article desired and in the latter will generally make a request for the required piece, thus allowing the losing gang foreman an opportunity to protect himself by immediately making requisition for a duplicate. I know of one shop in particular where this idea of so-called robbing is worked out successfully, systematically, very seldom causing a delay at any point; in fact, assisting the output very materially. This shop is on a trunk line having as few as seventy-eight different classes of engines. These several classes are from time to time transferred from one division to another, for some reason known only to the higher authorities, thus changing their shopping terminal. In this case it would be a very unbusiness-like arrangement to keep in stock, at the various repair shops, material for all of these classes of engines, consequently material only for the classes in use generally at these points is carried in any great amount. Frequently some of the recently received class need overhauling before going into service again, there is not material in stock to make the necessary repairs and none other within from one to three months' sight; at this time this system mentioned comes into use and very nicely, too. The machine foreman makes all requisitions for castings for locomotive repairs, hence "it is up to him", so to speak, to furnish them to the gang foreman upon their order. We will take for an instance that a back cylinder head is needed for Engine 850, Class G1, the gang foreman issues an order to machine foreman for this head, the stock of these, however, has become depleted until only one remains, this one must not be taken for shop use as the roundhouse may call for it at any moment; there is another G1 engine in shop for new flue sheet or some equally heavy job, the cylinder head is removed from this engine and placed on Engine 850, the gang foreman who had furnished the head accepted the order issued by the other gang foreman, which he retains for reference and immediately issued another order to machine foreman similar to the following, "Please furnish one back cylinder head for Engine ——, and charge to Engine 850." Engine 850 is due out of shop in three days and Engine —— is not due out for three weeks, nevertheless the assistance given to the 850 is considerable and perhaps uncomputable.

We would not think it good policy to hold an engine in shop awaiting repairs to injectors, headlight or air pump, which were removed from it upon arrival in shop, wherein lies the difference between these detail parts and driving boxes, springs, shoes and wedges, etc., as far as interchange is concerned.

Another item: Some shops have what is termed a "boneyard," that is, a storage track for engines waiting shop room; the collection at times will contain a locomotive upon which there is a doubt as to whether it will be repaired at this shop or at some other shop having better facilities to perform the particular class of repairs needed; occasionally the negotiations necessary will consume several months' time. Is it not proper to rob this engine of everything movable, if need be, as the gang foreman will, upon the actual shopping of the engine, have ample time to make requisition for everything required to again make the engine complete? I am of the opinion that where the right spirit of co-operation exists among the shop foremen that this matter of robbing can be taken care of very satisfactorily.

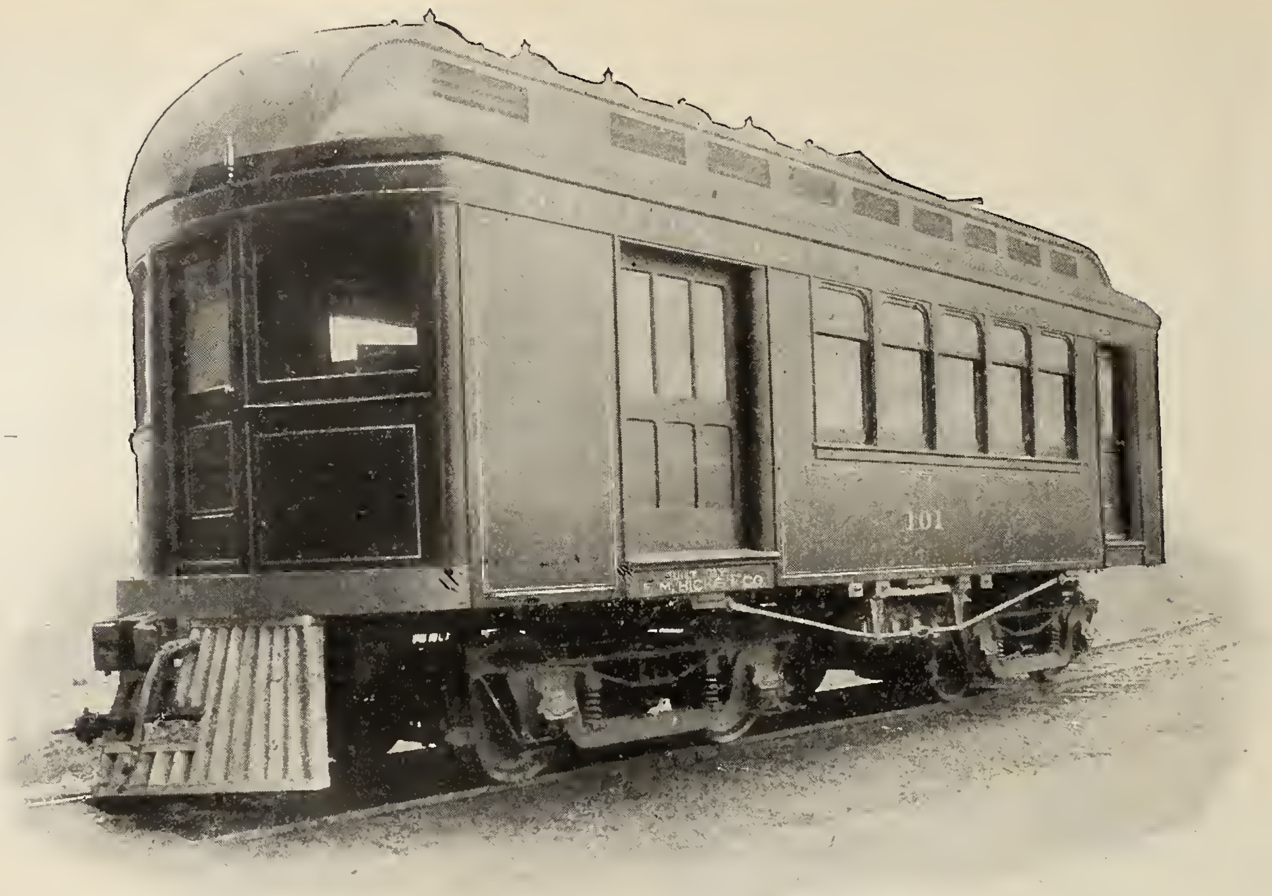
E. O. Palmer.

The Gasoline-Electric Motor Car

Built by F. M. Hicks & Co.

ONE of the latest developments in electric traction has recently been completed in the form of a gasoline-electric motor car, at the locomotive and car shops of F. M. Hicks & Co., Chicago Heights, Ill. This car, which was designed and built for the St. Joseph Valley Traction Company, represents the most modern and scientific type of car construction.

The problem of framing the car was carefully carried through to provide sufficient strength for the concentrated loads upon the floor, and at the same time to reduce the number of redundant members to a minimum. Two, 6-inch, fourteen and three-quarter pound I-beams serve

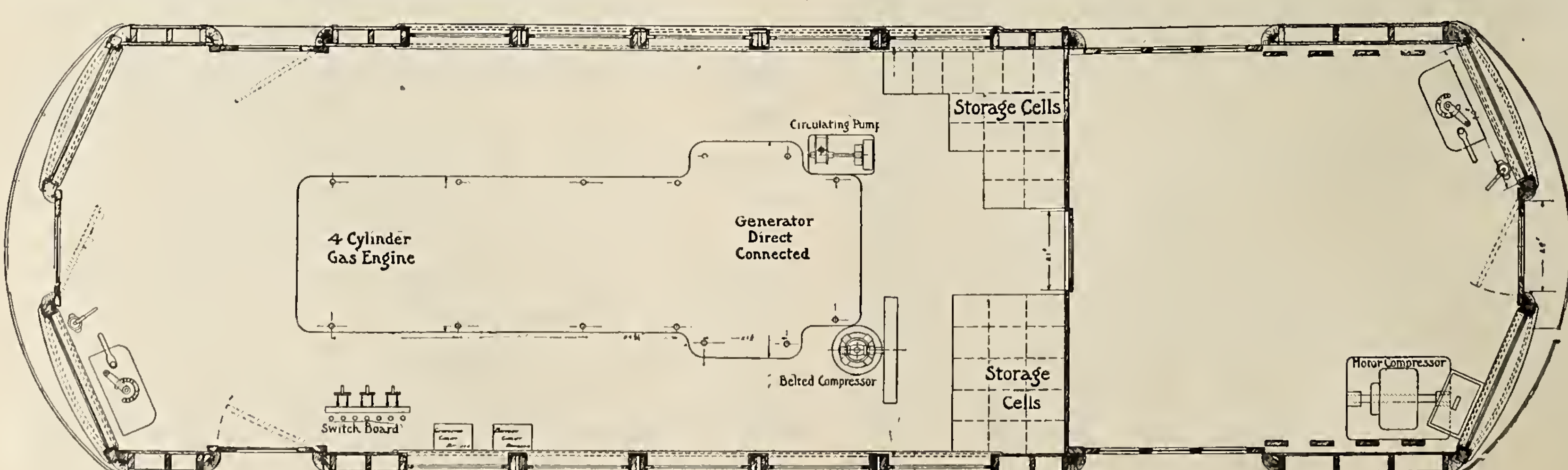


Hicks Gasoline-Electric Motor Car.

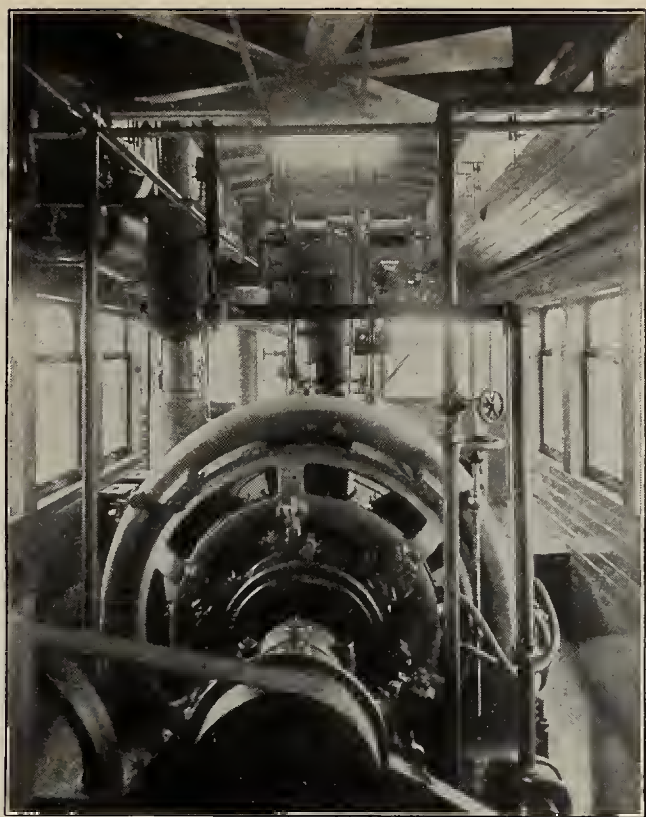
as the center sills. The two side sills are 5 ins. x 8 ins. Yllow Pine. There are four intermediate sills of 4 ins. x $6\frac{1}{2}$ ins. Yellow Pine, making a total of eight sills, to constitute the longitudinal under-framing. The transverse under-framing consists of the two end-sills 8 ins. x 12 ins. oak, two transoms, each constructed of two wrought iron plates, $1\frac{1}{2}$ ins. thick and 10 ins. wide, also an abundance of floor joists $2\frac{1}{4}$ ins. x $6\frac{1}{2}$ ins. The under-framing is amply tied with transverse, wrought iron tie rods, $\frac{5}{8}$ in. in diameter. The floor is constructed of two thicknesses of $\frac{3}{4}$-in. pine, separated by a layer of Neponset paper. The side framing is constructed extra heavy and reinforced by continuous blocking. Although the under framing is designed to carry its load with a large factor of safety, additional provision has been made to transmit stresses, due to excessive bending movements upon the under-framing, to heavy wrought iron car lines which serve as trusses across the deck of the car. The body is trussed by two $1\frac{1}{2}$-in. rods with $1\frac{3}{4}$-in. ends. The structure as a whole is so perfectly and compactly built that all vibration is practically eliminated.

The car is divided into two compartments, an engine room and a baggage room, being 34 ft. in length over end sills, and 9 ft. 8 ins. in width over side sills. The external appearance is very neat. It is finished in Pullman standard color with gold striping and lettering. The trucks are the heaviest design of street railway trucks with 33-in. wheels.

The motive power is derived from a four cylinder gasoline engine of the marine type, built by the Marinette Gas Engine Company. Under factory tests, this particular engine developed 70 dynamometric horse power at 325 revolutions per minute, with a consumption of one pint of gasoline per horse-power hour. The cylinder jacket water is kept in constant circulation by means of a rotary pump, belted to a pulley on the engine shaft. The cooling of the jacket water is effected by circulation through 800 ft. of $\frac{3}{4}$-in. automobile radiator pipe, and thence through a supply tank of 190 gallons capacity. The radiation of heat from the radiator is rendered more effective by a blast from two 42-in. fans revolving in a horizontal plane, at the rate of 300 revolutions per minute, directly



Floor Plan Hicks Gasoline-Electric Motor Car.



Interior of Hicks Gasoline-Electric Motor Car.

under the radiator and exhausting the air through ventilators in the upper deck.

The engine is direct connected to a Sprague Electric Company 50 k. w., 250 volt, direct current generator which supplies current to four 35 h. p. motors, mounted upon the trucks. To provide for the heavy load which is thrown upon the generator, for an instant, due to accelerating the car in starting, a battery of 120 chloride accumulators were installed. The normal rating of each cell is 2.08 volts and the 120 cells connected in series, give a difference of potential of 249.6 volts at the terminals of the battery. The cells are placed in well ventilated lockers, painted internally with asphaltum paint. The gases arising from the battery are drawn from the lockers and exhausted through the ventilators by the previously mentioned fans.

The car requires 140 amperes current for ordinary running, which allows 15 amperes for charging the batteries. For starting the car on a heavy grade the storage batteries furnish 300 amperes.

The leads for the battery are carried to the switch board, which is of special design, and there connected in multiple with the generator leads to the main controller leads. In this method of connection it is very evident that when a heavy pull comes upon the generator and its voltage drops below that of the battery, the load is divided between them, and vice versa, when the load does not require the total output of the generator, the excess current is utilized in charging the battery. Circuit breakers capable of adjustment for a series of amperages, are connected in the battery and generator leads to the switch board, to obviate the necessity of replacing blown out fuses.

In addition to the traction load, the generator supplies current for a four h. p. motor compressor connected with the air brake system; current for lighting purposes and for small storage battery used in the gas engine ignition. The car is equipped with the National Electric Automatic Air Brake System, and also a hand brake rigging. In the upper deck, directly above the engine cylinders, are two heavy hinged trap doors, through which the cylinder heads and pistons may be readily removed. This trap door may also be used in fair weather as a means of ventilating the car. The gasoline supply is carried underneath the car in a heavy galvanized iron tank of 125 gallons capacity.

The supply of gasoline to the engine is fed by a small reciprocating pump. The supply is always greater than that required for the engine and the excess gravities back to the reservoir through an everflow pipe.

One of the greatest difficulties to be surmounted in the use of a gasoline engine for this particular kind of service, is that of starting the engine, since such engines are not self starting and one man is usually expected to start them alone. In this car two methods for starting have been installed; either of which may be used independent of the other. The first method, and the one which will no doubt be more generally used, is that of driving the generator as a motor from the storage battery until the gasoline is working normally through the engine. To accomplish this end, the field leads from the generator, instead of being run directly to the field rheostat, are led through an intermediate switch upon the board. By throwing this switch, the field of the generator may be connected with the storage battery and fully excited; then by means of a single pole, four point switch, connected with a series of resistance, current may be gradually introduced to the armature, when the generator will start as a motor. As soon as the engine takes hold of the load it is only necessary to throw the field current back under the control of the rheostat.

The second method is that of driving the engine pistons by compressed air until gasoline works normally through the engine. For this purpose, an air compressor is belted to a pulley on the engine shaft. This compressor has a capacity of 5.9 cubic feet of free air per minute, running at 165 revolutions per minute, and maintains a pressure of 200 lbs. per square inch in two cylindrical steel reservoirs. These reservoirs are also connected with the reservoirs of the air brake system (where a pressure of 90 pounds per square inch is maintained) through a reducing valve, so that in case the motor compressor should become disabled, the air brake system could be operated.

The mechanical and electrical equipment of this car, all of which is representative of the best and most modern design, occupies 33 per cent of the floor space of the car and aggregates a weight of about 25 tons. It is well assured that the car will easily meet the requirements for which it was designed, i. e., for efficient interurban service. Although no efficiency test has yet been made, a trial trip through the switch yards at the shop demonstrated the fact that 25 miles per hour could be attained with ease.

THE WEIGHTS ARE:

	Lbs.
Gas engine	18,000
Generator	6,000
Storage Battery	9,250
Motors	10,000
Body and trucks	33,600
Gasoline tank, full	2,000
Jacket, water and tank	2,000
Miscellaneous	4,000
Total, approximately	85,650

New Angus Shops, Canadian Pacific Railway--II.

(Continued from 115.)

The machines are located in large groups, each arranged for a certain class of work. The machines for wheel work are located at the end of the shop nearest the midway. There is a wheel storage track alongside of the central supply track. Alongside of this track on the erecting side are five wheel lathes and the quartering machines. The machine shop traveling crane covers this space and is used for placing the wheels in and out of the machines. The wheel press is located at the end of the building in line with the lathes. This press is served by a jib crane fastened to a steel column, and has a small electric chain hoist. The open space in front of the press is used for the setting. All the machines for driving and truck wheels, such as boring mills, axle lathes, milling machines, etc., are located on the other side of the central supply track.

The next group of machines is for cylinders, trucks, and driving box fittings. There is a clear floor space for some distance, with lateral tracks and numerous jib cranes, supporting air hoists used for repairing engine trucks. The large cylinder planer and cylinder boring machine are placed in line with the wheel lathes and are served by the shop crane. Across the track are located machines for driving box fittings. The cleaning vats are placed in an addition just outside of the machine shop wall.

The next machines are the large frame planer, triple head frame slotter and multiple spindle frame drill. Across the track from these are machines for cross head and piston work, as well as machines for lighter frame work. The next group of machines consists of planers, slotters, milling machines, etc., for rod work. There are also a number of benches for fitting in this group. There are a large number of jib cranes in this section. The next group of machines are used for valve motion and general machine shop work. Following these are the machines and floor space for brake and spring work, scale repairs, airbrake work and steam pipe fitting.

The rest of the main floor of the machine side is taken up with machines for boiler work. The first part has the flue shops, with the regulation machines and furnaces, and a chain wet flue rattler. The latter machine is of interest on account of the small amount of time required in changing flues. This feat has been accomplished in six minutes. The other boiler shop machines are arranged on either side of the central track to the end of the building and include a number of hydraulic punches and shears as well as those driven by motors. This section has a large number of jib cranes with chain hoists, driven by air motors. The hydraulic pump and accumulator are located in the corner on this side of the building. The hydraulic riveters, of which there are two, one with 17 ft. gap and one of 6, are located at this end on the erecting side, where fitting up boilers and tank work is done.

In the gallery are located the small machines of all kinds for light work, including a tin shop, bolt department, brass work, tool work, etc.

There are three alternating-current and one direct-current circuits from the power house entering the machine shop. Each circuit comes to a large distributing board,

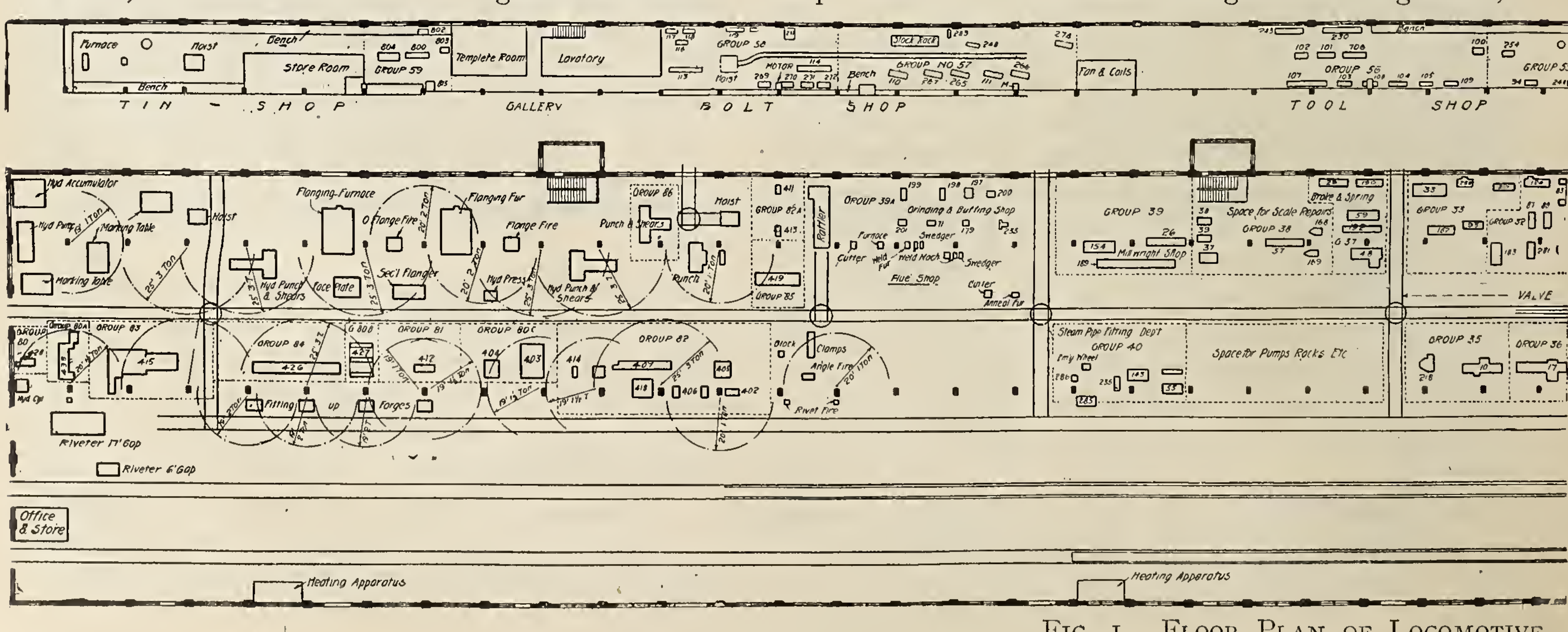


FIG. 1.—FLOOR PLAN OF LOCOMOTIVE

Fig. 2.—Flue Rattler in Boiler Shop, C. P. R. Shops.

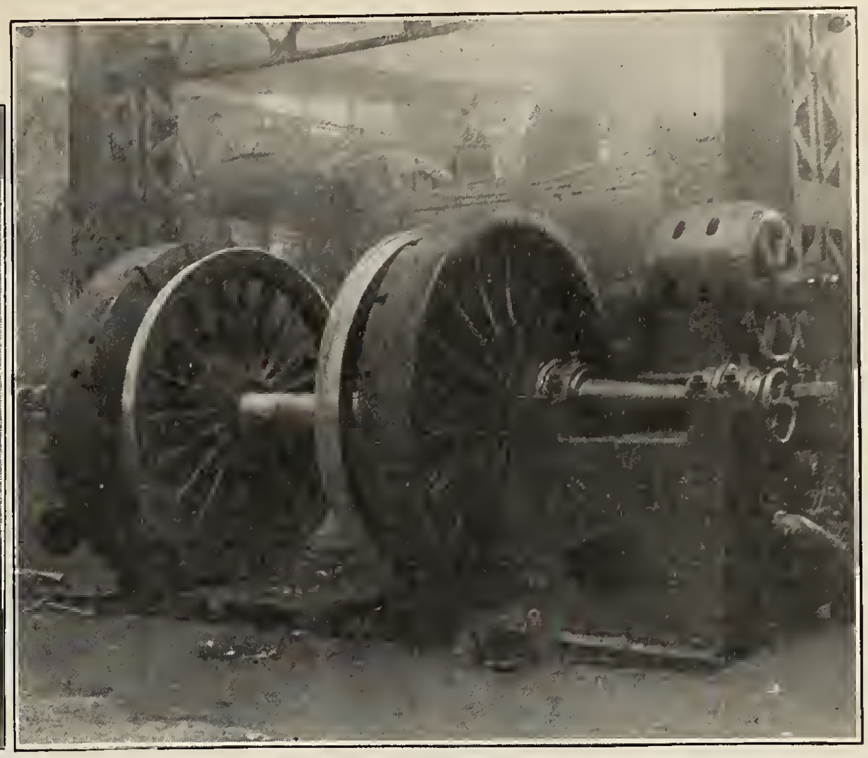
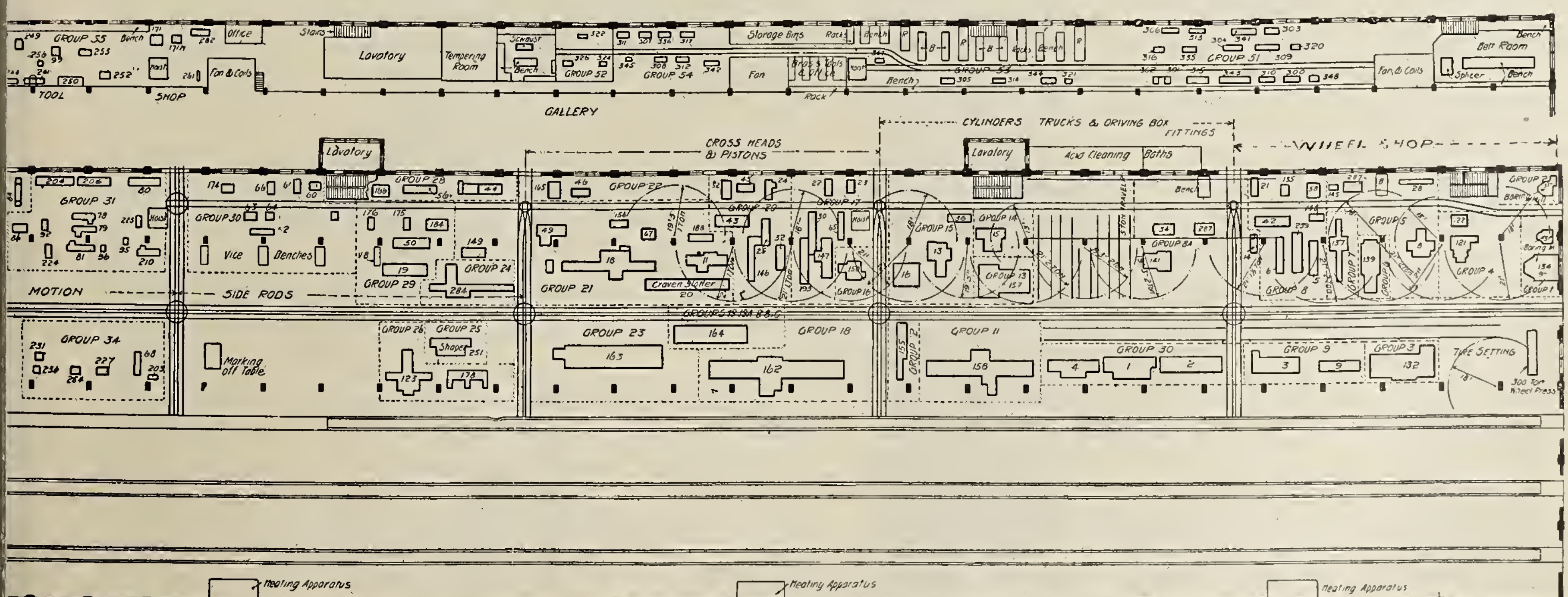


Fig. 3.—Niles Wheel Lathe, C. P. R. Shops.

from which circuits are distributed in the shop. Each of these circuits serve approximately 100 h. p. of motor capacity. The leads are taken from the distributing board, which is located in a gallery, above and outside the machine gallery, by three heavy insulated wires, carried on porcelain insulators along the roof trusses. The motor connections are made directly to these leads at the most convenient point. On each lead, just before the motor connection is taken off, is located an oil circuit breaker in a convenient position. There are no fuses, switches or other instruments in this circuit up to this breaker. The leads to the motors are carried through piping down the posts or walk to the starting box of the motor. This starting box is arranged in the form of a street-railway controller, and each notch cuts out resistance as the motor gains in speed. There is a no-voltage release at each oil circuit breaker.

The direct current machines, of which there are comparatively few, are taken from a circuit running the full length of the building, at the nearest available point. They have variable speed controllers and circuit breakers located on each machine. All crane motors are connected to this circuit.

The lighting circuits are taken from the three-phase line through transformers to the lighting points. The transformers are arranged in pairs, one being connected to wires 1 and 2 and the other to wires 2 and 3. These transformers change the voltage from 550 volts to 110 volts. The light distributing boards, or panels, contain two copper buss bars, from which the several lighting circuits are carried through fuses and switches. Each of these small circuits carries not more than one enclosed arc or 12 incandescent lights. There are 15 transformers in the locomotive shop and 29 lighting panels. The lighting in the erecting shop is mostly by arcs hung from the roof trusses and with incandescents along the side walls, while that in the machine shop is practically by incandescent lights. There are plug receptacles located at short distances in all pits and along the posts as well as at benches and any other place where they may possibly be needed. The electrical distribution is clearly shown in the accompanying diagram.



Shop, C. P. R. Shops.

List of Tools in Locomotive Shops

Tool
No. Group No. 1:
134 90-in. boring machine.
Group No. 1a:
51-in. boring mill.
Group No. 2:
51-in. boring mill.
Group No. 4:
122 Car wheel boring machine.
121 64-in. boring machine.
Group No. 5:
28 32-in. Engine lathe.
8 84-in. boring mill.
145 Emery wheel.
Group No. 7:
139 4-ft. x 4-ft. x 12-ft. planer.
Group No. 6:
137 4.ft. x 4-ft. x 14-ft. horizontal milling machine.
Group No. 8:
21 30-in. chuck lathe.
135 37-in. boring mill.
58 12-in. shaper.
140 24-in. shaper.
42 2-ft. x 2-ft. x 8-ft. planer.
5 Axle lathe.
6 Axle lathe.
234 Axle lathe.
Group No. 8a:
14 48-in. radial drill.
287 50-in. drill.
34 14-in. slotter.
141 20-in. slotter.
Group No. 3:
132 90-in. wheel lathe.
Group No. 9:
3 80-in. wheel lathe.
9 Quartering machine.
Group No. 10:
2 84-in. wheel lathe.
1 84-in. wheel lathe.
4 60-in. wheel lathe.
Group No. 11:
158 72-in. x 72-in. x 22-ft. planer.
Group No. 12:
155 Cylinder boring machine.
Group No. 14:
15 6-ft. radial drill.
Group No. 13:
157 9-ft. radial drill.
Group No. 15:
36 14-in. slotter.
8 5-ft. x 5-ft. x 8-ft. planer.
16 Cylinder boring machine.
Group No. 16:
150 60-in. boring mill.
Group No. 17:
22 30-in. lathe.
23 24-in. lathe.
193 36-in. lathe.
30 24-in. lathe.
147 36-in. lathe.
65 24-in. lathe.
Group No. 18:
162 6-ft. x 6-ft. x 32-ft. frame planer.
Group No. 19:
164 Frame drill.
Group No. 20:
146 28-in. lathe.
25 32-in. lathe.
32 30-in. lathe.
43 2-ft. x 2-ft. x 8-ft. planer.
52 36-in. drill.
45 24-in. drill.
24 24-in. drill.
Group No. 21:
18 4-ft. x 4-ft. x 25-ft. frame planer.
20 Frame slotter, three heads.
11 36-in. and 72-in. lathe.
188 Boring mill.
67 Vertical milling machine.
136 Cotter drill.
49 6-ft. radial drill.
149 5-in. turret lathe.
Group No. 22:
46 24-in. planer.
165 40-in. drill.
Group No. 23:
163 Frame slotter, three heads.
Group No. 24:
284 48-in. double planer.
Group No. 25:
251 24-in. shaper.
Group No. 26:
123 Boring mill.
178 Side rod borer.
Group No. 28:
44 2-ft. x 2-ft. x 11-ft. planer.
50 Cotter drill.
166 40-in. drill.
Group No. 29:
184 16-in. slotter.
175 24-in. shaper.
176 24-in. shaper.
50 Two spindle drill.
19 Double slotter.
Group No. 30:
174 30-in. boring machine.
66 20-in. planer.
61 24-in. shaper.
60 12-in. shaper.
63 24-in. lathe.
64 20-in. lathe.
62 16-in. lathe.
72 Small drill.
Group No. 31:
80 23-in. lathe.
206 24-in. lathe.
204 30-in. lathe.
210 18-in. lathe.
225 16-in. shaper.
95 20-in. vertical drill.
96 20-in. vertical drill.
81 18-in. lathe.
78 18-in. lathe.
79 18-in. lathe.
224 24-in. shaper.
92 Circular shaper.
86 Single drill.
Group No. 32:
84 2-ft. x 2-ft. x 6-ft. planer.
83 2-ft. x 2-ft. x 5-ft. planer.
124 24in. lathe.
87 Single drill.
88 Single drill.
183 Slotter.
231 36-in. vertical drill.
Group No. 33:
217 Horizontal boring machine, 3-in. bar.
33 Horizontal boring machine, 2-in. bar.
93 10-in. shaper.
182 Turret lathe.
238 Centering machine.
Group No. 34:
231 Universal grinder.
236 Buffing wheel, 30-in. x 8-in.
254 Double emery wheel.
227 Link grinder.
203 Twist drill grinder.
Group No. 36:
17 4½-ft. x 4½-ft. x 20-ft. planer.
Group No. 35:
10 36-in. lathe.
218 42-in. boring mill.
Group No. 37:
29 21-in. lathe.
190 20-in. lathe.
59 Double shaper, 12-in. stroke.
192 24-in. lathe.
48 6-ft. radial drill.
Group No. 38:
168 36-in. drill.
169 36-in. drill.
57 Double spindle drill.
38 10-in. slotter.
39 10-in. slotter.
37 12-in. slotter.
Group No. 39:
26 24-in. lathe.
189 24-in. x 23-ft. lathe.
154 8-ft. boring mill.
Group No. 40:
18-in. lathe.
55 36-in. drill.
143 45-in. drill.
235 4-in. pipe threading machine.
Emery wheel.
286 4-in. pipe threading machine.
285 10-in. pipe threading machine.
Group No. 39a:
235 Face grinder.
200 Double buffer.
197 Buffing belt.
198 Grindstone.
199 Grindstone.
179 Disc grinder.
201 Double emery wheel.
71 Double emery wheel.
Flue cutter.
Flue cutter.
Welding machine.
Welding machine.
Group No. 82:
405 Mudring drill.
402 Drill.
406 Double drill.
407 Plate planer.
418 Double screw machine.
414 Small bending rolls.
Group No. 82a:
411 Small punch.

413 Circular shear.
Group No. 85:
419 Double punch and shear.
Group No. 86:
410 Punch and shear.
Group No. 80e:
403 Double drilling and milling machine.
404 Double drill.
Group No. 81:
412 Horizontal punch.
Group No. 80b:
427 Three spindle drill and milling machine.
Group No. 84:
426 Boiler plate planer.
Group No. 83:
415 Large bending rolls.
Group No. 80a:
433 Mudring drill.
Group No. 80:
428 36-in. drill.
Group No. 58:
117 Nut facer.
118 Nut facer.
116 14-in. stud lathe.
113 12-in. bolt lathe.
112 12-in. bolt lathe.
119 Centering machine.
273 Bolt lathe.
277 Triple screwing machine.
269 Bolt lathe.
270 Bolt lathe.
271 Bolt lathe.
272 Bolt lathe.
114 12-in. bolt lathe.
115 12-in. bolt lathe.
Group No. 59:
800 Tinsmith rolls.
802 Small drill.
803 Forge.
804 Shears.
815 Forge.
Group No. 57:
110 2-in. x 24-in. turret lathe.
267 2-in. x 24-in. turret lathe.
265 2-in. x 24-in. turret lathe.
266 2-in. x 24-in. turret lathe.
111 2-in. x 24-in. turret lathe.
274 Bolt lathe.
283 Nut facer, 1-in.
Group No. 56:
243 20-in. lathe.
230 16-in. lathe.
102 Small lathe.
101 Small lathe.
106 Small lathe.
107 Small lathe.
103 Small lathe.
108 Small lathe.
104 Small lathe.
105 Small lathe.
109 Small lathe.
100 Universal milling machine.
Group No. 55:
254 Single drill.
94 4-in. double shaper.
244 Small lathe.
241 Small lathe.
250 18-in. Universal grinder.
252 Universal grinder.
255 Single drill.
249 Universal cutter and reamer grinder.
99 Universal miller.
171 Small lathe.
282 Nut facer.
261 Cutting off saw.
Group No. 52:
322 6-in. emery wheel.
324 Buffer.
326 Buffer.
Group No. 54:
311 14-in. speed lathe.
307 16-in. turret lathe.
336 16-in. turret lathe.
317 Turret lathe.
345 Four-spindle drill.
308 14-in. speed lathe.
312 14-in. speed lathe.
342 Turret lathe.
Group No. 53:
305 16-in. turret lathe.
314 Turret lathe.
344 Single drill.
321 Cock grinder.
Group No. 51:
302 16-in. chuck lathe.
315 Turret lathe.
343 22-in. engine lathe.
310 20-in. engine lathe.
300 14-in. engine lathe.
320 Milling machine.
348 Milling machine.
309 26-in. lathe.
304 23-in, turret lathe.
335 Turret lathe.
316 Turret lathe.
306 17-in. turret lathe.
313 Turret lathe.
341 Turret lathe.
303 14-in. lathe.

(To be continued.)

The Ridgway Boring and Turning Mill

A BORING mill which is typical of the character product to be brought out by the Ridgway Machine Tool Company, Ridgway, Pa., was the first tool to be produced by this new company. It is a machine built essentially for high duty, and is designed and constructed to meet every requirement of the present day need for rapid production, as it utilizes to their fullest capacity the modern high duty tool steels. The massive proportions and the structural features which impart to it greatest rigidity are plainly shown by the accompanying illustrations. The machine was built with a view of combining the very highest degree of rapidity with accuracy, and the results at the works of its purchase, where it was shipped several weeks ago, stamp it as a complete success.

As will be noted from the engravings, the mill is of the extension type. Its swing with the upright in the forward position is 10 ft. 8 ins., while with the housings moved backward to their extreme position the machine has a swing capacity of 16 feet 4 inches. The greatest height over the table is 5 feet 2 inches to the bottom of the tool holder and 5 feet 10 inches to the cross rail. The bed, which is of box form throughout, is 23 inches deep, and the table is 10 feet in diameter, 10 inches deep at the edge and 13 inches deep in the center. It is supported on a circular track of large diameter and wide face, which is so constructed that the bearing surface is immersed in oil. The spindle is carried in two bearings, which are placed wide apart to insure stability. Each bearing is fitted with a split taper bushing for taking up wear. A foot step is provided at the lower end of the spindle for raising the table off the circular track when it is desired to operate the mill at high speeds.

The raising and lowering of the table are performed by means of the wrench shown directly under the table in Fig. 1. This it will be noted is in a very convenient position, making it possible for the operator to quickly change the machine as desired for either rapid or slow feeds. The table driving gear ring is cut in high carbon rolled steel.

The structural features of the machine which are most apparent give it rigidity to stamp up under any strain that may be placed upon it, but with all this massiveness of design the machine is not unwieldly. On the other

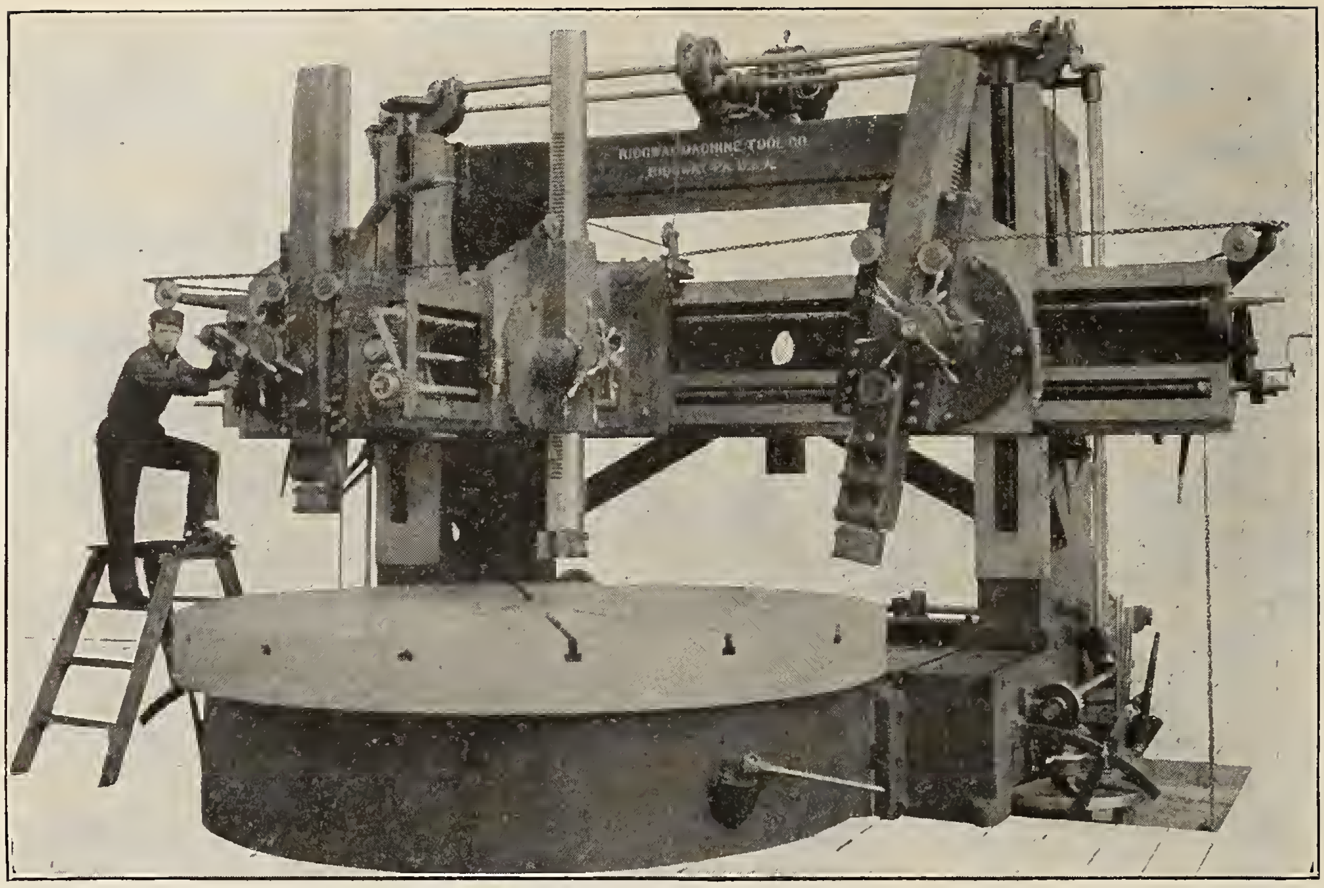


Fig. 1.—Ridgway Boring Machine.

hand, it is so ingeniously fitted with power movements and controlling apparatus located at the proper place that the manipulation of all movements is most easily and quickly accomplished. All of the principal movements, including those on the extension bar, have rapid power transverse.

The machine is driven by a 30 horse-power variable speed motor of 4 to 1 range, having 10 speeds. By means of mechanical changes 30 table speeds are obtainable in correct geometrical progressions, ranging from a maximum of 18.75 revolutions per minute, equaling 25 feet on 6 inches diameter, to a minimum of 0.32 revolutions per minute, equaling 16 feet on 16 feet diameter.

All of the speed changes are made by two parallel vertical levers, shown on the side of the mill in the illustrations. These it will be noted are in a very handy position for the operator. They are made interlocking by a very clever device. It will be observed that they move parallel with the bed, and each half has a latch lever which moves a latch pin running through the main lever

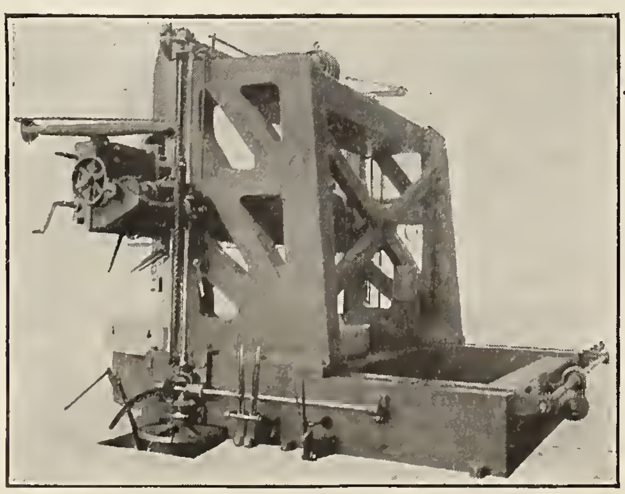


Fig. 2.—Ridgway Boring Machine.

and entering a hole in the casting behind it or into a groove in the round sliding bar which carries the other grooves past its pin so that the other lever must remain locked.

The right hand lever has three locking positions, while the one at the left has two. With the interlocking device, however, it is impossible to move either one of the levers with the other displaced from its neutral position.

The driving motor, clutches and speed changing gearing are all placed inside of the bed of the machine below the floor line. The approximate maximum power of the mill is two simultaneous cuts, each ½ inch deep with ⅛-inch feed, running 40 feet per minute in steel of about 80,000 pounds tensile strength.

The housings, which are of box form, are designed to properly carry the stresses imposed, and in practice have been proved to afford the great stiffness calculated to them theoretically. Their form permits the use of the very wide top shelf which takes up the twisting strain due to heavy cuts when the cross rail is at its highest position and the housings are in the extreme back position. The cross brace to the housings effectively counteracts the tilting strain under similar conditions to those cited above and when taking heavy side cuts. The housings are provided with power traverse driven by the main motor, and controlled by means of the right hand lever, shown at the base of the mill. A pair of faced pieces, properly marked with center lines, is provided at the front of the housings and base, which, when brought together exactly, bring the center of the tool holder exactly over the center of the table.

The cross rail is 31 inches deep and 8 inches thick in front of the housings, increasing to 22 inches from face to back in the center. It is held to the housings by means of the special clamps on the inside edges, which avoid transmitting the strains through the sections of the rail directly in front of the housing, which is necessarily the weakest part of the cross rail. There are also clamps on the outside edges of the uprights to insure the greatest possible rigidity. It is raised and lowered by the power furnished by the traverse motor, shown on the top of the machine. The elevating gear is controlled by means of the lever on the housing and a little below the cross rail. The saddles are of solid construction, eliminating the use of gibs entirely. They are so designed that the point of pressure is brought to the lower web of the cross rail.

The heads have 34 inches bearing on the cross rail. The guiding surfaces are both on the lower edge of the cross rail. This greatly diminishes the cramping of action, due to the taking of heavy cuts when the two bars are extended below the cross rail. The tool bar is of large box section, 7 feet 6 inches long and having a travel of 4 feet 1 inch. Each bar is separately counterweighted, one weight being on each end of the cross rail. The overhead motor traverses the heads of the cross rail and the bars in the heads, independent movement in either direction being obtainable by means of the two parallel levers shown projecting underneath the cross rail. The outer one of these levers controls the feed while the inner one manipulates the rapid traverse of the heads. These cross rail levers are in duplicate, being located on each side of the cross rail.

Each head has 12 changes of feed, ranging from zero to 2½ inches, and each is entirely independent of the other. The machine is designed to be built with either positive or friction feed, as desired. The purchaser of this particular machine expressly desired a friction feed, which is plainly shown. This feed is controlled by means of the lever moving on a projecting arm, shown near the friction disk.

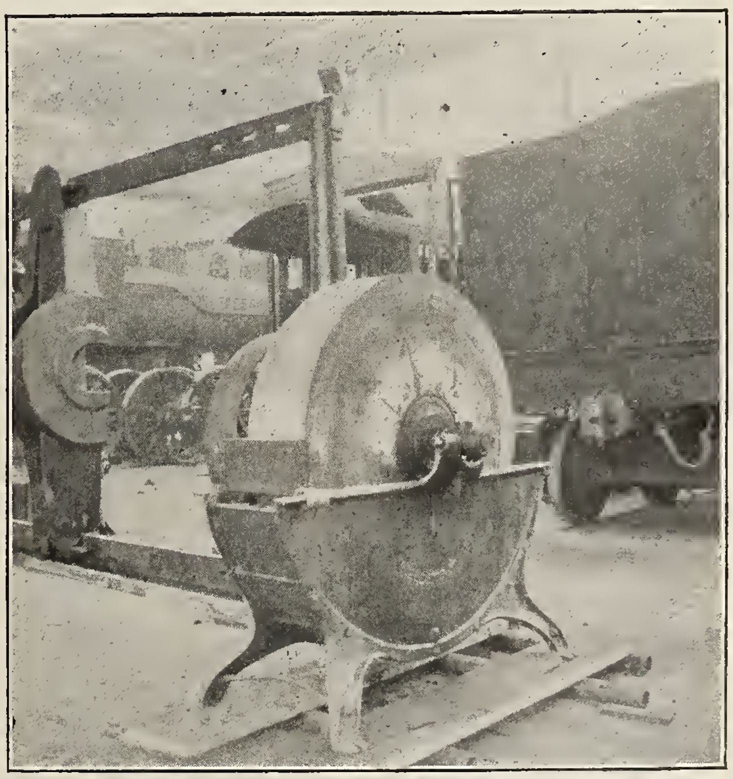
The arm carrying the extension head is of large box section. It has the unusually large bearing on the cross rail of 4 feet. It is of proper length so that the center of the tool bar is over the center of the table when the uprights are in their extreme backward position, but as it carries a saddle arranged with power feed it is capable of operating at any part of a piece of work within the maximum capacity of the machine—16 feet. The saddle carries a swivel which permits the boring of a taper hole. The weight of the machine is about 102,000 pounds.

The machine was shipped to the Bucyrus Company, South Milwaukee, Wis., where upon arrival Mr. Morgan conducted a series of tests as to its capacity. The following low results were obtained: The specifications called for 2 cuts ½-inch deep taken simultaneously on high tensile steel at the cutting speed of 40 feet per minute, 1-16 feed on 10-foot diameter work. The machine not only fulfilled this test but stood up under cuts ranging from ½ to over 1 inch deep on an irregular steel casting at 3-16-inch feed at a cutting speed of 50 feet per minute, developing twice the rated capacity of the motor and maintaining this speed without any ill effects. It was found that few, if any, of the steels tried would stand long at this high rate of speed, proving the machine fully equal to the modern high speed steels. The chips resulting from this performance constitute one of the most remarkable collections of their kind.

A noteworthy feature of this machine is that it was ordered from rough sketches, and the plant had not yet been placed in operation or a casting made. From that date until the delivery of the mill only seven months elapsed, which reflects great credit on Lewis H. Morgan, the superintendent and manager of the Ridgway Company who, together with F. B. Cockburn, chief engineer, designed and produced the machine complete in so short a space of time and simultaneously organized and equipped the shop in which it was built.

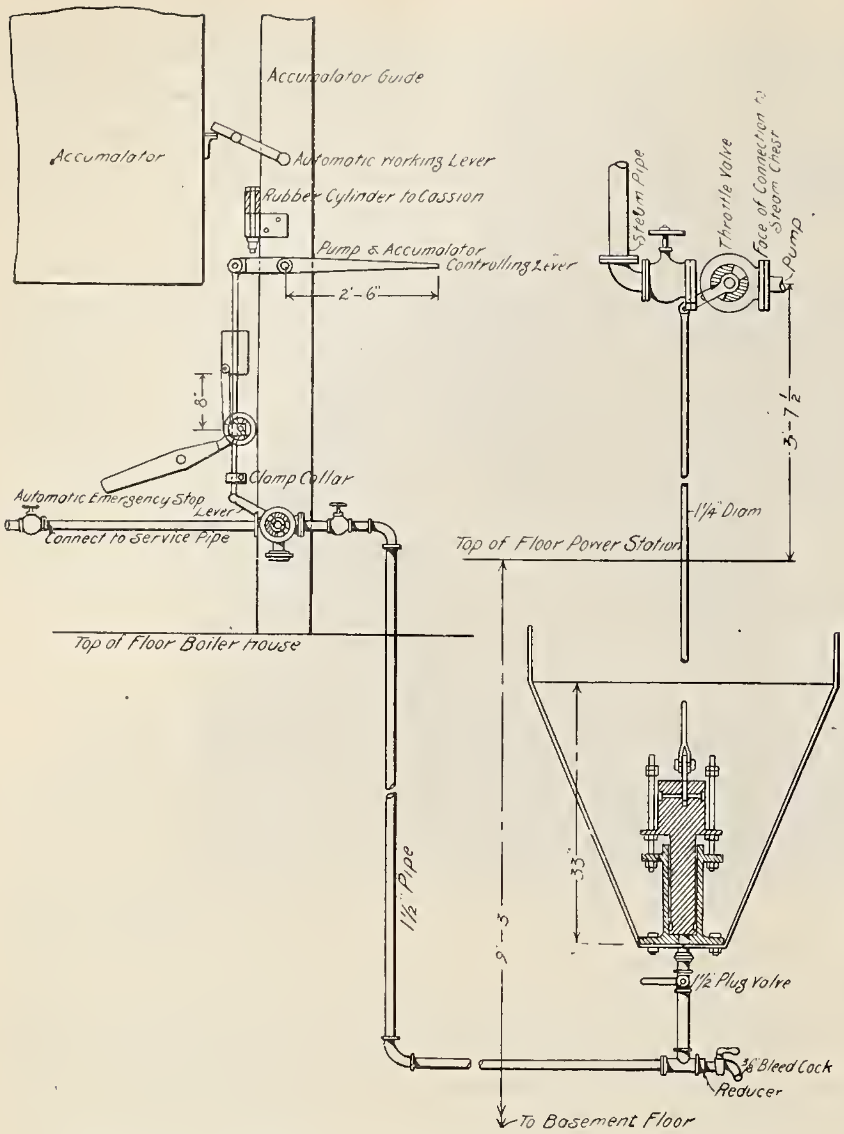
Grindstone in the Pere Marquette Shops

THE accompanying cut shows a grindstone and frame in the Pere Marquette shops at Grand Rapids. The frame is not all in place, as the stone is not in permanent position. When completed there will be a shield to prevent the discharge of water from the stone and an adjustable rest with grooves for holding the tool, which will be appreciated by all mechanics. The frame is water-tight, has the universal journal box, and the bearings are effectually protected from the grit of the stone. The arbor is made with flanges and nuts, and so arranged that a heavy stone can be hung with as little trouble, and held as firmly, as a saw.

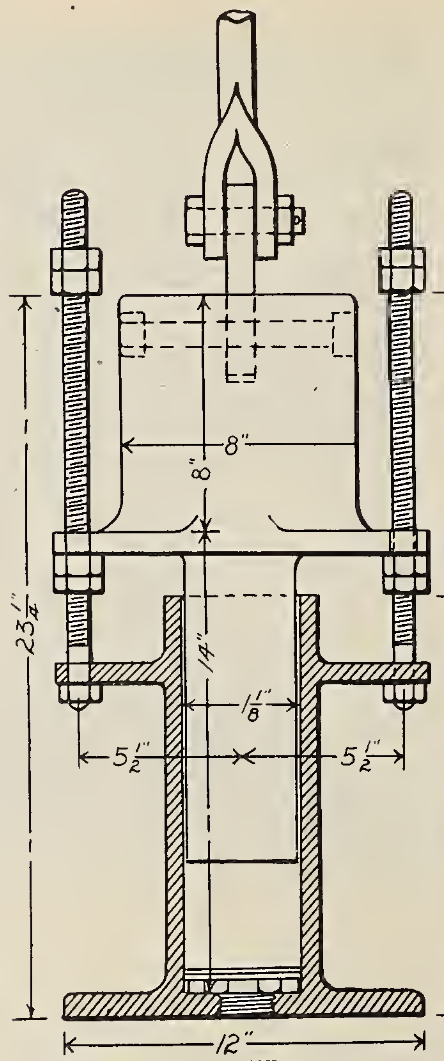


GRINDSTONE IN PERE MARQUETTE SHOPS.

The frame for the stone was furnished by the Howards Iron Works of Buffalo, N. Y.



General Scheme of Hydraulic Accumulator.



Pump Valve Cylinder of Hydraulic Accumulator.

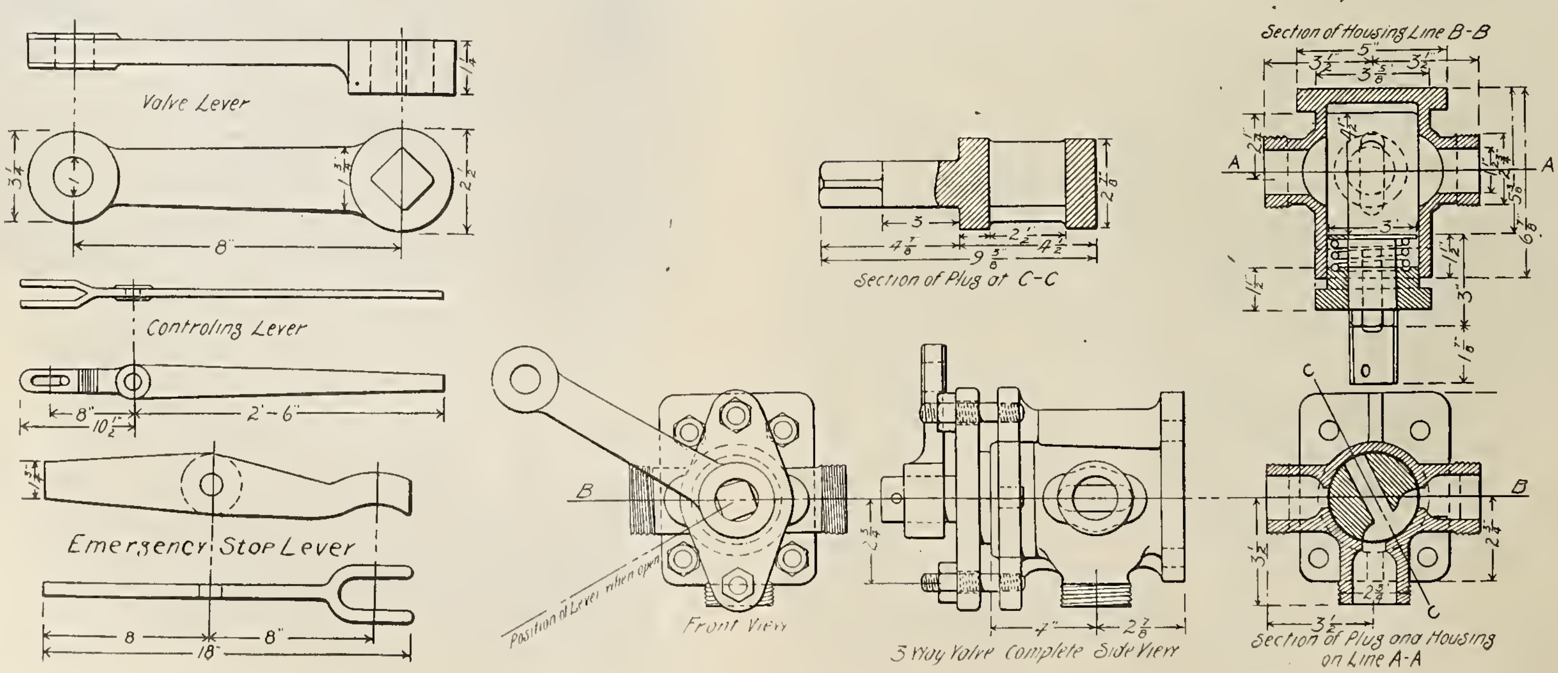
Pneumatic Device For Controlling The Quantity of Water in a Hydraulic Accumulator

THE accompanying line drawings illustrate a device for controling the quantity of water used in connection with a hydraulic accumulator. Fig. 1 is a diagramatic view of the whole arrangement. When the acumulator is full it will be at the top and turn a handle which cuts the air out of the line leading to the pumps and exhaust the air at the same time by means of a three-way cock. When the air pressure is relieved from beneath the piston shown below the pump valve, it will come down and close the throttle valve and thus stop the pump.

When the accumulator is empty it will lower and turn the three-way valve, admitting air in the pipe again, which raises the piston and starts up the pump in the power house.

Fig. 2 is a detail of the three-way valve used. Fig. 3 is a detail of the cylinder used in controlling the throttle valve, and Fig. 4 has details of levers employed.

When this system was first installed water pressure was employed, but the action was too slow on account of the accumulator being too far away from the pump. For this reason air was substituted, which necessitated



Details of Hydraulic Accumulator.

a cylinder with a piston about 1 inch in diameter in place of the 4-inch cylinder used with water.

This device is in use in the Chicago shops of the Chicago & Northwestern Railway, and we are indebted to Mr. R. Quayle and Mr. W. E. Dunham for the drawings and description.

Air Pump Rack

THE accompanying cut shows an air pump rack as used in the East Moline shops of the Chicago, Rock Island and Pacific Railway.

On the right is a movable rack for repairing the pumps. The pump is fastened to this after which it can be moved in any desirable position for the convenience of the workman.

On the left is the testing rack which has a capacity of six pumps. The pumps are connected up to steam and air pipes and given a test similar to actual practice. The racks are served by an air hoist and differential chain pulley.

Air Pump Rack in Moline Shops.

Personals

Mr. R. J. Farrell has resigned as master mechanic of the Illinois Southern at Sparta, Ill.

Mr. W. D. Lowry has been appointed master car builder of the Cincinnati, Hamilton & Dayton, with headquarters at Lima, O.

Mr. Thomas Marshall has been appointed master mechanic of the Chicago, St. Paul, Minneapolis & Omaha at St. Paul, Minn.

Mr. H. B. Sutton has been appointed master mechanic of the Newton & Northwestern, with headquarters at Boone, Ia., succeeding Mr. L. L. Collier, resigned.

Mr. J. H. Fulmer has been appointed master mechanic of the Schuykill division of the Pennsylvania Railroad.

Mr. R. E. Smith, assistant to the general manager of the Atlantic Coast Line, has been appointed general superintendent of motive power.

Mr. Webb C. Ball has been appointed general time inspector of the Toledo, St. Louis & Western, with headquarters at Cleveland, O.

Mr. Alexander Kearney has resigned as superintendent of motive power of the Baltimore & Ohio at Pittsburg to accept a position with the Norfolk & Western.

Mr. J. T. Stafford has been appointed master mechanic of the Grand Rapids district of the Pere Marquette, with headquarters at Grand Rapids, Mich.

Colonel Frederick de Funiak, formerly superintendent of machinery of the Louisville & Nashville, died at his residence in Louisville, Ky., on March 29, at the age of 65 years.

Mr. O. J. Kelly, master mechanic of the Baltimore & Ohio at Parkersburg, W. Va., has been transferred to Grafton, W. Va., in a similar capacity, to succeed Mr. W. S. Galloway, transferred.

Mr. H. H. Maxwell, formerly assistant engineer of motive power of the Pennsylvania Railroad at Jersey City, N. J., has been appointed master mechanic, with headquarters at Trenton, N. J.

Mr. E. D. Andrews, formerly road foreman of equipment of the Chicago, Rock Island & Pacific at Shawnee, Okla., has been appointed master mechanic of the El Paso division, with headquarters at Dalhart, Tex.

Mr. W. D. Lowry has been appointed master car builder of the Cincinnati, Hamilton & Dayton, Chicago, Cincinnati & Louisville and the Pere Marquette, with headquarters at Lima, O.

Mr. S. C. Graham, formerly master mechanic of the Chicago, & Northwestern at Lake City, has been transferred to the Ashland division, with headquarters at Kaukauna, Wis., succeeding Mr. J. F. Fluscher, who has been appointed master mechanic of the Sioux City division, with headquarters at Sioux City, Ia.

Mr. J. A. Driscoll has been appointed roundhouse foreman of the Philadelphia & Reading at Cressona, Pa., in place of Mr. H. I. Clouse, resigned. Mr. Joseph K. Downs has been appointed roundhouse foreman at East Penn Junction, Pa., to succeed Mr. Driscoll.

Mr. J. E. Gould, who recently resigned as master mechanic of the Cincinnati, Hamilton & Dayton, has been appointed master mechanic of the Colorado & Nebraska division of the Chicago, Rock Island & Pacific, with headquarters at Goodland, Kan.

Mr. Richard F. Whalen, Jr., has been appointed foreman of locomotive repairs of the Chicago, Burlington & Quincy at Hannibal, Mo., in place of Mr. W. J. Hoskins, resigned to accept a position as master mechanic of the Chicago & Eastern Illinois at Danville, Ill.

Mr. O. A. Fisher has been appointed road foreman of engines on the Kansas Southern division of the Atchison, Topeka & Santa Fe Ry., with headquarters at Chanute, Kansas. Mr. Fisher was formerly an engineer running out of Chicago.

The following changes are announced on the Southern Railway Co.: Mr. W. S. Murrian is appointed master mechanic at Spencer, N. C., vice Mr. J. T. Shealian, who has been transferred to Atlanta, Ga., vice Mr. S. M. Dolan, resigned. Mr. W. F. Kaderly is appointed master mechanic of the Washington division, vice Mr. Murrian, transferred.

Anti-Friction Metal

An interesting feature in the line of anti-friction metals, and something which is entirely new, is shown in the halftone reproduction below.

The particular point of interest lies in the peculiarity of crystallization, and forms the chief basis of claims of superiority which are made by its producers. The photograph represents a piece of metal which has been nicked on one side and, after being placed in a vise, has been broken off by a sharp blow from a heavy hammer. This operation reveals a fibrous, stringy mass; the crystals, it will be seen, extend perpendicular to the chilling surfaces. The alloy is of tin and aluminum base and a remarkable characteristic is that these fibers always radiate from the chilling surfaces, regardless of the number of times reheated, thereby presenting the ends and not the sides of the fiber to the sliding friction surface.

It is well known that in the case of wood and of wrought iron the surface exposing the ends of the fiber will stand a greater amount of crushing weight and wear than the sides of the material. It was for this same principle in an alloy that the metallurgist who produced this worked. His

Anti-Friction Metal.

efforts extended over a period of twenty years and the result is claimed to be all that could be wished.

To prove the soundness of the theory of resistance to wear the composition was given many severe tests which were, in all instances, gratifying. Its great toughness and malleability combined, it is claimed, permits it to withstand the most severe shocks without becoming brittle or what is ordinarily called "crystallized."

A close examination of the fractured metal shows it to be of so fine and smooth a texture, with no granular matter intervening, that it may be said to be a truly chemical compound.

Users of anti-friction metals always experience difficulty in remelting and using them over, owing to the grosser metals—those which melt at the lowest point—volatilizing and escaping, which leaves the composition harder with each pouring. The producers of this metal say they have entirely overcome this, and that by a perfect combination of metals they have secured an alloy which, it might be said, has produced—not a new composition—but an entirely new metal in itself that will admit of remelting an indefinite number of times without becoming hard or harsh or losing any of its original properties.

The characteristics of this metal would make it particularly desirable for use in linings of driving box and engine truck brasses, eccentric straps, cross-head gibs, steam and gas engine bearings, ships' bearings, wood working, and all kinds of high speed machinery.

The Buda Foundry & Manufacturing Company of Chicago will place this metal on the market, together with some new bronzes and a copper-steel composition, the latter being, they say, a rediscovery of the lost art of copper hardening.

This new departure on the part of the Buda Foundry & Manufacturing Company, whose former output has been largely confined to track supplies, will in the future be made an important branch of their increasing business, though it will not in any way interfere with their railroad specialties. "We were attracted to these metals," said Mr. H. K. Gilbert, Secretary of the Buda company, "by the exceptional merits which they possess. Thorough tests have convinced us that we have in them something which will be an agreeable surprise to users of anti-friction alloys, and that they will create a great demand for themselves. We are sending out samples free to interested persons, and an examination will show them to be of unusual interest and value."

Merritt & Company Lockers

The accompanying illustration shows the factory of Merritt & Co., located at Front and Arch Sts., Camden, N. J., where all kinds of expanded metal lockers are manufactured.

Expanded metal has in itself many advantages over any other type of material for open mesh lockers. It supports and braces its developing frame, instead of having to be supported by the same, consequently the danger inherent in

Plant of Merrit & Co.

all wire mesh lockers of disalignment of doors or panels is eliminated. Each panel is a single piece of metal, consequently the mesh cannot be spread apart, and articles extracted through large openings so made. Expanded metal, being neat and smooth, has all the advantages of wire mesh, with none of its weaknesses

In an experience of many years in locker building, the Merritt company have found that no locker will be thoroughly satisfactory which does not combine sanitary qualities, security to the belongings of the occupant, and durability; not only general durability of the main structure, but also in all details such as hinges, locks, lock fastenings, etc. They have also learned how strong each such part must be made and advise careful examination and investigation of such details when contemplating the purchase of a locker equipment, for upon them largely depends the success or failure of the system. They make lockers of all types and in any size, either single or double tire.

The Acme White Lead and Color Company

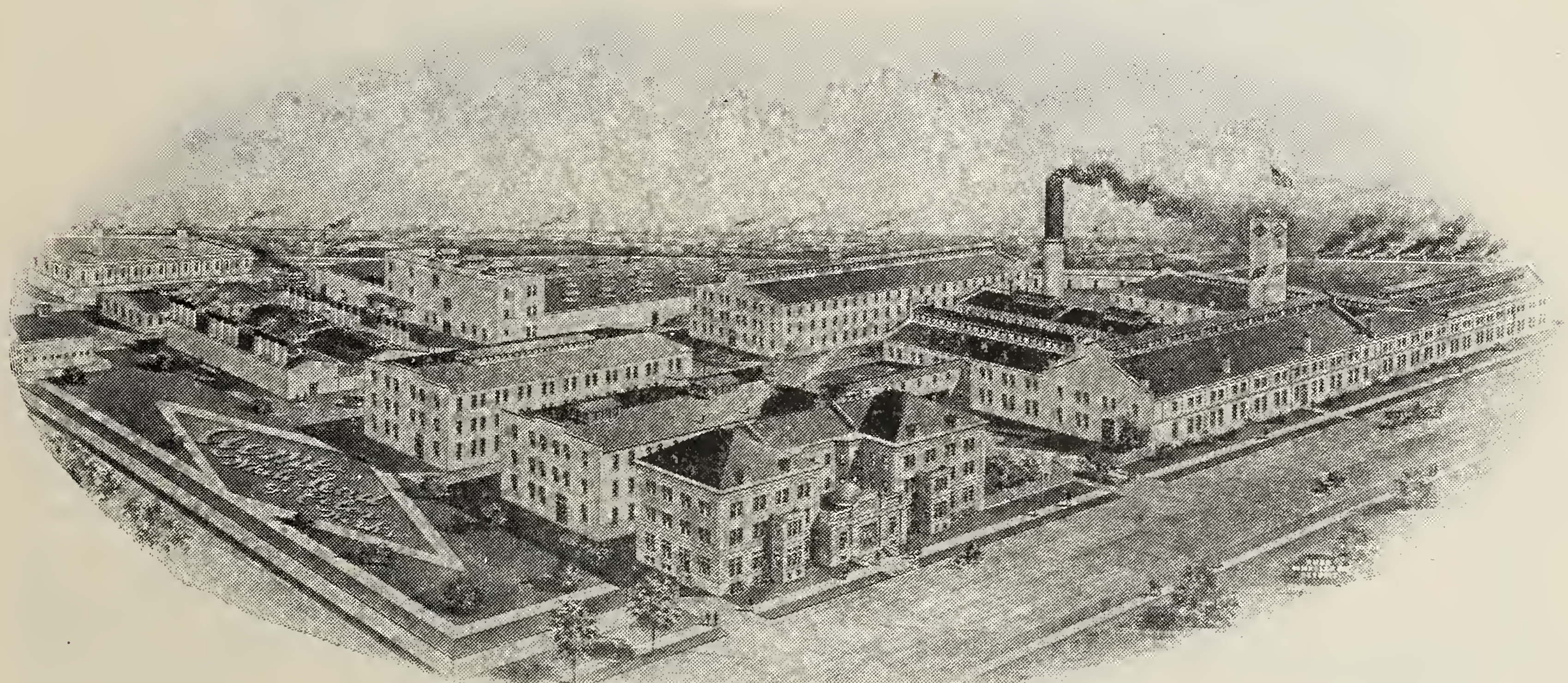
The accompanying illustrations show the plant of the Acme White Lead & Color Works of Detroit, Michigan, together with the members of the railway department.

The Acme White Lead & Color Works is one of the most progressive and successful paint and varnish manufacturing concerns in the United States. The secret of its wonderful growth and unparalleled success is due to the fact that it makes but one grade of goods—"Acme Quality"—the best that science and modern methods can produce.

It has over one hundred representatives selling its products in every section of the United States.

B. E. Brown, Manager.

K. J. Bowers, Secretary.



Works of the Acme White Lead and Color Co.

Mr. R. C. McIntosh, Eastern Representative, N. Y.

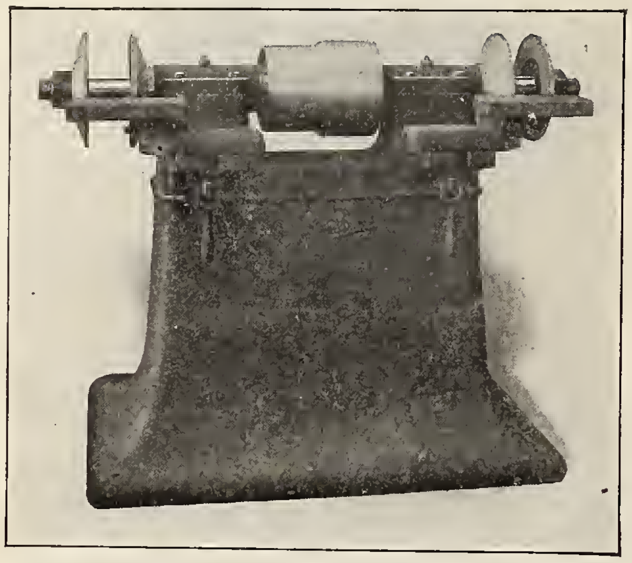
Mr. R. E. Mills, Southwestern Representative, St. Louis.

Mr. H. V. Deming, Western Representative, Chicago.

No. 7 Grinding Machine

The accompanying illustration shows a N. 7 grinding machine as manufactured by the J. G. Blount Co., Everett, Mass. This machine is of high efficiency, simple in construction and operation, strong and heavy. The metal is so arranged as to reduce vibration to the lowest point. The bearings are large, long and self-oiling. The spindles are of steel, ground to size, and the pulleys and collars are pressed on. The dimensions of the machine are as follows:

Size of wheels.......................... 24 in. x 4 in. x 2 in.



Blount Grinder.

Distance between wheels .... 35 in.
Length of bearings .... 10 in.
Diameter of spindle in bearings..................... 2⅛ in.
Diameter of spindle between flanges................. 2 in.
Size of spindle cone pulley...... 7½ in. and 8¼ in. x 4½ in.
Height from floor to center of spindle.............. 32 in.
Weight without countershaft .... About 800 lbs.
Speed of countershaft .... 425.

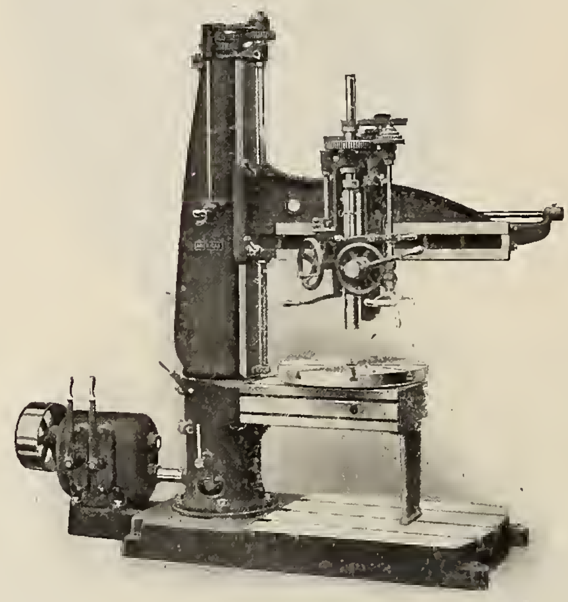
Three-Foot Arm Combination Radial Drill

In order to meet the changed conditions and greatly increased duties now imposed upon machine tools, consequent upon recent developments in modern shop practice, the American Tool Works Co., Cincinnati, Ohio, have completely redesigned their entire line of Radial Drills, taking into account every condition influencing modern radial work, and every point which would tend to increase their efficiency, with the result that the new "American" radial is very efficient in its capacity for continuous hard service under modern methods, and for using high speed twist drills.

The feeding mechanism on the head provides four distinct rates of feed covering a carefully chosen range, in geometrical progression, from .007 in. to .041 in. These feeds are all readily obtained by the simple turning of a dial on the feed box until the desired feed, indexed thereon, comes opposite a fixed pointer. This method of feed change is by far the simplest yet devised, as it requires no reference to index plates and subsequent handling of levers. The all-gear feeds, when supplied instead of belted feeds, insure vastly increased productive capacity, rapidity of change, and positive action. The feeds can be automatically tripped at any position of spindle by adjustable trip dog and pointer, acting on the worm clutch. Depth graduations are on the spindle, and all depths can be read from zero.

The speed-box is of the geared friction type providing four changes of speed, each being instantly available by use of the two levers shown. Frictions are of thin patent double band type, employing very few parts in their construction, which can thus be made of such large proportions as to be free from slippage under the severest cuts, and obviating the use of loose delicate parts, a source of frequent breakage on most other makes of radial drills. A motor of any type may be readily attached at any time, connection being made through chain, gear or belt. The speed box can be easily interchanged with a cone by simply breaking a coupling connection on the lower driving shaft of the machine.

The spindle has eight changes of speed, ranging from 13 to 300 in geometrical progression, all immediately available



Radial Drill.

without stopping the machine. This wide range of spindle speeds, combined with the exceptional driving power of the machine, renders the drill equally efficient with either ordinary or high speed twist drills. Spindle is regularly bored for No. 4 Morse taper hole. The column is of box girder type, revolves in a stationary stump carrying conical rollers, and is clamped securely in any position by means of a lever near the foot. Thus it is in effect and has all the good qualities of a round column capable of being swung in a complete circle unless arrested by belt, if driven from overhead, a very desirable feature. The arm is of parabolic beam section, strengthened along top and bottom lines by circular section, giving great resistance to bending and torsional strain. Its design leaves the lower line parallel with the base, and thus permits work being operated upon in close proximity to the column without the necessity of an extreme reach of spindle. Arm is clamped to column by binder levers, obviating loose wrenches, and is raised and lowered rapidly by a double thread coarse pitch screw, hung on ball bearings, and controlled instantly by a convenient lever.

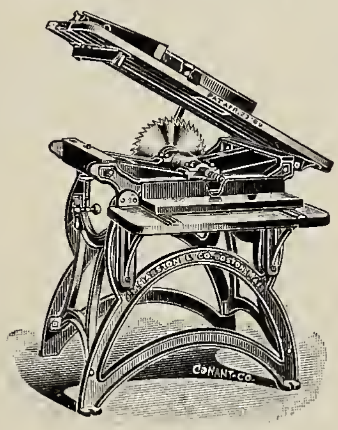
The head is moved rapidly along the arm by hand-wheel through spiral pinion and rack, the hand-wheel being located on head directly at hand of operator. Back gears are located on the head, thus bringing the greatest speed reduction direct to spindle. They may be engaged or disengaged without shock or jar while the machine is in operation. The spindle is counterbalanced and has quick advance and return. It is noted that all operating levers are controlled by operator at front of the machine, and within easy reach.

The tapping mechanism is carried on the head, between the back gears and speed box, thus giving to the frictions, already very powerful, the benefit of the back gear ratio, making unusually heavy tapping operations possible, and also permitting taps to be backed out at accelerated speed. The lever for starting, stopping, or reversing the spindle, is controlled at the head from the front of the machine.

The base is of massive proportions, strongly ribbed, in fan shape, radiating from column, making a particularly rigid base. It is accurately planed, and has large T-slots with an ample allowance of metal around them. The plain table has top surface of 16 in. x 26in., and also side surface, the latter giving the equivalent of an angle plate. Both top and surfaces are accurately planed and supplied with large T-slots. The worm swiveling table can be revolved to any angle horizontally, thru worm and worm-wheel. It is graduated in degrees at point of swiveling contact, and can be readily set to permit a hole being drilled at any angle within range. The top surface is 16 in. x 24 in. The round table is 24 in. diameter, and may be fitted to either the plain or worm swiveling table, as illustrated above. It revolves by hand on stump fitted into other table, and is thus very convenient for jig drilling. It can be securely locked by binding screw.

Power Circular Saw Bench

The accompanying illustration shows a power circular saw and bench as manufactured by J. M. Marston & Co., Boston, Mass. The frame is made of cast iron and is well braced and bolted. The top part of the frame is made very rigid, the center cross bar being double. The arbor is 18 inches long, one inch diameter, and made of open hearth steel with a collar to take up end motion. There is a ⅜-inch hole in end for machine bits. The pulley is 2¾ inches in diameter, 4 inches wide and placed on the arbor between the bearings. The distance from center of arbor to top of table is 2⅝ inches. The bearings are 3 inches long and lined with best genuine babbitt. The caps are securely bolted.



Power Circular Saw Bench.

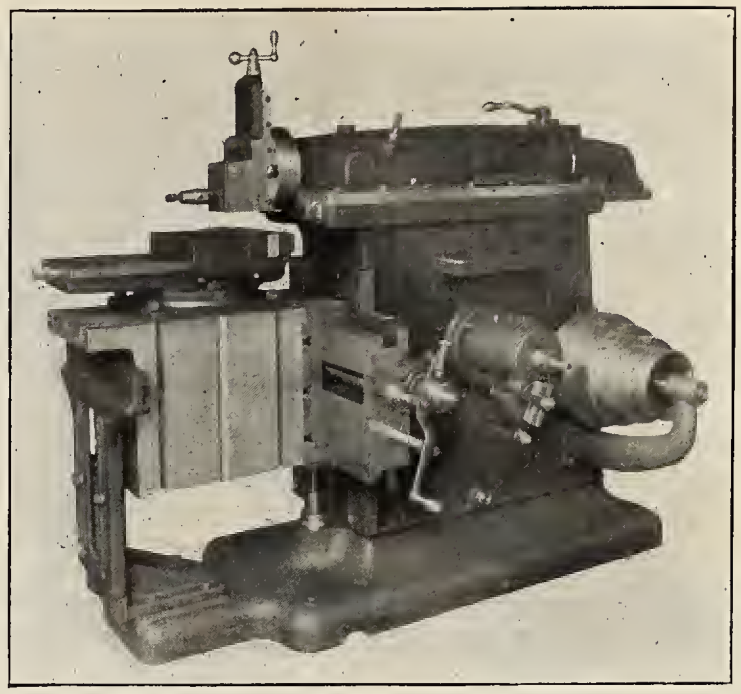
The top of table is 28 x 38 inches. The iron center part is 8 inches wide, running the whole length of table, being accurately planed, and has two grooves for cutting-off gauges to slide in. It has removable wooden mouthpieces, to admit of using growing saws or cutters. Huther grooving saws or dado head, from No. 1 to No. 5, 8 to 12 inches in diameter, can be used on this machine to especial advantage.

The height of the table is 32 inches above the floor. The floor space occupied is 28 x 38 inches. Two adjustable cutting-off or mitre gauges and one rip gauge are furnished with each machine. The counter-shaft is well made with self-oiling, adjustable boxes. The pulleys on countershaft are one 16 x 3 inch driving pulley, and one each tight and loose pulley 9 x 3 inches. The countershaft should make 500 revolutions.

Twenty-Four Inch Shaper

The accompanying illustrations show a 20-in. back-geared shaper, as manufactured by the Queen City Machine Tool Company, Cincinnati, O. Great care is exercised in the design and manufacture of these machines to secure a high degree of efficiency. In order to derive the full benefit of high speed tool steels, the back gearing is made 29 to 1.

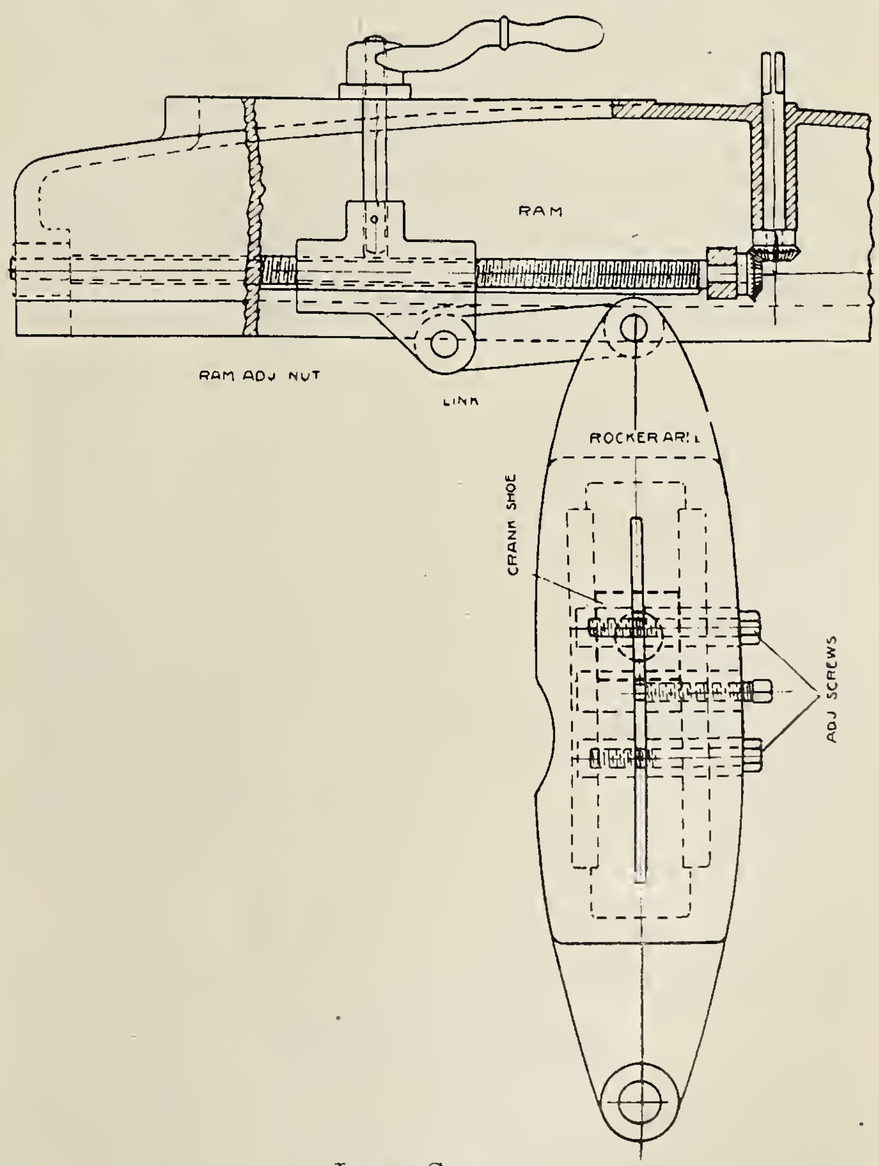
The column is of large proportions, very heavy and is reinforced at proper points to resist working strains. The bearing for the ram is 40x11 inches. The ways of the ram have



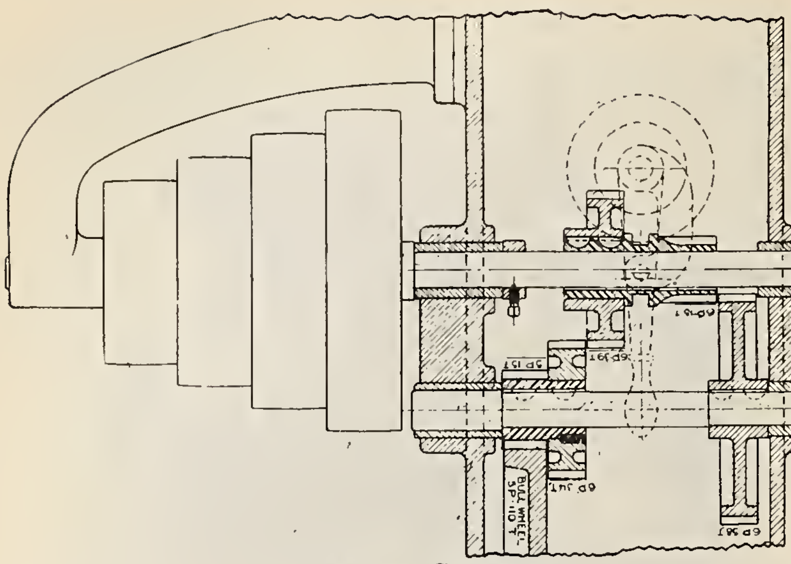
24-Inch Shaper.

an overhang, especially in front, which gives the tool increased stiffness. This construction of ram is the design of the Queen City Machine Tool Company. The arch construction brings the maximum section of metal into service when the cutting tool is in its extreme forward position. The length of stroke and position of ram can be changed without leaving the work, and while the tool is in motion or at rest.

The rail is extremely heavy. It has 9-inch front and 1¾-inch top wearing surfaces, inswing permanent alignment of table. The cross traverse is 30 inches and the screw has a graduated collar. It has a cam at this point, providing for rapid changing of feeds from 0 to extreme, without stopping the machine.



24-Inch Shaper.



24-Inch Shaper.

The vertical adjustment is effected by means of bevel gears, which are protected from chips and dirt, and provided with ball bearings, reducing the friction to a minimum. The telescopic screw does away with cutting a hole in the floor.

The rocker arm is connected to the ram by means of a link, giving a straight pull and an even cutting speed, with a quick return and no lost motion. This construction is shown in the line drawings.

The table is box form, T, slotted on top and sides, has V for holding shafts and similar work vertically, and can readily be detached from saddle. An extension provides for broad clamping surface, utilizing the full length of stroke. An outer support is furnished for all 24-in. machines. The vise is planer type and will hold absolutely solid, even on angle cuts. It has a base that can be firmly bolted to the table, and the swivel is held to this base by two steel planer head bolts. The head swivel is held in the same manner; both are graduated, and can be set at any angle. A double feed screw to head is provided with a graduated collar.

All flat wearing surfaces are scraped to a standard surface plate; are extremely wide, and so gibbed as to permit of close adjustment for wear. All column holes are unusually long, and bushed, providing for the maintenance of original centers.

The materials are carefully selected. All pinions, bevel gears and vise jaw plates are of steel. All gears and T-slots are cut from solid stock. The wrench connections are hardened and feed gears are covered. The large opening under the ram provides for key-seating shafts or similar work of any length.

	24 in. B. G.	16 in. B. G.
Actual length of stroke	25 in.	16½ in.
Vertical traverse of table	15 in.	15 in.
Cross traverse of table	30 in.	21 in.
Greatest distance ram to table	17 in.	17 in.
Diameter of head	9½ in.	8 in.
Feed to head	7½ in.	7 in.
Top of table	27x14 in.	15x11 in.
Side of table	27x17 in.	15x13½ in.
Length of ram bearing in column	40 in.	30¼ in.
Width of ram bearing in column	11 in.	10 in.
Key seating capacity up to	3¾ in.	3 in.
Vise jaws	14x2½ in.	10x2¼ in.
Vise opens	13 in.	8 in.
Number of grades to cover	4	4
Number of speeds to ram	8	8
R. P. M. of countershaft	330	300
Net weight of machine and C. S.	4400 lbs.	2500 lbs.

Notes of the Month

The office of J. W. Taylor, Secretary of the Master Car Builders' Association, Master Mechanics' Association, and Western Railway Club, has been changed from the Rookery to 390 Old Colony Building, Chicago, Ill.

The Falls Hollow Staybolt Co., Cuyahoga Falls, O., have received a large order for Falls Hollow Staybolt iron from the Western Australian government railways; also one from the Cuba Co.

Mr. L. D. Bolton, heretofore Chicago representative of the Federal Manufacturing Company, is now with the Diamond Chain & Manufacturing Company, of Indianapolis, and will represent that company in the Middle and Western States.

The past month was banner month for rail anchors. Among the consignments shipped by B. Burgess, Danville, Ill., were six anchors for the Southern Pacific Company and eight for the Boston & Albany Railroad.

The Haberkorn Engine Co., of Ft. Wayne, Ind., has closed a contract with the Litchfield Foundry & Machine Company, Litchfield, Ill., granting them the right to manufacture stationary engines under the Haberkorn patent valve and valve gear.

J. G. Blount Co., Everett, Mass., have issued a catalogue illustrating and describing their grinding, polishing machinery and speed lathes. This catalogue illustrates seven grinding machines, five combination grinding, polishing and buffing machines, buffing machines and three speed lathes.

The Landis Machine Company, Waynesboro, Pa., have issued a neat little catalogue on their bolt cutters and nut tapping machinery. This gives detail drawings of the mechanical construction of all the parts, together with illustrations of the principal sizes of bolt cutters.

Under date of January 9, 1905, United States Consul Fred D. Fisher, Tamsui, Formosa, reports that inquiries have recently been made at his office for catalogues of American manufacturers of boring machinery for sinking petroleum and artesian wells and of accumulators and second batteries for telephone and telegraph lines. The consul adds that if manufacturers of these lines will furnish him with their catalogues he will see that they are placed in the hands of the inquirers.

On April 4th Dr. J. A. L. Waddell, of the well-known firm of Waddell & Hedrick, of Kansas City, delivered a lecture to the Seniors and Juniors of Stevens Institute of Technology on "The Form of Engineering Contracts." The following day Dr. Waddell also lectured to the Seniors upon "The Present Practice of Bridge Construction." This was followed by an informal talk lasting about an hour, the students' having manifested great interest .

Mr. E. H. Mumford and C. S. Lovell, formerly with the Tabor Mfg. Co. of Philadelphia, have formed the E. H. Mumford Co. for the manufacture of foundry moulding machinery of every description, aiming especially at simplicity, strength and efficiency. Their long and thorough experience in this business will be used in the development of the latest modifications and combinations in moulding machines amply protected by patents. They will be located at Callowhill and 17th streets, Philadelphia.

The many friends of Mr. W. C. Johnston, so well know to the machinery trade, will be glad to hear of his connection with the Diamond Drill & Machine Co., of Birdsboro, Pa., since the severance of his connection with Alexander Foster, of New York. Mr. Johnston will be a machinery salesman for the Diamond Drill & Machine Co., representing their Wagner Cold Saw, Jackson Belt Lacing Machines, Punches, Shears, Rolling Mill Machinery, Open Hearth Steel Castings, Air Furnace and Cupola Castings, etc.

The Champion Blower & Forge Company, Lancaster, Pa., have just issued their catalogue of steel blowers and forges, lever and crank blowers, portable forges, blacksmith drills, tire binders, screw plates, taps and dies, tire and axle shrinkers and welders, etc. This catalogue is handsomely illustrated, giving full descriptions of machines and prices. This firm started in business 27 years ago with a single rented lathe and to-day their works cover ten acres of land with solid buildings filled with the latest and best steel tools for manufacturing purposes.

The plant of the Pittsburgh Spring and Steel Company, at Pittsburgh, Pa., has now been in successful operation for two years, manufacturing springs for every purpose. They make a specialty of elliptic and coil springs for locomotives, passenger, freight, traction and interurban cars; also machinery, valve, switch, governor, trolley, agricultural implements, and for other requirements. Their equipment is modern in every respect, which facilitates turning out the highest grade of springs promptly. Good results are obtained because they use the highest quality of material and employ only experienced workmen.

The firm of John F. Allen, 370-372 Gerard Ave., New York City, reports a good demand for the well-known "Allen" riveting machines, with sales during the month of March to the following concerns: Driggs-Seabury Ordnance Co., Sharon, Pa.; Pierson & Goodrich, New York City; Springfield Boiler & Mfg. Co., Springfield, Ill.; Baltimore Bridge Co., Baltimore, Md.; Groton Bridge Co., Groton, N. Y.; Berger, Carter & Co., San Francisco, Cal.; Amer. Tank & Tower Co., Elgin, Ill.; Amer. Car & Foundry Co., Memphis, Tenn.; Christopher & Simpson, St. Louis, Mo.

Adreon & Company, St. Louis, announce that they have secured exclusive selling rights covering the United States railroad trade for "Anti-Selenite" Boiler Scale Solvent. This compound is manufactured in Monterey, Mexico, and its basis being vegetable, it protects instead of injures the metal in boilers, and is remarkably effective in removing scale under all conditions. It has been subjected to exhaustive tests in this country by all classes of steam users, and reports on file prove every claim made for it by the manufacturer. "Anti-Selenite" received a gold medal, the highest award, at the Louisiana Purchase Exposition, against 72 competitors.

The Niles-Bement-Pond Company has leased an entire floor in the new Trinity Building at 111 Broadway, New York, and will be located there after May 1st. As is well known, the executive offices have been located in New York since the organization of the company under its present title. The Niles-Bement-Pond Company employs about 5,000 workmen, and has two factories in Philadelphia, one in Hamilton, Ohio, one in Plainfield, New Jersey, and it also owns the Pratt & Whitney Company at Hartford, Connecticut, thus constituting this company very much the largest builder of iron-working machinery in the world.

The International Acheson Graphite Company, of Niagara Falls, N. Y., announce that they have made arrangements with The Sherwin-Williams Company by which the latter firm becomes the sole manufacturer in the United States and Canada of Acheson Graphite Paint. Acheson Graphite is made by heating anthracite coal in an electric furnace at an almost inconceivable temperature which vaporizes and drives off all impurities and converts the carbon form of the coal into pure graphite. The process was invented by Mr. Edward. G. Acheson, one of Carnegie's "Captains of industry", and al- by the inventor of Carborundum. Acheson Graphite is said to process inherently the requisite characteristics of an ideal pigment for protective paints for metal surfaces.

The H. A. Rogers Company, 19 John street, New York, desire to announce that they have made permanent arrangements with Mr. E. W. Saunders to devote special attention to the machine tool department which has always been an important adjunct to their line. Mr. Saunders has for many years been identified with the machine tool trade in New York and being well versed in machine tools and their uses, his views will benefit purchasers, especially those seeking outside aid in selecting plants for manufacturing machinery on the interchangeable plan with greatest economy. The H. A. Rogers Company represent the well-known firm of Bentel & Margedant, Hamilton, Ohio, manufacturers of high grade woodworking machinery. Principals not represented in New York territory can secure active cooperation in the sale of their product for equipment of mills, mining property, factories and machine shops.

The instructions to the Canadian section of the international commission to investigate and report upon the conditions and uses of the waters adjacent to the boundary line between the United States and Canada have been framed by the Dominion government. Among the subjects that may come up for consideration by this commission are the following: 1. The proposed diversion southward by the Minnesota Canal & Power Company, of Duluth, of certain waters in the State of Minnesota that now flow north into the Rainy River and the Lake of the Woods. 2. The diversion about a mile and a half east of the town of Sault Ste. Marie of part of the waters of the St. Mary River into the Hay Canal entirely through American territory. The river St. Mary now forms part of the boundary between the United States and Canada, and the waters of the river are clearly international. Canadian vessels, of necessity are using the Hay Canal, but no treaty has been made confirming their right. 3. Inquiry into the effect of the construction of the Chicago Canal on the levels of lakes Huron and Erie. 4. The building of a dam and other obstructions on the St. John River, flowing through the State of Maine into New Brunswick, contrary to the express stipulation of the Ashburton treaty.

Mr. Newbigging, chief engineer of the Manchester municipally owned gas works, in a paper read recently before an association of students of civil engineering, said that the introduction of the incandescent gas-burner had given a new lease of life to gas undertakings, and had placed gas in the front position as the cheapest illuminant. While he did not deny that, for decorative effects, electricity had advantages over gas, he thought the recent introduction of the inverted incandescent gas-burner bade fair to rival the present incandescent electric light. Having made the statement that electricity, light for light at Manchester prices, is eight times dearer than gas, he said an incandescent gas-burner develops, per cubic foot of gas consumed, from 15 to 40 candles, according to the system employed. With gas at 56 cents per 1,000 cubic feet and electricity at 7.72 cents per unit, average prices in Manchester, and taking the lowest power developed by the incandescent gas-burner, viz., 15 candles per cubic foot, 15,000 candles per 1,000 feet, the cost would be 3.72 cents for 1,000 candles, while one unit of electricity developed in "an incandescent burner," a light equal to 256 candles each at 7.72 cents per unit, or 30.10 cents per 1,000 candles.

That the steam turbine and turbo-generator are destined to be one of the greatest power developing and distributing factors is evidenced by the number of units of this type which have been installed, and which are now in the process of construction. Owing to the restrictions placed by reciprocating engine speeds upon the designs of engine type generating machinery, their dimensions and bulk, as also the cost, have increased enormously in the past few years with the increase in capacity. With the advent of the steam turbine the speeds have increased so as to secure in generator construction minimum bulk and cost consistent with strength and durability. A striking example of this may be seen in the power equipment of the Rapid Transit Company in New York. Turbine type generators with a rated output of 5000 kw., weighing 234,000 lbs., run at 750 r.p.m. Generators of the same output driven by reciprocating engines at a speed of 75 r.p.m. weight 980,000 lbs. Orders for eight turbine generators have been placed with the Westinghouse Electric & Manufacturing Company in the past few days, mostly for 400 and 500 kw. units, with one 2000 kw. and one 2500 kw. machine.

The executive offices of the American Steel Foundries until lately were located at No. 74 Broadway. With the object of concentrating all of the departments of this well-known concern, it was found necessary to lease the entire eleventh floor of the recently completed building known as No. 42 Broadway, and henceforward communications should be sent to this new address. It is well known that in the new movement towards consolidation of allied industries, one of the chief elements of success involves the systematizing and harmonizing of every branch of the business. With this end in view the executive officers of the American Steel Foundries are inaugurating, simultaneously with the removal, a new system of accounting and distribution of orders, which will improve the organization and simplify their work. This will assist them in taking care of the many large orders they are receiving due to the increased demand for new equipment by the railroads and other large producers. The output of their eight plants for all kinds of steel castings is enormous, and they are always in a position to undertake new work and make prompt deliveries. With the acquisition of the Simplex Railway Appliance Company they are even better equipped than ever to fill the requirements of railroad companies and car builders.

Though the average American is far ahead of the German or Frenchman in inventive talent, he is handicapped by lack of technical knowledge. The little town of Sonneberg, in Germany, for instance, has an industrial school which has been in existence for twenty years. This school gives instruction in drawing, painting, modeling, turning in wood and ivory, wood carving, geometry, and arithmetic. The principal object is to train young people for the manufacture of toys and ceramic ware, which are the chief industries of the dictrict. The school has 74 students, and the cost of tuition is but 50 marks ($12.90) per year. Additional technical schools, giving instruction in glass blowing, painting on porcelain, drawing, modeling, and carving are located in Schlakau, Limbach, Lauscha, and Rauenstein, which are quite small places in the Sonneberg district. The town of Sonneberag has also a commercial school attended by 151 pupils, who are instructed in commercial knowledge, political economy, the English, French, and Spanish languages, bookkeeping, stenography and typewriting, calligraphy, and arithmetic. The efficient training given by such schools makes Germany capable of successfully competing with countries possessing superior natural advantages, and accounts in part for the wonderful rise of Germany's export trade and merchant marine.

A model of a recently invented automatic buffer coupling attached to two model cars has been exhibited at the offices of the London and Northwestern Railway Company. The coupling not only connects the vehicles, but at the same time connects the Westinghouse or vacuum brakes. The model shows the cars on a two-chain curve, which is more acute than any of the curves in existence on British or Continental lines. The outstanding feature of the invention, it is claimed, is that no manual labor is required to complete the act of coupling, the patent differing materially in this respect from the couplings which require to be put into position by a lever. The attachment has both an up and down and a lateral movement, thus adapting itself to either loaded or unloaded cars, and to sharp curves. To use the new coupling no alteration is required in the general construction of railway rolling stock. Being a buffer in itself, the two side buffers can be dispensed with, thus saving, it is estimated, at least nine hundredweight (1,800 pounds) in weight on each vehicle. There is also an attachment by which, in case of accident, or in the event of the vehicles becoming separated, the brake is automatically applied to all the cars. The coupling consists of only five parts, and no springs are exposed. It is said to work so easily that an engine fitted with the new coupling could be sent after a runaway car, and become attached to it on the slightest impact. In addition to being adapted for railway rolling stock, the coupling can be used for many other purposes, it is claimed, such as limbering or unlimbering gun carriages.

Many tentative efforts have been made to adapt the self-propelled stage coach to metropolitan conditions, and out of them several styles of motors have survived as suited to 'bus purposes. The points claimed in favor of each style are cheapness, trustworthiness, comparative simplicity in handling, and freedom from noise and odor. Each of the great London omnibus companies has adopted its type of motor car, and each is striving to see which will be the first to make the change in locomotive power. The first installment of the new autocars are now running for hire, and are taking their turn in the long procession of the streets. London is, without doubt, the chief 'bus-using city of the world. It is estimated that there are about 2,500 omnibuses in that city. To replace them, reckoning two motorbuses to three horse omnibuses, would require over 1,600 autobuses at least, but more likely 2,000 will be necessary, for on some of the routes small single-decked vehicles will be used. The field is a very large one, and the replacement of horses by motors will not be a matter of months, but of years. The London General Omnibus Company, which, as the greatest of the 'bus companies, had most to lose by any wrong step, deliberated over the idea for some years before it began to change its motive power. It has had two motorbuses running for a few weeks, and the trials have been so satisfactory that the company has decided to turn its 1,600 horse 'buses into motorbuses by mounting them on motor chasses. Two types of 'buses have been chosen. The speed of one type will be about 11 miles an hour, and it will carry the usual twenty-six passengers. The other type is a steam car with no roof seats, which is intended to carry sixteen passengers, but the police will not allow the two front seats beside the driver and the single seat beside the conductor to be used.

A description of a machine for accurately registering the cubic contents and linear measure of lumber or logs at the saw mill will be of interest to those connected with the lumber industries in the United States. It can be applied to either circular or gang saws, and a test witnessed proved the machine to be more accurate than the recognized standard tables for computing the cubic contents of lumber in a log. The mechanical principles involved are so simple that one could not but wonder that it had not been thought out before. The machine is attached to the side and upper part of the gang-saw frame, is operated by a chain belt from the feed-roller gear, and so geared that the length of the log is registered as it is drawn into the saws. By the attachment of a small roller placed between the feed roller and the saws and fastened to the feed roller, the irregularities of the log's surface, by the rising and lowering of the feed roller, are communicated to the indicator, which in turn controls the numerators registering the cubic contents. After the log has passed through, the feed roller, carrying with it the roller, lowers, thereby disengaging a small ratchet, throwing the indicating machine out of action. The indicator is first set at a point indicating the average diameter of the logs to be sawed, and the supplementary roller, which is attached to and working in harmony with the feed roller, causes the pointer to indicate the exact diameter of the log, which in turn regulates the speed of the gear wheel operating the cubic numerals. The machine is compact, strongly made with interchangeable parts, and should wear indefinitely. A millwright or machinist would readily understand the principles involved and be able to attach the apparatus without difficulty. The American rights are for sale, and at the desire of the inventor interested parties are requested to address all communications to the United States Council at Glauchau, Germany.

Technical Publications

Tests of Pennsylvania Railroad Consolidation Locomotive No. 1499, Pennsylvania Railroad Co., Publisher. Price 50 cents. Complete results of test of the P. R. R. consolidation locomtive; 34 tables; 64 curves; 7 drawings of apparatus and engine.

Arbitrary Price Making Through the Forms of Law, by Henry Wood. Lee and Shepard, Boston, publishers; 29 pages. Price 10 cents. A few points bearing upon the proper limits of governmental supervision or interference in railroad transportation.

Lecture Notes on Some of the Business Features of Engineering Practice—187 pages. Department of Business Engineering, Stevens' Institute of Technology, 1905. Contents—The Point of View, by W. C. Kerr; Notes on Contracts, by H. E. White; Accounting, Repairs and Depreciation, Accounting as Applied to Depreciation, Systems of Classification—Taxes, Analysis of a Balance Sheet, Analysis of Data, and Estimates and Specifications, by Humphreys.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

The Number of Coats on a Car

The time was once when it was thought by many that the more coats of paint and varnish there were put upon a car the more thorough was the job and the better the wood would be "preserved." It was like the Irishman with his boots; he got more leather for his money by buying several sizes too large for him. Thirty-five years ago, when most passenger coaches were painted light yellow, if the painter did not put on about ten coats of paint and three coats of varnish to a newly painted car from the wood it would have been considered that he was not doing justice to it; that he was "skinning out," or cheapening work. But the world has moved since that day and the paintshop has kept in pace with it Now, instead of a car lying in the shop three months to have all these coats and much ornamenting put on, it is hustled out in less than that number of weeks. Coat by coat little by little, year by year, has the method and cost of painting a passenger coach shrunken, until it has now reached sensible and businesslike proportions. Rough-stuffing and block pumicing to get a piano levelness, requiring three extra coats of material, if not more, has given away, or is giving away, to a method that only requires three operations, or coats, from the wood to bring it up with the required surface to the color; and with two coats of color and two coats of durable finishing varnish—all that is necessary, under ordinary conditions—the job is complete from the wood, with seven coatings, to-wit: 1. Priming. 2. Knifing surfacer. 3. Sanding coat. 4. First coat color. 5. Second coat color. 6. First coat varnish. 7. Second coat varnish. In the case of a baggage or mail car the second coat of color and first coat of varnish can be applied at once in the form of an enamel or varnish color, and thus the operations or coatings be successfully reduced to six. We have recently turned out a new 60-ft. mail in this way and have another to do.

It is manifest that the least material that can be applied to a car from the wood, consistent with a passable surface, the better it is for the life of the car; not only in less liability of the material itself to crack, but it allows of the annual "cutting in" and varnishing and an occasional entire painting over the old paint without such an accumulation of material as would otherwise be with its bad results, and longer life, we believe, to the job as a whole. Of course much depends upon the nature of the material used in either case, but the writer is of the opinion that at last—and he has been slow to adopt a knifing system—the right kind of material is upon the market for this purpose, and he is obtaining good results from it in the shop, with every indication of its durability in years of service. At present he is more than pleased with the appearance of the work and that the slop bucket has been abolished on sheathed cars at least—he may rub down an occasional panel car yet for a while, but hopes, in the near future, that block pumice surfacing will be no longer needed for any kind of car exterior. There is a class of cars at least—baggage, express, mail and milk—that one can experiment on and when he has got a number of men broken in on it and somewhat expert, then coaches and other and better work can be undertaken. Once established we believe this system will never be abandoned for the old method, with men growling with rheumatism and sore hands, to rub a car with block pumice and water, to say nothing of soaking the work to its injury, with necessary time to dry.

Exterior Natural Wood Finish

To attempt now, in the light of leading railroad experience and the practice of the Pullman Company, and in view of the universal testimony of master painters in convention assembled, to finish car sashes of mahogany in the natural wood on their exteriors is to take a long step backward to the primitive, the pre-historic and the impracticable. It is the waking up of Rip Van Winkle to do something that was abolished during his long nap.

Why, do you ask? Because every foreman car painter of experience knows that natural wood finish exposed to the weather is not a durable foundation for varnish. Consequently it will perish and the smoke, working its way rapidly into the perished varnish, like into one's chapped hands, soon begrimes them into an appearance intolerable to the esthetic eye. Then, to keep on in this unwise practice, there is nothing else to do but to scrape and plane off again and proceed as before, ad finitum, ad nauseam, until the sash grows too thin to keep in the car without rattling, and then a new set must be made, only to repeat the former errors upon. It is so well known now that it almost goes without saying that a good paint foundation is the best to sustain varnish upon exposed to the weather. To this end, if a mahogany finish is desired, the natural wood itself is easily reproduced in paint by painting the sashes with the suitable ground color and then with the gelatine roller take from the natural wood the exact impression of it and reproduce it upon the sashes by the printing process as accurately and tastefully as by chromo-lithography. There is no perceptible difference, hardly in the eyes of an expert, between this effect and the wood itself finished in varnish; but the durability of the job is far superior. Sashes finished in this way, by actual experience and observation, are good for the life of the paint on the rest of the car with annual varnishing, and will not need scraping until does the rest. The writer knows of a batch of fifty cars so treated nine years ago and are in good order today, with only annual cleaning and varnishing. And being built outside of his own shops, in a car manufactory before he knew anything about this method, or had much to do with the specifications, he varnished them two or three years before he knew they were grained, and would not have known then except for an accident that happened to them, and then he scraped a spot with his knife for confirmation of his new-found light. Such is the effect that the painter's art can be brought to that, you see, "the very elect" can be thereby deceived. What better can be desired for a finish then, durability considered?

There is but one practicable alternative, and that is to paint the sashes the body color of the car where Pullman color is used. This the Pullman company are already doing with their parlor and sleeping cars; and it may be argued that if it will do for them why will it not do for rairoads to follow suit? There is some foundation for an argument here, we are ready to admit, especially since we long ago painted the exterior of deck sashes that way; also doors of passenger cars, and now we are painting side vestibule doors in that fashion. But, having seen a train done that way in which at least one railroad has followed the Pullman style, we object to it on account of the hearse-like appearance produced. It needs the mahogany finish of sashes on the body of the car to break up this all-overish, monotonous, gloomy, paint effect. And this can be done with very little, if any extra cost; consequently, finance and finish impels its continuance. Still, it is more practicable to do even this than to finish in the natural wood.

Outs About Piece-Work

One of the disadvantages of piece work, for the company at least, is to introduce any new, quicker and cheaper methods of doing the work during the year or season under way. The schedules are all made, the contracts given, prices established and men employed to do it, and everything running so smooth that if some bright, thinking mind devises a shorter cut to get an equal result with less expense to the company and to the betterment of the car it will be difficult to introduce it, because it interrupts the present order of things, which must run the season out on the let-well-enough-alone principle, though at more expense to the company; and possibly when a new year's force is employed it may be considered worthy of adoption.

Now with day work any new idea introduced to shorten labor can be belted right on to at once, without spoiling anybody's piece-price profits, and the company begin to reap the benefits of it immediately. What think ye? We recognize that there are benefits to the employer and to the employee under the piece-work system. Still, as with about everything else in this mundane sphere, there are some outs about it—it is not perfect, perhaps far from it. The work is probably not so well done, for another item on the list of imperfections, no matter how well inspected. Charity covers the multitude of sins here more readily than on day work.

Having seen day work and piece work running neck and neck on the same railroad at two shops fifty miles apart, with the odds in favor of the day-work shop in point of work turned out per man, we are not at present convinced that the company is gaining a whole lot at the piece-work shop, though we are ready to concede that some of the men are making a good thing at it. "Well," you say, "then they must be paying too much at the piece-work shop." We doubt it; the prices are reasonably low. Possibly the day-work men are "scratching gravel" a little for fear of its adoption, perhaps a needless fear on their account. It goes to show what can be done at day work to carry out a principle; and possibly what can be done at piece work to keep from making too much to have the prices further cut. Justice is somewhere located between these two shop crews, but where we are not at present prepared to state. At any rate, piece work has its outs and day work its ins, which we shall doubtless hear all about when this perplexing subject comes up at the next convention, when able advocates will have their say on both sides of the question. At present, however, we are inclined to think that, in general, piece work has the abler advocates, take the country over, who have long been at this form of work and know its ins as well as its outs. We shall hear what we shall hear, and see what we shall see.

Courtesy Breeds Courtesy

A surly, overbearing employer can hardly expect to develop courteous, willing employes. Half the trouble with help comes from the fact that some men forget what they felt like when they were journeymen themselves, and never give any consideration to the fact that their employes are human like themselves. A man need not be "Jack" or "Bill" to his workmen, but he can be pleasant and agreeable, while exacting, as to the relationship between himself and those about him. A gentleman will always be treated like a gentleman by everybody he meets. The reason why some men are always being insulted or imposed upon is that they leave themselves open to such treat-

A SCROLL BY WARNER BAILEY.

ment. Kindness and courtesy are cheap and will go a long way towards making your business relationships satisfactory as well as profitable.—Selected.

Early Manufacture of Varnish in London

In or about the year 1760, a poor French gentleman, by reason of a rebellion in France, emigrated to London and took lodgings in a house near Long Acre. To support himself, he manufactured a little varnish, and not knowing the English language he was compelled to get a young woman living in the house to dispose of it. She took some to Mr. Hatchett to test, which he did, and then ordered two gallons more of it. The Frenchman was highly pleased with the success. The girl stood by him while he made it. She thought he might allow her to make some, and refused to sell any more unless he allowed her to make it, which he did. He stood over her to see that the gum was not spoiled, and she made it equal to what he first made. The girl was the (afterward) celebrated Mrs. Ives.—George Burgess, in Carriage Builders' Gazette.

About the year 1845 the once celebrated carriage making firm of Ives & Innell, of Long Acre, London, failed, and the business closed up. Mr. Ives, having secured the formulas from his aunt, the Mrs. Ives referred to above, began the manufacture of varnish. His son, John Edward, then just attaining his majority, began with his father the study of the manufacture of varnish, and accepted his first position as varnish maker for a firm in Liverpool; after a two years' engagement he went to Scotland, and remained in the employ of Messrs. Dawson & Co., of Leith (now North British Color Works.)

In 1854 John Edward Ives went to London, and entered the employ of Pontifex & Wood. About the same time William Marshall, then a boy of six years, removed with his parents from Scotland to London, and in 1859 went under the tuition of Mr. Ives to learn the business of varnish making, and remained with him, hearing many a good story about the above Lady Ives, until 1869.

In 1870 William Marshall came to America, and since 1872 has been engaged in the manufacture of varnish at Newark, N. J. He has very properly adopted the name of "Anglo-American Varnishes" as his trade-mark.

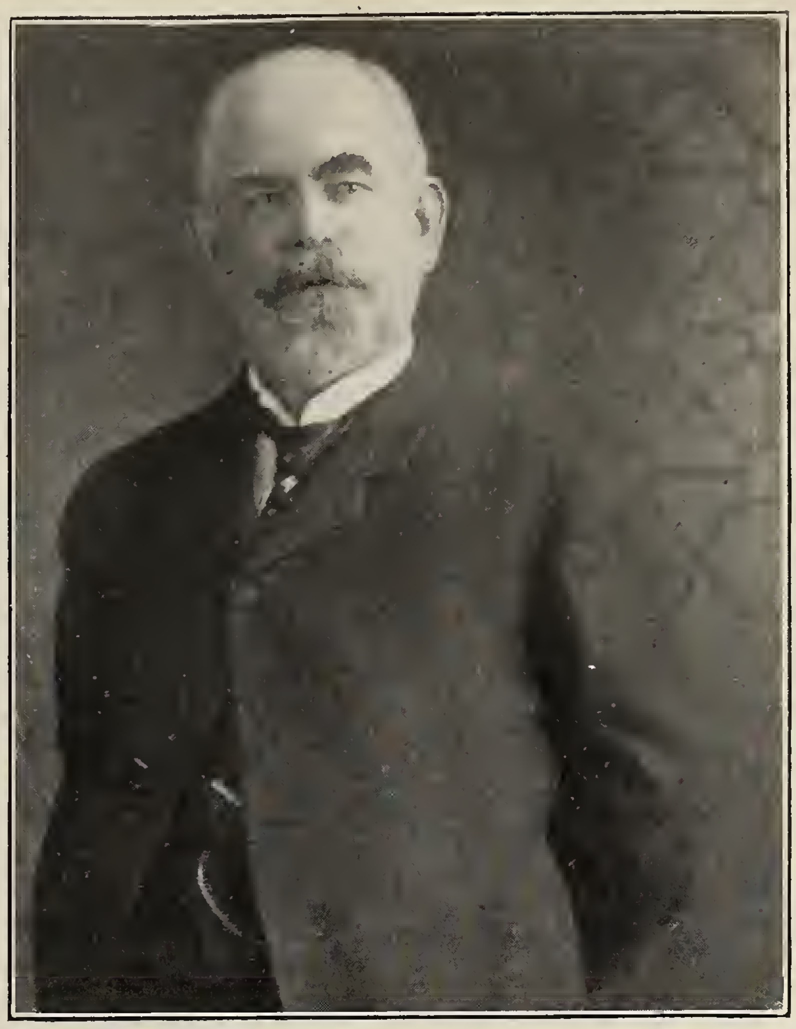
In the main features of varnish making he is making his goods on the same principles as those handed down to posterity by the poor Frenchman in London.—Exchange.

And today this same William Marshall is making varnishes which are noted for their permanence of lustre. The Anglo-American Varnish Co. is also producing a black rubbing varnish which is a delight to all who use it.—From "The American Vehicle."

Among the Supply Men

WILLIAM MARSHALL.

Mr. William Marshall, secretary and general manager of the Anglo-Aemrican Varnish Company, Newark, N. J., whose photo adorns our columns this month, was born Sunday, Jan. 9, 1848, at Edinboro, Scotland. The family left Scotland and went to London, England, six years later, and on Wednesday, April 13, 1859, young Marshall, at eleven years of age, entered the varnish works of Pontifex & Woods, London. There, under tuition of John Edward Ives, who was a third generation of varnish makers, the subject of our sketch received education both in general knowledge and varnish making, where he remained until June, 1870. Then he set out, Columbus like, for the New World and made Canada the place of abode for a time; then to New York, where for eighteen months he was in the employ of the old house of Win Tilden Blodgett. In December, 1872, he started in business at Newark, N. J., and in 1890 became incorporated under the name of the Anglo-American Varnish Co. Since then he has devoted almost all the time to the production of the highest class of railway varnishes and has the high honor of furnishing a number of the leading railway systems of the United States with his product.



WM. MARSHALL.

The writer first met Mr. Marshall at the Buffalo convention in '94. He shares the friendship and confidence of his fellow supply men, having for years acted as secretary and treasurer for them at our conventions, and is withal a fast friend of our association and a genial acquaintance with those who know him.

Varnish and Paint Removers

Recently the attention of the Ball Chemical Co., Allegheny, Pa., was called to several varnish removers now being placed on the market. They succeeded in getting samples of nearly all of them and find, by anaylsis, that they are all infringements on the patent issued to Mr. Ball and now owned by their company. In order to protect their rights under the patent they have had the patent attorneys, Messrs. Kay, Totten & Winter, of Pittsburgh, make a complete examination of the patent records and rendered the following report:

"At your request we have made an investigation of patent No. 488,416, for a paint and varnish removing composition, granted Dec. 20, 1892, to George L. Ball, and now owned by your company.

"We find that this patent was regularly issued and is valid in all particulars. We made a thorough investigation of the prior art and find that this is the first patent for paint and varnish removing composition consisting of solvent hydrocarbons. There were prior thereto a number of patents for paint and varnish removing composition, but these consisted of entirely different ingredients and all containing either alkali or acids. There were also prior thereto compositions for cleaning purposes which contained some one of the ingredients mentioned in this patent, but none of these latter compositions were capable of removing paint or varnish and did not even remotely resemble Mr. Ball's composition. Although the patent office cited a number of such earlier cleaning compounds it did not maintain that Mr. Ball's invention was affected thereby, for it allowed his application without requiring any change whatsoever to be made either in the specification or claim.

"The patent is a pioneer one, and is therefore entitled to a broad and liberal interpretation, so that the courts will give it a very wide range of equivalents and will hold as infringements thereof any compositions having the essential ingredients of the composition described in the patent, or the equivalents thereof. This will bring within the scope of the patent many varnish removing compositions placed on the market since the grant of the Ball patent, and which contain similar ingredients to those mentioned in said patent, or their equivalents, and producing the same result. The sale and use of all such compositions can be enjoined, and damages collected from the manufacturers, the sellers, or the users. We advise that you take steps to enjoin the manufacture, sale and use of these infringing compositions."

Notes and Comments

The man who courts trouble is soon married.—The Western Painter.

And not easily divorced.

THEY COVER THE EARTH.—A special train of seventeen cars loaded with Sherwin-Williams' paints and varnishes passed through Newton today. The train is en route from Cleveland, Ohio, to Texas, where its contents are consigned to retail dealers.—Newton, Kansas, Republican.

ANOTHER BRANCH.—The Sherwin-Williams' Co., of Cleveland, O., will erect a large warehouse at Fort Worth, Tex., for the more convenient handling of their paints and varnishes.—Exchange.

The paint shop of the St. Louis, Iron Mountain and Southern Railway at Little Rock, Ark., was destroyed by fire March 19, entailing a loss of $65,000."

We clip the above from "The Western Painter" for March and wonder if this is another case of varnish remover and the flame of something that should have been kept away from it. We believe Bro. Younger is foreman painter at this place.

April 1 an explosion in Berry Bros'. varnish factory at Detroit, Mich., started a fire which caused a loss of $25,000 before it was extinguished. Fortunatey no one was injured.

The N. E. R. R. Club held its last meeting at Pierce Hall, Copley Square, Boston, April 11. This elegant hall, where the club has met for several years, being a part of the Pierce building, built and owned by the S. S. Pierce Co., Boston's famous grocers, is to be remodelled the coming season into offices. The club will, at its May meeting, visit the new large car shops of the N. Y., N. H. & H. R. R. at Readville in the afternoon of the third Tuesday (postponing its meeting one week on account of the International Railway Congress at Washington), returning to dine at some hotel not yet decided upon, where the meeting will be held. It is now probable that next season's meetings will be held in a hotel, preceded by a dinner, reading papers and holding its discussions at the tables while the cigars are passed. This will make it very social. "The Curtis Steam Turbine" was the subject at the April meeting, with stereopticon and interesting paper by a representative of the company.

There is one man at least who would hail with delight the success of the committee on uniform stenciling of freight cars, and he is Wm. E. Dyer, foreman painter at the B. & M. shops, Lyndonville, Vt. During the month of March he had two wrecks of three or four cars each of Chicago refrigerator beef cars to repaint, with all their indescribable hieroglyphics and variations of outline and color. We believe there were just two alike in the lot. This, to a small shop with limited men, was a great burden with its regular work to be got out for the month. Will the "beef trust" submit to uniform stenciling? We trow not. Perhaps it is not intended to apply to their cars.

Somewhat hearse-like in appearance, passing by where this writer sees them in a train of coaches with mahogany sashes, are Pullman parlor cars with sashes painted the body Pullman color of the car. It is an all-overish look to the car, for all that breaks the monotony of color now is one wide gold stripe near the bottom of the car, a few narrow ones

Established 1878

RAILWAY MASTER MECHANIC

Published by the

BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago

TELEPHONE - - MAIN 3185

Eastern Office: Room 714, 132 Nassau Street, New York City.

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent.

Vol. XXIX. CHICAGO, JUNE, 1905. No. 6.

Contents.

It is a pleasurable duty to record the fact that the American Railway Appliance Exhibition was not only an unqualified success, but it has eclipsed the most ardent expectations of the friends of the supply fraternity and manufacturers of railway specialties. In point of thoroughness it was unequalled, and furnished a liberal insight into the intricacies of details necessary to the maintenance of power, rolling stock and permanent way. To make a showing as complete as this one, meant the expenditure of much money, gray matter and energy, more than can come within the mental grasp of anyone not familiar with the inside of the railway supply business, and it was worth all the time and trouble involved, for it was the most perfect exhibition of the kind ever gotten together.

These features which were of such magnitude as to require a separate pavilion for a proper presentation, constituted a very attractive part of the show. Most of these buildings were put up sufficiently durable to be permanent structures, and cost a nice sum to erect, evincing a spirit of enterprise that will bring golden returns. While all who were identified with this magnificent show are entitled to great credit, the chairman, George A. Post, has covered himself with undying fame as an organizer and director, by his indefatigable work in piloting such an immense project to a glorious issue.

Improvement of the Locomotive

In the development of the steam locomotive to its present high standard, the general aim of the designer has been in the direction of fuel saving, first, by perfecting the valve motion to produce a correct and economical steam distribution, next by compounding the cylinders to obtain an increased range of expansion, for the extraction of as much heat from the steam as possible, and of these there are the two-cylinder, three-cylinder and four-cylinder types. The latter system has many points of superiority over the first named, not, however, from the principle of compounding, but rather from the fact that the engine may be made a balanced machine, containing within itself the germ that has produced a more nearly perfect locomotive than any that has preceded it, and one that makes the most radical change in its history.

Coming with this improved type of locomotive, there is a well defined revival of interest in compounding, not from the fact of an increased efficiency of the newer types in handling of steam, but for the advantages due to the balancing referred to, which eliminates the stresses and shocks heretofore absorbed by the machine and roadbed. That this interest will survive is fair to believe, for the reason that the question of superheating in connection with compounding has assumed an importance second to no other scheme so far worked out for the heat engine, and supplements rather than antagonizes all that has gone before in the direction of improvement. The efforts made abroad for some years, and latterly in this country to show the economy possible in the use of superheated steam in all types of cylinders has been so productive of flattering results, that even the simple engine has a longer lease of life, since it has been demonstrated that it can when using superheated steam develop a horse power on less fuel than can the compound engine when using saturated steam.

German engineers have been most persistent in this race for results with the superheater, and to them great credit is due for blazing the way to a higher steam performance, for their attention has been given unceasingly to its application to both simple and compound engines. Their latest attempts in this direction have been made on the Prussian State Railway, which has been the scene of the most extensive tests of the superheating system on locomotives. In this case the engines were of the outside cylinder simple build, corresponding to our mogul type, and equipped with the Schmidt superheater. In a competitive test with other simple engines and also with compound engines in the same service, but which used saturated steam, this mogul showed that the superheater gave an efficiency of 20 per cent for water, and 15 per cent for fuel. The superheat ranged from 570 to 660 degrees F.

The devices tested for superheating on above railway embraced also the Pielock system which differs from the Schmidt in the particular that it can be applied to any boiler already in service and be in harmony with existing details. In competitive tests in passenger service with simple engines without a superheater, the Pielock device gave an economy of 16 per cent in water and 12 per cent in fuel, while a compound engine gave an economy 10 per cent in water, and 3.5 per cent in fuel over the compound using saturated steam. The Pielock system is very elastic in point of application, since it may be placed at any position in the boiler, and does not depend on a smokebox connection as in other systems. A superheat of 350 degrees Centigrade (660 degrees F.) is obtained in the Pielock superheater, which is seen to compare closely with the heat developed in other systems.

In the Schmidt system the superheating is accomplished by means of either a single large tube located in the boiler at the bottom line of boiler tubes, and connecting with the superheating tubes in the smokebox, or, by a number of smaller tubes located near the top line of boiler tubes, and connecting with the smokebox tubes. A very high temperature is possible with the first of these arrangements, the gases being heated to a temperature of 1,500 to 1,800 degrees F., with a resulting temperature of from 550 to 650 degrees F. While the initiative in superheating was taken abroad, and followed up so intelligently as to give results plainly worthy of consideration, the interest awakened in this country is by no means a passing one. The action of the Canadian Pacific Ry., in pushing investigations of the merits of this idea of the conservation of heat, was of such a positive character as to enlist the best efforts of the engineering fraternity in this country, and we can now point to superheaters of an improved form going into service on several of our prominent roads. The heavy simple Pacific type engines recently going into service on the Erie R. R. exemplifies the activity of our designers in superheating, as it is equipped with the system devised by the American Locomotive Company, several of which are in use on other roads, and giving most excellent results.

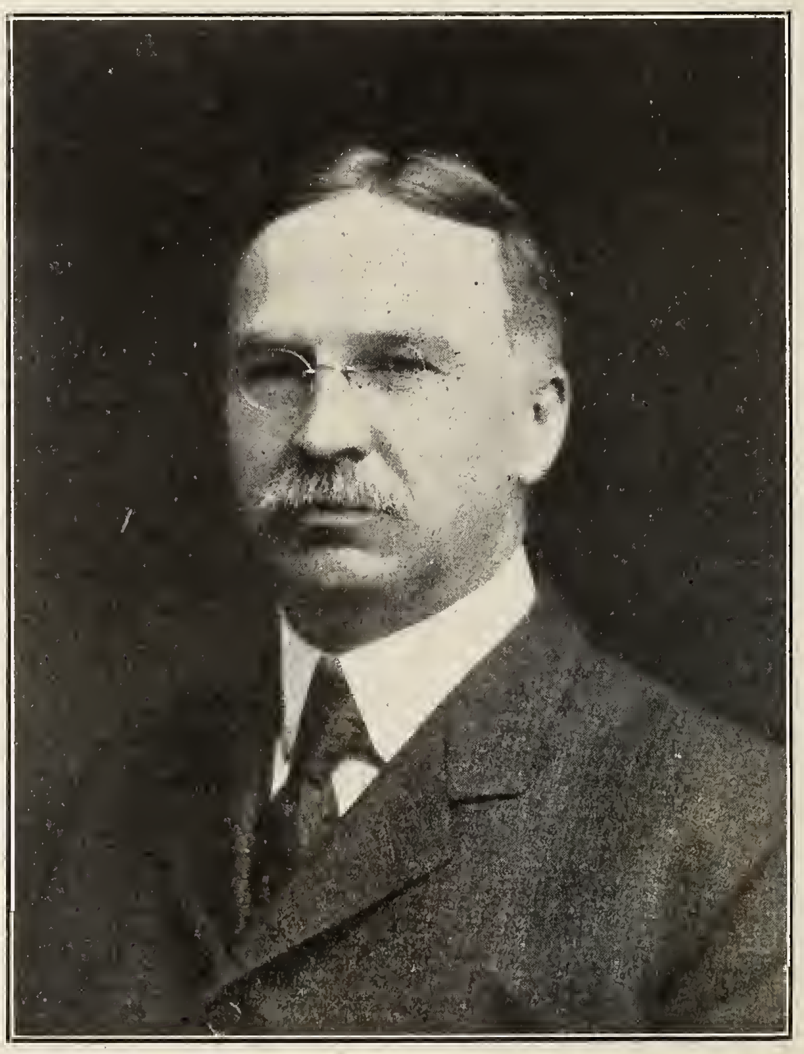


Photo copyrighted by C. M. Bell, Washington.

MR. THEODORE P. SHONTS.

CHAIRMAN ISTHMIAN CANAL COMMISSION.

Mr. Shonts was born in Crawford County, Pa., in 1855. He graduated from Monmouth College in the class of 1876, with the degree of B. A. In 1879 the degree of M. A. was conferred by the same college. He entered railway service in July, 1881, since which time he has been, consecutively, superintendent Iowa Construction Co. till May, 1882; May, 1882, to 1886, general superintendent Indiana, Illinois & Iowa Rd.; 1886 to 1898, general manager same road; 1898 to 1902, president same road; on January 15, 1904 he was chosen president of the Toledo, St. Louis & Western, and upon the organization of the new Isthmian Canal Commission, Mr. Shonts was chosen chairman.

It is not in evidence that the economy of the simple engine having a superheater, will have the effect of making the compound engine an undesirable factor in transportation, for the friends of that type of machine are quite ready to take advantage of a device that promises a saving in stead in addition to that due to compounding, and this is already being done on the Soo Line, a road that has given the compound engine a thorough trying out, and continued the use of that type of power during the wave of popularity on other roads. It is noteworthy that there is an advantage due to superheating that is rather more than was expected when the increase in thermal efficiency between that due to temperature of saturated steam and that of superheat was the goal aimed at. This advantage lies in the lesser liability of disaster to cylinders and reciprocating parts due to condensation, and also working entrained water. Of the first there is necessarily less than in the use of saturated steam, and of the second there is practically none, since entrained water cannot be carried over, no matter what the quality of feed water used or how pumped. It is not easy to forecast the next improvement in locomotives that will be of equal importance to those here merely touched upon, but it is probable that the boiler will receive early consideration, since not only an improved circulation cost is one of the requirements, but a reduced maintenance cost is an absolute necessity.

The International Railway Congress

THE seventh session of the International Railway Congress opened at Washington, D. C., at 11 o'clock a. m., Wednesday, May 3, with an address of welcome by the vice-president of the United States, Fairbanks. The attendance was large, 35 countries being represented. The meeting was held in the large ball room of the new Willard Hotel and it was handsomely decorated with flags of the different countries represented. Mr. Ernest Gerald, of Belgium, acted or President Dubois, who was not present. He introduced Mr. Stuyvesant Fish, president of the American section of the International Railway Congress, who made an elaborate and interesting address in English. This address was then read in French by Mr. Edward Sauvage of Paris. President Fish, by consent, appointed Messrs. Weisenbruch and Allen temporary secretaries. Announcement was then made that the five secretaries would immediately meet in the room assigned them to organize.

The questions for discussion at the Congress covered all branches of railroading and each topic was assigned to its special section. Those matters which are of interest to the mechanical department are reviewed in the following pages of this issue.

Under the general head of "Locomotives and Rolling Stock" came first locomotives of great power, the discussion of which referred to the increase in the power of locomotives by the adoption of high pressures and of the compound principle. Improvements in construction from this point of view. Use of nickel steel. Then in the second part of this section came the question of pooling locomotives, the use of two or more crews and the advantages and disadvantages of the practice and the result of such common use with respect to the efficiency and care of the locomotive. The third part of the section discussed automatic couplers, their advantages and disadvantages and the improvements effected in their construction and their use in connection with other couplings. The fourth part of the section took up electric traction, discussing the progress made on important lines of railways, continue current, alternating currents, polyhase current, experiments made with high tension currents.

Under the general head of "Working" there was taken up in the first part of the section the question of lighting, heating and ventilation of trains and the improvements made regarding the same.

On May 4, the first day the sections met mainly for the purpose of organization, and the discussion of reports and papers was not taken up until the second day, May 5.

LOCOMOTIVES OF GREAT POWER.

In the discussion of this report Mr. J. F. Deems of the New York Central lines examined different special points, especially the use of devices for increasing traction at starting, which in his opinion have not as yet given all the results that might be expected. He referred to mechanical stokers and said that it would be of interest to see them tested further. A discussion ensued on the use of these devices in which a prominent part was taken by Messrs. Muhlfeld, D. F. Crawford (Pennsylvania Lines West of Pittsburg), F. G. Wright (Great Western Ry., England), A. W. Gibbs (Pennsylvania R. R.), Th. Laurent (Paris to Orleans R. R., France). The conclusion arrived at was that up to the present time these mechanical stokers do not appear to have secured any considerable saving of fuel and are still in the experimental stage; furthermore, they seem to have given only mediocre results in England on the Great Western Ry., and Mr. Muhlfeld expressed his belief that the hardest service required of locomotives of the existing types can be secured without the use of these devices. It would be interesting, however, to continue experiments along this line.

Mr. Deems made some remarks on the most desirable forms of fireboxes. He has ascertained that narrow fireboxes wear out less quickly than wide ones, although the latter in certain cases appear to be necessary in order to secure the necessary amount of grate surface. He cited also a number of cases of breakage of cylinders which might unquestionably have been avoided by the use of pressed steel. Mr. R. P. C. Sanderson (Seaboard Air Line Ry.) recommended at all events the use of hard cast cylinders with soft cast jackets.

Ideas were exchanged in regard to the use of the compound system, which appears to have been confined in America until recently almost exclusively to 2-cylinder engines or 4-cylinder engines without crank axles.

The reporter was of the opinion that increased engine capacity could be best attained by compounding, but his opinion did not appear to be shared by the majority of the American representatives who engaged in the discussion. Some stated they were not yet prepared to express an opinion on this subject. The saving secured by compound engines appeared also less noticeable on lines of irregular grades than on lines of light grades, and the decreased consumption of fuel is largely made up by the increased cost of maintenance.

While admitting the merit of the compound system with four balanced cylinders. Mr. Deems expressed fears on the subject of durability of crank axles even when made from special grades of steel, owing to the great increase in the power of the engines.

Mr. H. H. Vaughan (Canadian Pacific Ry.) stated he had had an extensive experience with two-cylinder compound locomotives, and had noted in certain cases a saving of fuel, but also an increased cost of maintenance. He thought the use of superheating would give better results and he estimated at 10 per cent the saving of fuel thereby secured in connection with two-cylinder compound engines. Data supplied from various roads showed that there will soon be in operation in America 110 locomotives fitted with superheaters.

Referring to remarks by the reporter regarding the insufficient investigation of certain details of high power engines Mr. Deems called attention to the fact that these investigations were often rendered impossible by the haste with which orders had to be placed owing to the requirements of traffic.

After some remarks by Mr. A. Buchanan (Central Vermont Ry.) and Mr. F. H. Clark (Chicago Burlington & Quincy R. R.), Mr. A. Lovell (Atchison, Topeka & Santa Fe R. R.) reported experiments carried out successfully on his system for the comparison of compound and ordinary engines under identical conditions during the same kind of work. These experiments have proved that the compound engines were more economical as to the expense in fuel, but that their maintenance was slightly higher. Noting especially the comparative experiments made between simple and compound engines with four balanced cylinders, both using liquid fuel, have demonstrated that for long and heavy hauls simple expansion engines cannot carry the same load as the compound engines and that the latter have shown a saving in fuel of 20 to 24 per cent with respect to the former. In this special case it has been observed that the boilers of the simple expansion engines require more frequent repairs than those of the compound engines. This was due to the fact that the fire had to be forced to produce a sufficient steaming.

Mr. Lovell thinks positively that there is little difference between the cost of maintenance of compound engines and simple expansion engines and if an increase in these expenses is observed it is chiefly due to the increase in the power of the engines. He urther added, that the fears expressed by Mr. Deems as to crank axles do not appear to him to be justified.

M. E. Sauvage (Western Railroad of France) read the conclusion of his report, as follows:

Conclusions.—(a) Wheel loads: An important point in considering locomotives of great power is the wheel load permisssible. Most of the lines of any importance allow at least 7.5 English tons; frequently the limit is 8.5 to 9 tons. It is 10 English tons on several English railways; in the United States there are instances where higher wheel loads are admitted. If we limit ourselves to the continent wheel loads hardly exceed 9 tons (8.86 English tons). But it is probable that the traffic of trunk lines will require a new increase in the power of locomotives for fast trains, so that it will be desirable to have tracks which can stand wheel loads of 10 tons (9.48 English tons). However, in order not to fatigue the rails too much, it might be specified that this limit of 10 tons (9.48 English tons) is only allowed in the case of locomotives constructed so as to keep within sufficiently narrow limits, at the highest speeds, the variations of load which are produced at each revolution of the wheels.

(b) Gauge of the Tracks.—The power of locomotives built for track of wider gage than the standard, which are used in some countries (Spain, Portugal, Ireland, empire of India, Russia) does not exceed that of locomotives running on standard gage tracks. In order to benefit by the wider gage it would be necessary for the track to stand heavier wheel loads.

(c) Diameter of Driving Wheels.—The diameter of the wheels hardly exceeds 2 meters (6 feet 6¾ inches) with the fastest locomotives; at most it amounts to 2.10 or 2.15 meters (6 feet 10 11-16 inches or 7 feet ⅝ inches). Very high speed locomotives often have wheels of a less diameter than 2 meters (6 feet 6¾ inches). This results in more than 300 revolutions per minute; this corresponds to a speed of 113 kilometers (70.2 miles) per hour with 2 meter (6 feet 6¾ inches) wheels. It would be desirable not to exceed this limit, in order not to have too much wire drawing of steam; but the disadvantages of large wheels are too great nowadays. There would be an excessive increase in the weight of the locomotives, and in the weight not carried on springs, and it would be necessary, as in the old locomotives, to reduce the diameter of the boilers. The disadvantages of great angular speeds is counteracted by giving large cross sections to the steam passages, particularly by using piston valves.

On the other hand, with locomotives having six or eight coupled wheels, very small diameters are not used; the diameter is hardly ever less than 1. 4 meter (4 feet 7⅛ inches.)

(d) Material Used.—The tendency is to use metals of good commercial quality; the use of exceptional qualities, e. g., of nickel steel, is very exceptional and does not appear to be extending. The applications of steel casting are becoming more and more numerous and varied.

(e) Boilers.—In the case of boilers a grate area of 3 square meters (32.29 square feet), with a heating surface of 75 to 80 times the size, is obtained by the usual construction, with narrow firebox. It appears to be difficult to obtain a much larger grate area on this plan, and this leads to the use of fireboxes extending over the wheels. The large diameter wheels of the high speed locomotives must then be below the barrel of the boiler; this can be done in the case of the Atlantic type. In Europe, several applications of these extended fireboxes now begin to be seen, and it is probable they will multiply. For a long time hesitation was shown in placing the grate above an axle, particularly in England; now that position of the grate is generally accepted. No doubt the same will happen with regard to the extension of the firebox above the wheels.

Very high pressure (14 to 16 kilograms per square centimeter (199 to 228 pounds per square inch) are used at present, particularly with compounds. They necessarily involve an increased cost of maintenance of the boilers.

Serve ribbed tubes are generally used, particularly in France; they are useful by making it possible to have a larger heating surface with a boiler of given size. The tubes must be cleaned out frequently and with care.

(f) Compound System.—As a general rule, it is well established that the compound system results either in a certain economy of fuel for the same power, or more frequently in an increased power for the same fuel consumption. In some few cases these advantages have not been realized; this may depend on the particular use made of the locomotives or to some defects in the application of the system.

The use of four separate cylinders, acting by twos on cranks placed at 180 degrees to each other, makes it possible to obtain greater power without fatiguing the mechanism too much; this arrangement balances the reciprocating masses without producing vertical disturbances. As far as possible the cylinders must act on two different axles, but these are coupled up.

It is advisable that each system should have a valve gear of its own and that it should be possible to operate independently the reversing shafts belonging to the two groups of cylinders, high pressure and low pressure.

(g) Valve Gear.—No mechanism has succeeded in replacing the valve gear consisting of a slide valve and link motion. The link motions most generally used are Stephenson's and Walschaerts'. Valve gear without eccentrics has the disadvantage of being disturbed by vertical displacement of the axles.

The only modification of these ancient systems at all common is the replacement of flat slide valves by piston valves, which reduce friction, and consequently wear, and make it possible to arrange larger passages for the steam. On the other hand, a piston valve may leak; it makes it absolutely necessary to have a valve for admitting air to the valve chest for running with regulator closed, and it is advisable to fit relief valves on the cylinder ends.

(h) Motion.—Tail rods are to be recommended as soon as the diameter of the cylinders attains or exceeds 500 millimeters (1 foot 7 21-32 inches). The lubrication of the slide valves and pistons is ensured in a continuous manner by lubricator pumps or by sight feed lubricators, placed under the eyes of the crew.

(i) Power of Locomotives.—With the present limits of weight admitted on the main European systems, locomotives can be built, thanks to the use of high pressures and the compound system, giving 1500 to 2000 indicating horsepower (1480 to 1973 indicated British horsepower).

(j) Locomotives for High Speed Trains.—For heavily loaded high speed trains, locomotives of the Atlantic type or locomotives with six large coupled wheels are used. The choice between the two types depends on the nature of the service, on the profile of the lines, and also on the maximum wheel load allowed.

(k) Locomotives for General Purposes.—The locomotive with six-coupled wheels and bogie, the wheels having a diameter of 1.5 to 1.8 meters (4 feet 11 inches to 5 feet 10⅞ inches), is eminently suitable for a passenger train service, and the same locomotive can also haul goods (freight) trains satisfactorily.

(l) Locomotives for Heavy Goods Trains.—For heavy goods trains there is a return to locomotives with eight coupled wheels, by preference with a leading pair of carrying wheels. These locomotives can exercise tractive efforts of more than 10,000 kilograms (22,000 pounds); they are limited by the strength of the couplings used in Europe.

(m) Tank Locomotives.—A very fair amount of attention is being paid to the design of tank locomotives with six or even eight coupled wheels, either for suburban train services, where very quick starting is necessary, or for very long distance runs. A leading pair of wheels or bogie is added either at one end, or at both, according to the nature of the service. Having two bogies, however, results in having very long and very heavy locomotives.

For the convenience of the service, these locomotives have long footplates for the crew and carry large quantities of water and particularly of fuel, at least as much as is carried in the small separate tenders which are still in use.

(n) Locomotives with Flexible Wheelbase.—The only type of powerful locomotive with its whole weight adhesive and arranged to run over specially sharp curves, which is largely used, is the Mallet type. However, most railways content themselves with locomotives of the ordinary type, without flexible wheelbase.

(o) General Remarks.—The railway industry does not escape a law which nearly all industries are subject to, owing to the rapid progress made in engineering, of almost continuously modifying its stock. As soon as new locomotives have been designed, which are very superior to those used previously, one is tempted to think that to some extent finality has been reached, or at least that during a sufficiently long period it will be possible to do without any new designs. It appears very tempting to keep for a long time to standard types, which are cheaper to build and easier to maintain, but progress, which does not stop, hardly allows definite types to be determined in this way.

Thus on European railways we find locomotives running developing 1,480 and even more indicated British horsepower; but the continual increase in train weights and train speeds make it necessary today already to look for still more powerful locomotives, if not for actually existing needs, then atleast for the needs of the immediate future.

Certainly the old stock is, therefore, not to be given up entirely, and the variety of existing railway services makes it possible to utilize well locomotives which are already of older date, but care must be taken that the unavoidable age of such locomotives, which is the result of the time which passes away, is not increased by an artificial age, by making them several years old already when building them.

The conclusions of this report were then opened for discussion jointly with those of Mr. Muhlfeld's report. Mr. Moffre (Railroad of the Midi, France) states that if some American engineers find compound engines of small advantage because the increase in the cost of maintenance exceeds the economy in fuel, this opinion is not shared either by the French engineers nor by the engineers of the adjacent countries. It is true that a comparison is often difficult, as there are no engines exactly similar and doing exactly the same work. On the Railway of the Midi he had occasion to compare ordinary engines with double cylinder compound engines which were rebuilt from the former, and, therefore, had exactly the same boilers; this comparison has shown an economy of 20 per cent in fuel in favor of the compound engines. In France the arrangements with four balanced cylinders is generally preferred, as it is thought to give a better distribution of work, and a balancing of parts in alternating movement.

Mr. Moffre also thought that if compounding should at some time be abandoned for superheating, the arrangement in four cylinders will still be the best. As to the question of crank axles, it does not exist in Europe, where axles of ordinary steel can be seen seven or eight years old, and having run more than 600,000 kilometers (some 370,000 miles) without developing any cracks. Still better results may be expected with special steels.

The cost of maintenance of the machinery of four-cylinder engines should in no case exceed by more than 40 per cent that of the ordinary engines; in some special cases a saving has even been observed. As to the cost of maintenance of the boilers, that increase is solely due to the greater pressure, and it could without doubt be reduced by making certain changes in the present form of construction.

Mr. W. McIntosh (Central Railroad of New Jersey) stated that he favored compound engines which, according to him, are an improvement, and he thought that if the first types have not realized all expectations there is no reason for condemning the system, which can still be improved.

Mr. Karl Steinbiss (royal management of the Altona Railroad, Prussia) reported on experiments made in Germany during 20 years on compound engines of various types with two, three or four cylinders of the systems von Borries, Mallet, etc. At present more than a thousand engines of these types are in service in Germany, both on passenger trains as well as on freight trains, and they give the best results in respects of economy. The saving in coal is on an average 10 per cent; excepting the starting valves, the repairs are not more costly than for the ordinary engines.

Recently another great question has been investigated, that of superheating. Thanks to the use of the Schmidt superheater and to the improvements made by Mr. Garbe, great progress is expected with simple engines, with two-cylinder engines, with cylindrical or balanced valve chests. In concluding Mr. Steinbiss remarked that German locomotives can not attain such great dimensions as American engines, because the load per wheel is limited to eight tons in general, and to nine tons in special cases.

Mr. Alfred W. Gibbs (Pennsylvania R. R.) made some remarks in regard to the DeGlehn type of locomotive built for his company by the Societe Alsacienne. This engine represents a very fine type of construction and is a very handsome example from the standpoint of lightness of parts; still the distribution of parts does not seem to him superior to that in American engines, and he stated that he had had many cases of hot boxes. He would be very glad to have the opinion of French engineers on these points, and also regarding the best type of crank axles to adopt. He added that the De Glehn locomotive had excellent qualities in the matter of quick starting.

Mr. Laurent (Chemin de Fer de Paris a Orleans, France), replying to Mr. Gibbs, admitted that copper staybolts also give a great deal of trouble in France; that the upper rows have had to be replaced with manganese bronze staybolts, and they are still seeking a better metal. But these difficulties are also experienced with the American engines belonging to his company and appear inherent to the use of high pressure. As to hot boxes on drivers, he had tried American lubrication with wool waste and derived no advantage from them, and after many cases of hot boxes with this system, he has returned to the system of lubricators which, on the whole, seems to him preferable.

Returning to the question of firing, Mr. Laurent reported that by using grates inclined at an angle of about 18 degrees a single fireman can fire about two tons an hour on the powerful engines of his company. It has been shown in fact by very accurate tests made by his company that, within limits of load varying 50 per cent, the consumption of fuel per unit of work does not vary over five per cent.

Mr. Asselin (Chemin de Fer du Nord, France) stated that on his line copper staybolts have been replaced entirely with manganese bronze staybolts, the heads of which, it is true, burn out more quickly than those of copper staybolts, but by being careful to replace all staybolts whose heads have burned out, whenever the engine is laid off for any reason, all objections are overcome. For crank axles, his company uses oil tempered gun steel, which gives entire satisfaction.

Mr. Dubois (Chemin de Fer de l'Ouest, France) declared that his company had not observed any difference in wear between the three designs of crank axles which they have tried, and they have finally taken to using the least expensive design, viz., parallel crank axles.

Mr. Bowman Malcolm (Midland Railway, Ireland) estimated the saving of fuel by the use of compound engines at ten per cent., and thought that they do not involve any perceptible increase of cost of maintenance. In his opinion the difficulties experienced with them at the start should not interfere with their general adoption, and he spoke particularly of the four cylinder system.

On Monday, May 8, Section 2 again took up the subject of "Locomotives of Great Power." A discussion took place on the maintenance of boilers, and especially on leakage at the joints with the tubes and the rupture of stay bolts, which was participated in by Messrs. H. C. King (Great Western Railway), Th. Ronayne (New Zealand Government Railways), B. Malcolm (Midland Railways), A. W. Gibbs (Pennsylvania Railroad), and J. E. Muhlfeld.

It appeared from the discussion that in the United States the use of soft steel fire boxes with well spaced wrought iron stay bolts proves satisfactory, the use of soft steel for stay bolts being limited to Belpaire boilers. Some engineers prefer, if possible, to leave the fires banked during the housing of the engine, to avoid cooling and contraction. Mr. Gibbs stated that the wear of fire boxes is not so rapid as it is commonly believed to be. Thus on his system, having 3,300 locomotives in service, 700 of which are heavy engines, in late years not more than 65 to 70 fire boxes have to be replaced annually. In a boiler having a life of 20 years the fire box has been replaced on the average twice. Bad quality of water and lack of care in construction are the most frequent causes of boiler defects.

Mr. Wright observed that experiments made 20 years ago with compound locomotives on the Great Western Railway were given up because of damage due to the water entrained in the cylinders because of poor design. They have been taken up again, and last summer his company put into service a de Glehn compound locomotive which has covered the distance from London to Plymouth (246 miles) without a stop. Mr. Wright believes that the superiority of this engine consists in its two independent mechanisms.

On the compound engines of the London & North Western Railway, where the two mechanisms were connected together, the results obtained were not so good, and a very noticeable improvement was obtained after separating the distribution. The Great Western Railway has ordered two other machines of the same type, but of higher power.

M. Ronayne said that the need of increasing the power of engines has also made itself felt on the railroads of New Zealand. He has ordered four locomotives of the de Glehn type to be built, and the opinions expressed at the congress by other members indicate to him that he is on the right road. He reported that he has experienced with nickel steel with little success. The use of the latter material has given better results with piston rods, and it is at the present time being tried for smoke tubes. He also intends to experiment with spiral tubes in order to suppress the flying of sparks through the stack. The cylindrical valve boxes used in connection with the Walschaerts distribution give full satisfaction, and he prefers them to the balanced valve boxes.

M. Tordeux (East French Railroads) stated that all locomotives built for the last seven years by his comapny have four cylinders. It has 260 of this type already in service and will soon have 320 or 330. The main reason for adopting the compound system on his roads is the economy in coal. There are no coal mines in the vicinity, and the cost of fuel is about 18 francs per metric ton. The first hundred compound locomotives which were built had flat valve boxes. After the Universal Exposition of 1900 the comparative experiments which were made with engines having cylindrical valve boxes and those with flat boxes have shown that the former behaved better, that they were maintained easier and that they produced a saving in fuel of 4 to 5 per cent compared with the latter, which is due to the reduced throttling of the steam. All new locomotives are built at present with cylindrical valve boxes. The Compagnie de l'Est has also been making for a year past experiments with steam jackets, but without appreciable results. As to lubrication, the substitution of the wick lubricator by the American syphon lubricator has reduced the consumption of oil from 35 to 40 per cent. The use of the latter device is therefore being extended.

Mr. D. F. Crawford (Pennsylvania Lines West of Pittsburg) confirmed what has been said on the advantages of cylindrical valve boxes. Trials made covering a period of three years by his company on an equal number of engines of the same type, one series having flat valve boxes and the other cylindrical, proved the superiority of the latter for passenger locomotives. This system reduces the throttling of the steam; it causes only an insignificant wear, while the flat valve box requires the adjustment of the distributing mechanism between two general repairs, and, finally, notwithstanding the extreme balancing of the flat box, the lifting mechanism is much more difficult to handle. Similar trials are being made on freight engines.

Mr. Muhlfeld then summed up the various points which were brought out by the discussion, and pointed out the main differences between American and European practice as follows: The working pressure of the boilers is somewhat higher in the United States than in Europe; the slow adoption of the compound system in America, which is attributed to difficulties encountered at the beginning and to the different object aimed at by compounding, which in Europe is chiefly for the saving of fuel, while in the United States increase in tractive force is principally desired; the difference in the construction of fire boxes and staybolts, etc. Mr. Muhlfeld considers that superheating is not sufficiently developed in his country, and that it should attract the attention of engineers. He also called attention to the advantage which heavy tank engines offer by utilizing the weight of the fuel and water to increase the friction on the rails for certain classes of service, besides suburban traffic and operations, for which this kind of engine is used exclusively in America. There are also very few articulated locomotives in the United States.

Mr. Muhlfeld's last remarks led Mr. Asselin (Nord Francais) to refer to the construction on his line of an engine of great power, designed by Mr. du Bousquet, the chief engineer, which is simply an articulated tender engine. It is a compound freight engine working 228 pounds pressure, with an exceptionally powerful boiler for a European locomotive, as it has a capacity of 283 cu. ft., 32 square feet of grate surface, and a heating surface of 2620 sq. ft., of which 129 sq. ft. is firebox. There are 130 tubes of the Serve type, 2¾ ins. outside diameter and 15.6 ft. long. The object aimed at was to build an engine capable of hauling 1,100 tons on a 1.2 per cent grade at a speed of 12½ miles an hour and this same load on lines having no gradients exceeding 0.5 per cent at a speed of at least 30 miles per hour. With this object the drivers were given a diameter of 4 ft. 9 ins.

Mr. Asselin gave some details of the construction of this locomotive, which is not a Mallet engine, as its boiler rests on two articulated trucks. For this purpose the two ordinary bolsters of the engine are replaced by a single center beam which carries the boiler and rests on the two trucks. Like the Mallet locomotive on the Baltimore & Ohio Railroad, of which Mr. Muhlfeld spoke in his report, the two driver trucks are furnished with three coupled axles. As there is a fourth carrying axle placed on each truck, the weight per axle does not exceed 16½ tons. The steam is led to the high pressure cylinders mounted on the rear truck through the center bearing of the truck. Connection with the low pressure cylinders is made by means of articulated metal pipes. The total length of engine is 53 ft. Weight, empty, 85.8 tons, and loaded, 112 tons.

Following the same line of thought, Mr. Flobert (Nord de l'Espagne) described an engine in course of construction for his company and intended for hauling coal trains at a speed of 12½ miles an hour on a line containing 2 per cent grades and curves of 820 feet radius. This engine is composed of two locomotives with three coupled axles and pony truck ahead, coupled to a single rear tender. The whole engine weighs 33 tons and is 82 feet long. The tractive power is 26,400 pounds. It takes one engineer and two firemen to handle the engine.

The president read the following draft of conclusions to be submitted to the general meeting on the question of engines of great power:

"The power of locomotives is more limited in Europe than in America, owing to the lower allowance of weight per axle.

"European engineers generally agree in thinking that compounding admits of the construction of engines giving the maximum power and economy. This system utilizes the steam very well and does not appear to increase to any noticeable extent the cost of maintenance of locomotives; it does make the maintenance of the boilers more difficult, but that is due to their increased size and higher working pressure, which are necessary in all cases. Almost all locomotives built in France in recent years have four balanced cylinders. These engines, as well as compound engines of other systems, are also employed in other European countries, especially Germany, Austria, Spain, etc. Several engineers in Great Britain and Ireland express equal satisfaction from their use and insist on the advantage of separating the high and low pressure machinery. A number of American engineers also express opinions favorable to compound locomotives, which have given satisfactory results on the Atchison, Topeka & Santa Fe Railway; the sentiment on this matter is, however, less unanimous in the United States than in Europe. The section has been informed of experiments made in New Zealand with four-cylinder compound locomotives.

"The introduction of American locomotives in Europe and European locomotives in America has had the advantage of making known on both sides some interesting details of construction, particularly the light weight of the parts of European locomotives and the syphon and sight feed lubricators of American locomotives.

"The constantly increasing use of cast steel is observed, which in the United States has even been tried for cylinders.

"The use of the Walschaerts motion gear is extending in the United States.

"Generally speaking, all the engineers who have spoken of cylindrical valve chests appear well satisfied with them.

"A number of tests of automatic stokers have been made in the United States and on the Great Western Railway, of England, but as yet the results have not been definite. It has also been found, both in America and in England, that without the aid of these devices, but with proper arrangements of grates, the heaviest firing necessary at the present time can be effected without difficulty.

"Finally the section has examined the use of articulated locomotives of great power on lines of irregular grades, particularly Mallet locomotives and those designed by the Nord Francais and Nord de l'Espagne railways."

These conclusions were adopted, after Mr. Muhlfeld had called attention to the necessity of giving more care to details of construction and maintenance of engines, and made a statement regarding the maximum load per axle in America (62,000 lbs.), and the maximum weight for a locomotive (334,500 lbs.), for a wheel base of 30 ft. 6 ins.

LIGHTING, HEATING AND VENTILATION OF TRAINS.

Mr. C. B. Dudley (Pennsylvania Railroad) summarized his report on the lighting, heating and ventilation of trains. This report shows that the use of candles is being abandoned, except in cases of emergency, and the same is largely true of oil lamps. The carburetter system seems to have given good results on branch lines. The use of oil gas is being largely extended, while that of coal gas is disappearing. At the present time 25,000 to 26,000 cars in the United States are lighted with oil gas, and this number tends to increase. Electric lighting has been tried on a large scale under five distinct forms:

First—By the use of movable storage batteries.

Second—By the use of storage batteries placed permanently under the cars and charged during stops of the latter.

Third—By the use of dynamos operated by the motion of the car axle.

Fourth—By the use of a dynamo placed in a baggage car.

Fifth—By means of a steam turbine driving a dynamo placed on the locomotive. This last system has been tested in only a few cases.

It did not seem possible to the reporter to render at this time a final decision on these different systems.

Acetylene lighting has been tried under three forms:

First—With acetylene generators hung under the cars.

Second—With receivers holding compressed acetylene.

Third—With acetylene dissolved in acetone, in cylinders containing some absorbent material, such as disks of asbestos.

Electricity seems to be the most economical system as regards consumption, but it is difficult to give figures regarding the cost of maintenance of the apparatus.

As for car heating, in the reporter's opinion, the best method is to use steam from the locomotive, and he particularly recommended the Baker system, which admits of the use of either steam or coal, as may be desired. The proper diameter to be used in the pipes and the arrangement of the couplings are the most delicate points in the equipment, and the reporter called attention to the systems shown at the exposition, which provide for coupling simultaneously and automatically the pipes for the steam, air and signal pipes.

On the subject of ventilation the reporter remarked that a good system should work both in summer and winter, and should be properly harmonized with the heating system. He described the system used on the Pennsylvania Railroad, whereby the air is taken from outside, under the flooring of the cars, is heated by radiators and admitted inside the car through openings under the seats and passed off through ventilators in the roof.

The secretary then read the conclusions from the report presented on the same subject by Mr. Cajetan Banovits (Hungarian State Railway), published in full in the Bulletin of the International Railway Congress, page 1,383, Vol. XIX, 1905, which were as follows:

"In consequence of the continual improvements and advances made in the lighting, heating and ventilation of railway carriages, the general character of these appliances has steadily improved during the last few years. Nevertheless appliances are still largely used which only very inadequately or moderately satisfy the reasonable requirements of passengers.

"The better and more improved appliances may be divided into two groups; the one comprises the appliances which by their efficiency are capable of satisfying all requirements, however exacting, but which require separate attention, and can consequently be used with advantage only in special cases, not where there is much traffic; the other comprises the appliances which can satisfy all modern requirements, and owing to the simplicity of their manipulation are suitable for the best trains, and allow a large amount of traffic to be dealt with readily and expeditiously. It is evident, however, that in such appliances also further improvements may still be made.

"To the second group, which is most suitable for the improvement of deficient appliances, belong:

"(a) As regards lighting: Gas, mixed gas and electric lighting. The last, owing to its many advantages, is worthy of special attention and its use should be extended as much as possible.

"(b) As regards heating: The various systems of steam heating, the steam and the condensed water conduction being kept as separate as possible, or even separate piping being provided for carrying off the condensed water.

"(c) As regards ventilation: The roof ventilators, with their action increased as much as possible by combining them with pipe ventilators.' In this connection it should also be noted that it is desirable to supplement the ventilation by providing for the supply of fresh air in addition to removing the foul air.

"Finally, it must be emphasized that for these reasons also special importance must be attached to the proper and suitable design of the carriages, by which not only is the proper working of the appliances mentioned above better ensured, and consequently the legitimate demands of passengers met by this means, but the safety of the traffic is also increased."

Mr. Wickersheimer (State Railway, France) asked for some details on the use of acetylene gas, which, when under low pressure, did seem to him dangerous, and, particularly, whether freezing of generators on cars cannot be prevented by adding a certain proportion of alcohol to the water.

Mr. Max Toltz (Manistee & Grand Rapids R. R.) gave an account of experiments made with a system designed by himself conjointly with Mr. Lipschutz. In this system they use acetylene compressed to 10 atmospheres in receivers hung under the cars, and to avoid explosions arising from the heating of the each receiver is fitted with a number of fusible plugs. To avoid heating of the gas during its compression the latter is effected in three successive periods, and the gas cooled after each compression. This system is being used at the present time on a large scale by the Great Western Ry. (United States) and the Canadian Pacific Ry., and no serious accident has so far occurred. Replying to the question previously asked by Mr. Wickersheimer, Mr. Toltz said that as far as he knew only glycerine has been used to prevent freezing.

Mr. W. E. Fowler (Canadian Pacific Ry.) confirmed the information given by Mr. Toltz on the subject of his system, which is now in use on 36 cars of his company, and is working there in a satisfactory manner, without having caused any accident. He stated that this system gives three times as much light as oil lamps for the same expense.

In reply to an inquiry from Mr. Brisse (Chemin de fer de l'Est, France), Mr. Fowler stated that the Toltz system did not give any more trouble or inconvenience than the Pintsch system as regards charging the tanks at stations.

Mr. R. F. De Salis (North Staffordshire Railway, England) described a system of obtaining acetylene gas without water by mixing calcium carbine with bicarbonate of soda. This process, which avoids any trouble in regard to freezing, has been employed only for stationary apparatus, up to the present time, but he thinks it would be interesting to try its application to the lighting of cars.

Mr. Verlant (Paris, Lyons & Mediterranean Ry., France) stated that his company, which has in its cars about 25,000 lamps burning a rich gas, has improved its lighting in the last few years by mixing this gas with 20 to 25 per cent of acetylene. A further improvement has been attempted by using incandescent mantles, but as these wear out quickly with acetylene, and the fact that two generating plants are required (one for gas and one for acetylene), is a disadvantage, Mr. Verlant thinks that with incandescent mantles it is preferable to give up using acetylene.

Mr. Brisse reported that the Compagnie de l'Est has decided to adopt on its entire rolling stock the use of rich gas with incandescent mantles. This method of lighting, while given a greater illuminating power than ordinary gas burners, secures at the same time a very marked saving. Two designs of tips are used—the straight burner and the reverse burner. The latter gives a more satisfactory appearance, but the life of the mantles is much longer with the former.

Mr. J. J. W. Van Loenen Martinet (Chemins de fer Hollandais) said that his line has been using for the last eight years oil gas mixed with 15 per cent acetylene, but that a serious explosion occurred in a stationary acetylene plant used for lighting a station, and it was thought more prudent not to extend the use of this system. They resorted, therefore, to electric lighting by the Stone system, with which 10 per cent of their cars are now equipped. According to the speaker, the net cost of this method of illumination, without allowing for depreciation, is 20 per cent greater than that of gas mixed with acetylene.

Mr. R. Salle (German Empire Railway) stated that in Germany the mixture of rich gas and acetylene is extensively used, but owing to a very severe explosion some years ago in Strasburg, the cause of which could not be ascertained, it has been decided to seek some other process. They have consequently begun to experiment with incandescent burners, using, however, two mantles for each lamp.

Mr. W. Clow (Great Central Ry., England) expressed the opinion that electric light gives the best results. Out of 631 cars belonging to his company 50 per cent are lighted with electric light, 40 per cent with gas and 10 per cent with oil. Mr. H. C. Hodgson (Midland Ry., England) recalled that 13 years ago his company experimented with a Brotherhood engine driving a dynamo set on the locomotive, but after a few years they abandoned this arrangement.

Mr. L. Rouet de Journel (Madrid-Saragossa-Alicante Railway, Spain) gave complete data on the Vicarino system of electric lighting as applied to 23 cars belonging to his company. The net cost of this system would be 1.55 francs per 1,000 candle-power (French measure) per hour, 40 per cent of this being charged to depreciation and interest, 20 per cent to operation, 15 per cent to maintenance of dynamos, 11 per cent to maintenance of accumulators, 7 per cent to keeping up belts and 7 per cent to maintenance of lamps. A number of cases of slipping of belt have been experienced, and to avoid the consequences they propose to try coupling the different cars to each other. The speaker thought it would be advantageous to devise some arrangement for stopping the process of charging the accumulators when the necessary voltage is reached.

Mr. Ch. Jenny (South Austrian Railways) thought that electric lighting would be particularly advantageous for lines having numerous tunnels, to save the expense resulting from the prolonged burning of gas lamps.

M. Karl Steinbiss (Royal Management, Altona Ry., Prussia) described two interesting experiments in electric lighting. The first, undertaken three years ago, consisted in driving a dynamo by a Laval turbine, mounted on the locomotive. The lighting worked well, but the consumption of steam was excessive, and the care of the electric apparatus required much attention from the engine crew. This system was therefore abandoned and a dynamo mounted on the wheels of a car was tried, according to an arrangement devised by Messrs.

Wittfeld and Rosenberg. The dynamo produced a current of 200 amperes with a tension of 72 volts, and sufficed to illuminate a train of seven cars, each of which was provided with two storage batteries of 32 volts. This seems to give excellent results.

M. F. Paul-Dubois (Paris-Orleans Railway, France) stated that his company is very well satisfied with the Stone electric lighting system, which is at present installed in 50 cars. Some suburban trains are lighted by means of a single dynamo set up in the baggage car.

M. C. Boell (State Railroads, France) reported that after having tried electric lighting without great success by movable accumulators, his management has adopted for the principal trains the Vicarino system, which gives excellent results. The majority of cars of his system are furnished with rich gas burners, which will be improved by the use of incandescent mantles.

Mr. Anderson (Government Railroads of India) said that lighting by electricity has been considered as a great improvement in Europe and in America, and it is almost a necessity in the Oriental countries, because it absolutely avoids heat and, still better, permits the use of fans by the same current. On the main lines of India about 95 per cent of the cars are lighted by electricity and it is certain that the use of gas will completely disappear. The only question is to decide which of the various systems should be used. Until the present time three methods are in use.

First—The use of a dynamo placed at the end of the train. This system has been used for years past with good results.

Second—Lighting by means of a storage battery which is being used at the present time on one system operating 1,600 miles of track. It was at first feared that the replacing of the storage batteries would involve much cost, but these fears have not been realized. On the above distance there are six stations where storage batteries are recharged.

Third—The Stone system, which is used between Bombay and Calcutta, on the Peninsular Express. This system, however, does not give the best results, because it is difficult to keep the apparatus in good order, partly on account of the scarcity of electricians in India and to the lack of capacity of the ordinary train staff.

Mr. J. J. di Salva, Freire (locomotive superintendent, Central Brazil Railroad), informed the section that the system of lighting, by Pintsch gas, has been in use for a long time in Brazil, and that an attempt had been made to obtain a better light by mixing acetylene gas with the Pintsch gas, which, however, did not give satisfactory results. The speaker inquired whether others had made similar experiments, and thought that the want of success on the Brazilian railroads was due, at least in part, to the smaller diameter of the pipes used. On certain lines, especially on the St. Paul Railway System, the Stone system has been in use for the past ten years with very good results. Unfortunately this system is costly. The Brazilian railroads are always on the lookout for a better light, provided that it will not cost too much.

Mr. Crawford (locomotive superintendent, Pennsylvania Railroad Lines West of Pittsburg) stated that on his system all the trains are heated by steam from the locomotives. The Pullman cars are in addition equipped with fixtures which enable them to be heated either by a hot water system, or by steam from the locomotvie.

The Pennsylvania Railroad has experimented with steam at low pressure and the main difficulty has been to find good coupling connections. In the matter of ventilation, about 200 passenger cars out of the 400 in service on the Pennsylvania Lines West of Pittsburg are being operated upon the system of ventilation described in Mr. Dudley's report, with excellent results.

The greatest difficulty encountered in the system of direct heating by steam is in regulating the temperature in the cars. Automatic regulators have been tried in several cars, but have not shown good results up to the present time, and the cars are generally overheated so that the temperature has to be regulated by the train staff.

The direct heating system, described by Mr. Dudley, is not, the speaker stated, used by the Pullman Company, and he attributes this to the fact that this company has cars with panels of very expensive woods and that the difference in temperature between the periods during which the cars are in motion and those during which they are stationary would soon destroy the paneling.

Mr. Dudley replied that the direct system of heating by steam is used in the Pullman cars if by the direct system is understood one in which each car is supplied with the necessary steam from a main pipe coming from the locomotive and extending from one end of the train to the other, the condensation water being discharged onto the track without a special valve.

Mr. Crawford replied that the Pullman Company uses the steam heating system, but also each car has a hot water system which enables the temperature to be maintained during stops. Mr. Fowler (Canadian Pacific Ry.) understood by direct heating the use of the steam as it comes from the locomotive, and again expressed his opinion that this system is inadvisable in cars with costly wood panels.

M. Brisse (assistant chief of operation of the Eastern French Railroads) informed the section that his company has experimented with a mixed heating system, using steam and compressed air supplied by the air pump of the locomotive, a system which was invented by Mr. Lancrenom for the requirements of the heating of trains of great length. The use of steam alone presented great difficulties, especially in the suburban service of Paris, where trains frequently consist of 24 units on two or three axles each. This heating system has been gradually extended on all trains of the Eastern Railway. It has the advantage of permitting a reduction in the diameter of the pipes. The hot mixture is led under the feet of the passengers, which is preferred in France, and is also either along the sides or under the seats, where it produces heat by radiation. In the cars in the international service this system permits also heating by steam alone when outside of French territory. The improvements made by this inventor enabled the road to maintain in its cars during last winter an average temperature of 20 degs. Centigrade when it was outside minus 15. With this system no special difficulty is experienced in maintaining pressure.

Mr. Hodgson (general manager, Midland Railway of England) called the attention of the meeting to the fact that in England the differences in temperature, though sudden, are never very excessive. There is no extreme cold, and opinions are divided between the use of hot water heaters and steam heating. Two types of cars are in general use on the railreads of Great Britain; and the heating systems are applied according as the cars have a central passage or side doors. In cars of the first type it is difficult to use water heaters, but in the second they give general satisfaction. Opinions are also divided as to the best location of the main steam pipe. If it is placed outside of the cars a great loss of heat is occasioned, but, on the other hand, if placed on the inside it becomes impossible to isolate a car placed in the middle or at the front of the train. This trouble is avoided when each car is equipped with its own radiating apparatus fed by an external pipe.

M. Hodeige (Belgium State Railroad) stated that a certain number of water heaters are still in use in Belgium where, however, they have begun to use the system of heating by steam taken from the locomotive as well as the system described by Mr. Brisse. Belgium still being in an experimental stage, the speaker regretted not being able to recommend any system.

Mr. Mitchell (Lehigh Valley Railroad) stated that a direct heating system by steam is in use on all cars of his company. At the yards special generators are installed, which furnish the steam necessary to maintain the temperature in cars during long stops. The innovation has permitted the abandonment of the hot water system with which 132 cars were previously equipped, which has resulted in an increased space in each car. Several years ago a commission was appointed by the American Master Car Builders' Association to determine whether the main pipe of 1½ ins. in diameter which had been previously used, was sufficiently large. This committee recommended the adoption of pipes 2 ins. in diameter, which were then installed on certain lines. The main objection to pipes of 2-in. diameter is that they require coupling connections of the same diameter, which are difficult to keep in order. In some cases these pipes are supplied with reducers, thus permitting the use of connections with pipes of 1½ inc. diameter.

Mr. Fowler (Canadian Pacific Ry.) informed the session that the Canadian Pacific has equipped all of its cars with 2-in. train pipes and couplings of the same size. It is due to this large diameter that they have succeeded in keeping up a comfortable temperature in their cars when the temperature outdoors is 60 degs. below zero (Fahrenheit), as happens at times along Lake Superior.

Mr. Ronayne (New Zealand Railways) stated that the lines in his country generally use systems of foot warmers for car heating, although they are now considering the introduction of a system of steam heating. In the southern island especially the cold at some seasons is quite severe.

While the New Zealand railways have had little experience in the matter of heating, they have had occasion to study the system of ventilating cars. In some parts of the territory through which they run the air is full of a very fine white dust, which penetrates everywhere. All of the cars are supplied with double windows. In dining cars especially the air is admitted through openings in the side panels through a strainer, and in many cases it is cooled with ice. This system has given very satisfactory results. Ordinary coaches are ventilated through openings in the sides fitted with two sides, which passengers can lower or close as they desire.

Mr. Clark (Buffalo & Susquehanna Railroad) observed that nothing had been said about the economy of using steam for heating trains. Some companies have tried to utilize the exhaust steam from the vacuum pumps on the locomotive and obtained very fair results. As the radiators are the same as those used in other steam heating systems, it is easy for the engineer to turn live steam into them when the temperature gets too low. The chief objection to this system is that it causes back pressure on the steam piston of the vacuum pump. This objection, however, is unimportant. On the other hand, at least in American practice, it obviates the necessity for discharging the exhaust steam from the vacuum pump through the stack of the locomotive and thus avoids an irregular draft on the fires.

Discussion having ceased, the president proposed the adoption of the following conclusions:

"As regards lighting, the congress notes the development of the use of incandescent mantles, heated by oil gas and sometimes by common gas, and of different systems of electric lighting. Cylindrical mantles seem to be somewhat stronger than globe mantles, but the latter distribute the light somewhat better. Various types of mantles are used in Europe by different managements, especially in France and Germany, and are beginning to extend to the United States.

"Systems of electric lighting are giving satisfaction on different roads. Attention is called to their advantage in certain cases for intermittent lighting, in passing through tunnels and operating driving fans.

"Acetylene gas has been used mixed with Pintsch gas, especially in France and Germany, but a tendency is observed to abandon this mixture, owing to the use of mantles. On the other hand, mention is made of the use in America of pure compressed acetylene, with some special precautions.

"Steam heating has a tendency to extend in different countries. To obtain sufficient heat for very long trains, or in cases of very low temperature, care is taken either to use pipes of sufficient diameter or compressed air mixed with steam.

"The adoption of a uniform coupling for all the cars in the same territory is an important question to be solved.

"The congress notes the different systems of car ventilation that have been applied, especially that in use on the Pennsylvania Railroad."

POOLING LOCOMOTIVES.

The use of two or more crews. Advantages and disadvantages of the practice and the result of such common use with respect to the efficiency and the care of the locomotive.

Reporters for the United States: Mr. G. W. Rhodes, general superintendent Wyoming District, Chicago, Burlington & Quincy Railway, Alliance, Neb.; Belgium, United Kingdom and Colonies, Netherlands, Denmark, Sweden, Norway and Russia, Mr. Hubert, director of the Belgian State Railways, 13 Rue de Louvain, Brussels; other countries, Mr. Boell, chief engineer of mines, chief engineer of rolling stock and motive power of the State Railways of France, 136 Boulevard Raspail, Paris.

Mr. Boell (State Railroads, France) summed up his report, which was published in full in the bulletin of the International Commission of the Railway Congress, Vol. XVIII., 1904, and read his following conclusions:

1. That the pooling system always leads to a very perceptible increase in the expense per kilometer, and therefore it ought not to be employed except in case of absolute necessity.

2. That for the purpose of increasing the work of engines it is preferable to have recourse to the system of auxiliary crews. Or to the multiple crew system, the evils of which are infinitely less.

3. That the double crew system is particularly to be approved, particularly for switching suburban or shuttle train service, and even for certain classes of through train service, for the reason that, while affording better utilization of engines than the single crew system, it may permit of a slight saving in fuel without appreciable increase in cost of repairs.

4. That with these various systems it may be of advantage in fuel expense to assign to each engine man a particular tender which, however, gives rise to certain complications in the service and cannot always be realized.

5. That the system of three-men crews may in certain cases be substituted advantageously for that of double crews.

6. Finally, that other systems than that of the single crew have little to commend them for fast express train service, which demands engines in a perfect condition of repair and well understood by the engine man who handles them.

Mr. Hodeige (State Railroads, Belgium) gave an abstract of the report presented by the lamented M. E. Hubert, recently deceased, the text of which has appeared in the Bulletin of the International Commission of the Railway Congress, Vol. XIX., 1905. It appears from this report that out of 50 roads which have replied to the questions of the reporter, 16 use single crews only, except in switching operations at the yards, where some of them use double crews and that 24 roads, representing about 45 per cent of the total mileage, prefer without exception the use of single crews. After the single crew the system most used is the double crew. A great majority of railroads which regularly use this system recognize that the advantages which it affords, in the annual number of kilometers run by their locomotives, in the reduction and regulation of the number of working hours of the employees and in lighting up and banking are only obtained at the expense of increasing the consumption of fuel and lubricating materials and also at the cost of a poorer maintenance of the engines.

The three men and multiple crews are not used except for yard switching operations or under special conditions. Finally complete pooling is little in favor, and outside of the Taff Vale Railway (England), which seems to be pleased with it, and the Transbaikal (Russia), which operates under peculiar conditions, this system is not used if it can be avoided. The reporter is of the opinion that this system cannot be well judged except after studying the results obtained by important companies using it on their systems, in a permanent and general manner.

The secretary then summed up the report of Mr. G. W. Rhodes (Burlington & Missouri River Railroad), the text of which was published in the Bulletin of the International Commission of the Railway Congress, Vol. XVIII., 1904. It appears from this report that out of 84 replies obtained, 48 were against and 36 in favor of the complete pooling system.

The reporter stated that two important points controlled this matter 30 years ago and still exert the same influence today:

1. That complete pooling system increases the cost of transportation.

2. The main advantage of the complete pooling system, which is of a nature to compensate for the increase in expenses, is the possibility of doing the work with fewer locomotives which effects a reduction of the capital investment.

The reporter reaches the conclusion that the essentials for a properly conducted engine pool are as follows:

1. An engine house inspector, or inspectors, whose duty it is to report all work on incoming engines, which shall be checked up with the engineman's incoming report. Provision should be made to have all work properly attended to; neglect in this matter has done more to injure and discredit pooling than any other feature. Men in a pool, when they report, work, and 10 days later get on the same engine and find the same thing which requires repair still not attended to, drop into careless habits. If a regular man had the engine he would raise objections until the work as reported was done. In a pool the foreman or workman has a chance to say: "Another man will get this engine who will not know whether this work was reported or not."

2. A sufficient engine house force to attend all cleaning of engines both below and above the footboard and in the cab. Provision to be made also for cleaning and filling all engine lights.

3. All lanterns to be maintained and kept under a tool room check system. Under this system lanterns are pooled in the same way that engines are, and each incoming crew has to account for its lanterns. The number of lanterns under this system is materially minimized through a large proportion being in constant service.

4. Heavy engine tools to be kept in a sealed box on the engine, the seal to be carefully inspected on each arrival. Each engineman to be supplied with a portable tool box.

5. A kit of oil cans should be assigned to each engineer and returned to him after each trip and placed in the oil room, to be properly filled, cleaned and cared for.

6. A set of enginemen's lockers or boxes should be at the disposal of the engine crew.

The report concluded with the statement that no hard and fast rule can be made that will fit all railroads in the matter of pooling engines; the condtions of traffic, together with the quality of equipment, on each road, alone can determine the expediency for or against pooling.

Mr. Alfred W. Gibbs (Pennsylvania Railroad) began the discussion by stating that the pooling system has been generally used on his lines for the last 28 years, except for some passenger trains which have single or double crews. The round-houses are organized for this system, and do not afford, on an average, more covered space than is required for four engines. He would be pleased to know how the single crew system is organized in Europe—that is, who takes care of the engines while the employees in charge are resting, how the crews of the engines in repair are utilized, and how the engines repaired are distributed.

M. Tordeux (Eastern Railroads of France) reported on the poor results obtained on his system by the use of a double crew. The number of accidents caused were so great that it finally required the service of a greater number of engines to straighten out these accidents.

M. Asselin (Northern Railroad of France) replied to Mr. Gibbs that engines are inspected on arrival at the roundhouse by the machinist and the station masters, and that special firemen take care of them. When an engine goes into the shop a supplementary engine is turned over to its crew until the latter can again take up the engine, which is regularly assigned to it. On the average, the number of covered places available at the round house is equal to half of the engines belonging to it.

Replying to a question by M. Asselin, Mr. Gibbs stated that the longest continuous run ever made by a locomotive in America was, to his knowledge, 281 miles on a freight train with a double crew.

M. Sabouret (Western Railroads of France) stated that the great difference which exists between American and European practice can be explained by the differenc in the cost of fuel, which costs from $1 to $2 on the tender in America and from $3 to $4 in France. In France the consumption of fuel represents an expense double that of the wages of the engine crew; it would be interesting to know what this proportion is in America.

Mr. A. E. Mitchell (Lehigh Valley Railroad) stated that for modern locomotives the cost of fuel on his system exceeds the wages of the employees by 10 per cent and that on other systems this expense is practically the same.

Mr. Dugald Drummond (London & Southwestern Railway, England) reported that pooling is unusual in his country, except for certain suburban traffic; the maintenance and fuel consumption of the pooled engines being 10 per cent higher than that of the single crew. Money prizes encourage the engineers to be economical with fuel and to take care of the engines.

Mr. J. F. Deems (New York Central & Hudson River Railroad) remarked that pooling would give better results when practiced in a general and continuous way than when used only at certain times to suit the requirements of the traffic.

Mr. Asselin replied that in spite of all precautions taken by the Northern Railroad when it tried to introduce pooling the results attained were entirely unsatisfactory.

Mr. Arthur Pilkington (Madras Railway, India) explained that his road, having stations great distances apart, would very much like to find a system which would enable it to run its locomotives much greater distances than can be accomplished by its crews. He would be pleased to get some information on the working of the "caboose" system, which consists in taking along on the train a second engine crew.

Mr. O. F. A. Busse (State Railroads, Denmark) reported that in a country with severe climate all engines must be provided with shelter, and that on his road if an engine enters for repair the crew in charge of it takes another engine. On his road the double crew is used on many passenger trains, which enables them to reduce the number of necessary engines without noticeably increasing the expenses. The cost of lubrication alone increases, but this increase in expense is small if the economy realized on the capital is considered. The only difficulty is in the division of the labor of the engines and the crews and this difficulty varies with the service to be performed.

Mr. Asselin stated that at a previous meeting Mr. Gibbs had expressed his regrets that the engine crew in America does not get money prizes for economy as in France. The system of prizes is not practicable with pooling, and he asked Mr. Gibbs whether the tendency in America is to increase or reduce pooling.

Mr. Gibbs replied that at the present time the sentiment in America seems to be favorable to putting locomotives in charge of certain crews, as shown by the example of several roads. In expressing his regrets that there are no money prizes in America, he repeated the opinion of an engineer sent by him to France. If he were sure to obtain the same results by applying the same system, he would be well pleased to do so.

Mr. W. W. Hoy (president South African Railways) supplied some information on the working of the "caboose system" on his lines which consists in employing two complete crews, others by double crews, but on the most busy sections and giving them a complete rest of about ten hours after a run of about five hundred miles.

Mr. W. McIntosh (Central Railroad of New Jersey) stated that he was of the opinion that pooling is the most suitable system for the operation of a great railroad system with heavy traffic but it is difficult to organize and requires closer attention to the inspection service which renders the system unpopular. Certain sections of his road are served by single crews others by double crews, but on the most busy sections pooling dominates absolutely, and the nature of the traffic does not permit of the use of any other organization.

Mr. H. J. Small (Southern Pacific Railway) reported that the use of crude petroleum as a fuel for several years past has increased the difficulties of pooling to such an extent that his company had to go back to the single crew system, with the result of a considerable reduction in the number of accidents.

Mr. A. Lovell (Atchison, Topeka & Santa Fe Ry.) confirmed the statement of Mr. Small. For the same reason his company had to return to the single crew system as engines using liquid fuel cannot be conveniently maintained if they do not stay at the roundhouse a sufficiently long time. Moreover, the bad quality of the water compels them to wash the boilers after a run of six to eight hours. He added that these conditions are not the same throughout the whole country.

Mr. Thomas Ronayne (New Zealand Railroads) maintained that the single crew system gives more satisfactory results because the men take better care of the engines. The double crew gives equally good results if its crews are suitably selected. The three-men crew is much used on his system under the same conditions. The multiple crew and the system of mixed crews are little used, and complete pooling, which has given poor results in all points, is employed as little as possible except for station operations.

Messrs. G. Noltein (Moscow Kanzan Railroad, Russia) and Flobert (Northern Railroad of Spain) declare themselves also opposed to the complete pooling system.

Mr. Gibbs supplied some information on the measures taken by the Pennsylvania Railroad as a consequence of traffic fluctuations. It is, of course, understood that the system needs a sufficient number of engines to enable it to handle the greatest requirements of its traffic; when the traffic decreases, all locomotives which are not necessary are put aside and carefully oiled to avoid unnecessary maintenance expenses. As to the employees who cannot be utilized, they are laid off temporarily.

The chairman then read the following draft of the conclusion:

"The Congress finds that in Europe and in countries other that North America the general sentiment is very much in favor of the single crew system and unfavorable to complete pooling, which is used only when necessitated by a sudden increase in traffic. However for certain services various combinations of double or multiple crews or of mixed crews are used, according to circumstances.

In North America pooling is, on the contrary, very general, though little used for passenger service, and a tendency to using single crews is generally manifest.

"It is, however, in place to remark that the organization of train service depends to a large extent on local conditions."

These conclusions were approved.

ELECTRIC TRACTION.

Progress made in electric traction on important lines of railways. Continuous current, alternating polyphase current. Experiments made with high tension currents.

The reporters, Messrs. F. Paul-Dubois (Paris-Orleans Railway), E. Gerard (Belgian State Railways) and W. D. Young (Baltimore & Ohio Railroad), each read an abstract and the conclusions of their reports. One of the secretaries also read the conclusions of Mr. V. Tremontani (Italian Railroads of the Mediterranean), who was absent.

Mr. Schulz (Railway of the German Empire) gave some information on the experiments made in Germany with high speed electric traction, to which some of the reporters have referred. Mr. Schulz explained that the object of these experiments was to determine scientifically if high speed electric traction were possible and satisfactory on main railway lines. In a great number of trial runs speeds of 200 to 210 kilometers per hour were attained, which are much higher than those previously reached. The experiments have shown that the ordinary type of superstructure, properly strengthened, would completely suffice for speeds of 200 kilometers per hour and more, and that on the other hand, the general arrangement of express passenger cars is well adapted to great speeds, provided the wheel base be sufficiently increased. Because of the great amount of energy to be transmitted to the motors, it has been found convenient to use the three-phase current with a tension of 10 to 12 thousand volts.

The current was transmitted by three copper wires of 100 square millimeters sectional area each, place one above the other in a vertical plane, on one side of the patform. The bow-like pole for taking the current was very light and provided with double acting springs which pressed the pole against the wires with a sufficient pressure to assure a good contact at the highest speed. The experiments have shown that it is thus possible to transmit a great amount of energy to an electric car going at a high speed. The arrangements used have, in fact, permitted the transmission as many as 2000 k. w. to the cars going at a speed of almost 60 meters per second, and this under unfavorable atmospheric conditions.

The measurement of the total resistance of traction has given the following results: The resistance due to friction which is only 1.5 kilograms per ton at a speed of 5 kilometers per hour increases gradually with the speed and becomes 300 kilometers at a speed of 200 kilometers per hour. The resistance due to the air increases much more rapidly than the speed; and, it can be said, that it is this resistance which really limits the speed which may be realized. The resistance of a trail car is much less than that of the first automotor car, so that it is more economical to make up the trains of several cars than to run single automotor cars at short intervals, though the latter system is more satisfactory from the public point of view.

With a slowing down of 1½ meters per second, which can be realized without danger to the passengers, trains running at a speed of 160 to 200 kilometers per hour can be stopped in a distance of 660 to 1000 meters, respectively. At speeds higher than 120 kilometers per hour, the signals could be seen during bad weather in sufficient time. This has been improved by means of an electro-magnetic arrangement which places a red disk before the eyes of the motorman if the signal in front of him is at "danger."

More than 300 trial runs were made without any accident. Mr. Schulz held that this opens a great field to railroad engineers and electricians, and he expressed the wish that the operation of a high speed electric railroad may soon become an accomplished fact.

J. A. F. Aspinall (Lancashire & Yorkshire Railway) gave some additional details on the electric line from Liverpool to Southport. Electric traction was not adopted on this line for the sake of economy, but to increase the receipts. Since the twelve months during which the line has been operated electrically the results are most satisfactory as to increase in traffic, but the operation is more expensive than with steam. The cost of coal per ton mile especially is greater; the running expenses, however, are less because of the greater mileage run by the crews. Mr. Aspinall added that the train staff of express trains (made up of four and sometimes five cars) consists of a motorman and conductor, who stays during the run in the motorman's compartment; that of local trains consists of a motorman and two conductors. The service is complicated owing to the fact that it has three classes and considerable baggage to transport. The run from Liverpool to Southport takes 37 minutes, including 14 stops of 15 seconds each; passengers open and close the doors themselves; the boarding and leaving is done very rapidly owing to the special arrangement of the entrance and exit doors.

One of the reasons for introducing electric traction on the line was the necessity of decreasing the crowding of the Liverpool terminus during the busy hours; the handling of an inbound steam train and its redispatching requires four distinct switching operations and eight signal operations, while for an electric train two switching and four signal operations are sufficient.

The line has on a certain section four tracks, two of which are at present used as freight tracks; the latter are to be equipped electrically and will be partially utilized for passengers during the busy hours because of the increase in traffic.

The cost of the electric installation on the Liverpool and Southport line was as high as £20,000 sterling per mile, or about three and one-half times the installation of a steam locomotive service. If the interest and sinking fund charges of this sum are added to the cost of operation, it is not surprising that electric traction costs more than steam.

Mr. Aspinall added that the weight of electric equipment of the trains on the Liverpool-Southport line is not less than the weight of corresponding locomotives, and that the same will hold true for trains on main lines.

A discussion then developed between Mr. Schulz and Mr. E. Gerard on the usefulness of a guard rail with which the road built for high speed experiments was provided. Mr. Schulz held that this guard rail is especially important because of the strengthening of the track it affords, but it did not appear to him necessary for the prevention of derailments; the opinions on this subject were, however, divided and experience only will enable a decision whether the guard rail is useful or not.

Mr. T. H. Laurent (Paris-Orleans Railroad) was struck by the enormous increase in the consumption of the energy required for high speed; thus, not less than 1340 horsepower are required to maintain a speed of 200 kilometers per hour, on a level stretch, for a single motor car weighing 90 tons and containing 50 seats. The cost of this consumption is enormous if it is remembered that in the high speed trains of the Orleans Company 1200 to 1300 horsepower engines are sufficient to pull trains containing about 400 first-class passengers at a speed of 100 to 120 kilometers per hour. The question may then be asked whether, after the technical problem has been solved, the economic problem can also be considered as admitting of solution.

M. Sabouret (French Western Railways) contributed details on the electric installation on the line from the Invalides to Versailles, similar to those on the line from Paris to Juvisy. The main reason which has induced the French Western Railway Company to introduce electric traction on this line is the existence of a terminal station at Paris which is partially underground and of a tunnel three and a half kilometers long on a continuous grade of 0.8, where it was necessary to avoid smoke.

Ten electric locomotives and two automotor trains are in service on this line with different types of motors, some geared and some not geared. At the great speeds (82 to 100 kilometers per hour) which the trains acquire while descending, the ungeared motors, the armatures of which are mounted on a hollow shaft, engaging the wheels in a yielding, offer important advantages over the geared motors. It has also been stated that the "mazout" lubrication is better than the American way of lubricating with grease. This service consists of four to five trains per hour in either direction, and while the kilowatt hour does not cost more than five to six centimes, at the power station, the cost of operation of electric traction is noticeably higher than that of steam traction.

Mr. A. Wilson (North Eastern Railway, England) gave some information on the use of electric traction on the suburban lines of Newcastle-on-Tyne. He also furnished some data on the cost of operation of these lines, mentioning, however, the difficulty of making comparisons with steam traction. Electricity permits a better utilization of the existing lines and experience shows that the improved service which follows generally leads to increased receipts.

The cost of electric traction for the month of February, 1905, was as follows:

Mileage of trains	92,541
Mileage of cars	254,938
Average number of cars per train	2.75
Total energy consumed (kilowatt hours)	647,140
Energy consumed per train mile (kilowatt hours)	6.993
Energy consumed per car mile (kilowatt hours)	2.538
	Pence
Average cost of power per car mile	1.601
Engineeer's pay per car mile	.297
Conductor's pay per car mile	.217
Total cost of traction per car mile	2.115
Total cost of traction per train mile	5.7

Replying to an inquiry from Mr. Moffre (French Southern Railway), who wished to know whether monophase alternating current motors have been applied to traction in the United States or elsewhere, Mr. K. Steinbiss (Royal Prussian Railways) said that in addition to the trials made in Germany with electric traction by continuous current motors (for instance, on the Wannsee Railway), some monophase motors have been in operation since 1903 on the Niederschoeneweider-Spindlerfeld line near Berlin. The motors employed are of the Winter-Eichberg system; the speed is from 40 to 60 kilometers per hour; trains are made up of one or two automotor cars, with or without trailers; the heaviest train contains 5 cars weighs 150 tons.

Encouraged by the results given by this trial, German engineers are applying the same system to a line connecting Hamburg, Altona and Blankanese, which is 26 kilometers long. The trains in ordinary service will consist of two cars, with three axles each (one two-axle truck and one independent axle), with a total of 100 seats; these trains will be run at a speed of 60 kilometers per hour, with three minutes' leeway between trains. The work of equipping the line has been begun; it is to be opened to traffic October 1 of next year.

Mr. W. D. Young (Baltimore & Ohio Railroad) said that since his report was written two lines equipped with this type of motor have gone into operation in the United States —one near Indianapolis and the other between Bloomington and Pontiac, Ill.

As for the third rail, he did not believe it was as dangerous as people thought. Ten years ago there was installed in Baltimore, to avoid the third rail, a system of overhead wiring, which proved very expensive and gave a great deal of trouble, particularly in the tunnels, which extend over half the length of the line. The corrosion caused by the sulphurous smoke and vapors from the locomotives finally made it necessary to rewire this line throughout. As all the changes and repairs had to be made without interrupting the service, and working with live wires, the expense was very great. Consequently his company decided three years ago to replace this overhead wiring with a third rail. This third rail is protected between stations by guard boards; at stations it is entirely enclosed, leaving a slot on top for the contact shoe. As an additional measure of safety, a system of automatic current breakers has been installed at the station and at points where the workmen most frequently cross the tracks, but this system works irregularly and, therefore, is not very reliable. Last year the line was extended across the North Baltimore station; where passing this station the third rail has merely been omitted for a distance of 700 ft. over which the trains are carried by momentum. In a new station all danger could be avoided by using elevated platforms.

In reply to a question put by Mr. Luarent, Mr. Young explained the means employed in America to prevent trouble from sleet on the third rail. The Manhattan Elevated Railway Company uses for this purpose, and apparently with success, scrapers held against the rail by compressed air. Mr. Young prefers using a solution of chloride of lime, regulating the density to the temperature, which is very cheap and entirely efficient.

Mr. Young pointed out the importance for the different railroad companies of arriving at a definite agreement on the question of the location of the third rail. On the Baltimore & Ohio Railroad the horizontal distance between the axis of the third rail and the axis of the track rail nearest to it is $31\frac{1}{2}$ ins.; the height of the third rail above the track rail is $3\frac{1}{2}$ ins. This height is almost the same everywhere, but the horizontal distance varies much with the different companies, and it would be very desirable to make these dimensions uniform.

The meeting adopted the following conclusions proposed by the section:

The section recognizes that electric traction should be considered at present as an important auxiliary of steam traction, being capable of handling certain portions of railway traffic with advantage and economy.

It is impossible in a general exposition to point out the exact service to which electricity can be most readily applied, the application being essentially a question of local conditions, each particular case requiring special study. In this study there must be taken into account the expense of electrification and the following points: First, condition of service—that is, the frequency and weight of trains; second, the physical conditions of the line, such as length, profile and plan. In comparing the expenses of operation by electricity and by steam, the interest and depreciation on the electrical installation must be considered.

The increase in revenue which the improvements in service will generally produce should also be given consideration. An important point in the use of electricity is the increase in the present station facilities resulting from the reducing number of movements in the stations by the use of electric traction.

From the information furnished to the congress it would seem that with the third rail as now used, security can be assured under favorable conditions without it being necessary to cover or protect the third rail for its entire length.

The congress has heard with much interest the results experienced with high-speed electric traction between Marienfeld and Zossen, and also of the tests and first applications for traction purposes of the alternating monophase motors in several countries.

Finally, the congress recommends that on account of their future usefulness exact data on the cost of eletric traction be obtained.

Railway Appliances at Washington

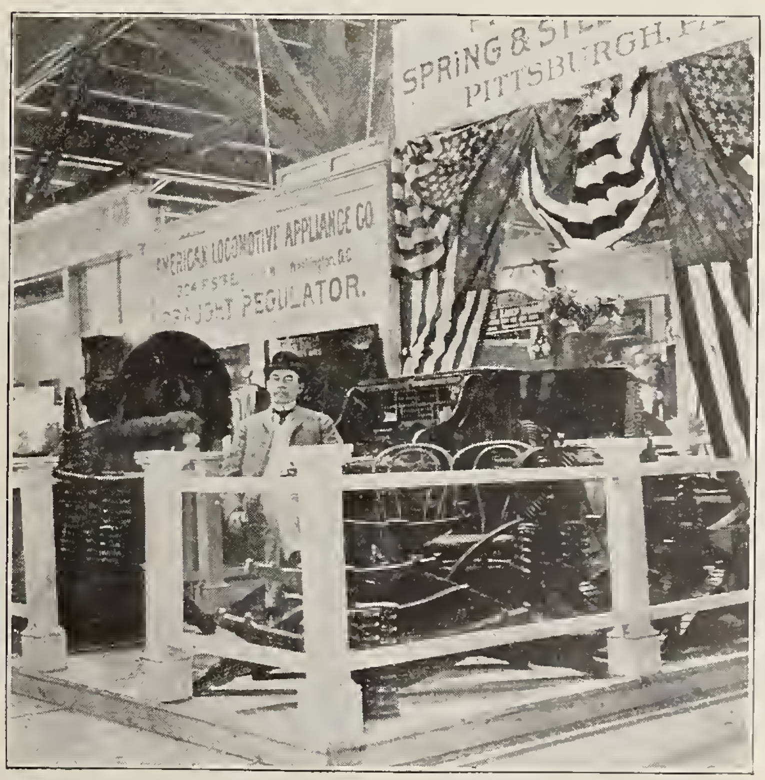
IN the exhibit of Railway Appliances, the general arrangement and character of the display was very similar to that at St. Louis, though on a lesser scale, but what was lost in magnificent distances was more than compensated for in the selection of specialties exhibited. The same care to make the most of the space allotted, was to be seen in the smaller pavilions on the ground, as was shown in the main building. The lighting facilities were on a most extensive plan, making the evening show fully as effective as that of the day, for the outside exhibits as well as those in the pavilions, large and small. A brief resumé of some of the exhibits will convey the impression that the show was an extensive one.

The Perry Side Bearing, of Joliet, Ill., was shown with bearings, new and also worn, in the main pavilion. One of those which had seen a wear due to two years service under an 80,000 lb. car, looked as new as those out of the shop—no signs of abrasion whatever on the stud rollers, or on the cap against which the rollers bear. Another of these bearings which had carried a load of 134,000 lbs. on a tender through 80,000 miles of service gave no indication of wear.

General Entrance.

Oliver Machinery Co.

H. B. Underwood & Co.



Pittsburg Spring & Steel Co.

Ajax Mfg. Co.—Railway Materials Co.—Draper Manufacturing Co.

S. F. Bowser & Co., and Their Representatives.

The Flannery Bolt Co., Pittsburg, had an instructive exhibit of their Gate Flexible staybolts for fireboxes. All details of application were shown in full sized bolts and sheets, and bolts and sleeves were also shown in section, by which the action of the ball joint was made plain, illustrating the impossibility of transverse stresses affecting the strength of this staybolt.

The Homestead Valve Co., Pittsburg, exhibited a full line of their valves, including the blow-off valves in which the locking system was shown in section. Valves which had seen long service and were still in first class working condition, added interest to this exhibit.

In the exhibit of the Falls Hollow Staybolt Co., Cuyahoga Falls, O., was shown the iron furnished in their staybolts. This iron has a small hole through its center, full length of the bolt, by means of which air is admitted to the firebox, also making an unerring telltale in case of failure of a staybolt.

Armstrong Brothers Tool Co., Chicago, had a comprehensive exhibit of their tool holders and holders for grinding tools and inserted cutters. Among their exhibits was a claw bar having two inserted teeth side by side let into the head of the bar. This device had the strong point that it need never be out of commission when two inserted teeth are available, as the bar itself is made on a design that defies the roughest usage. The tool holders for turning and boring were complete and ready to go from the exhibit to the shop. They also showed the only machine made expressly for grinding inserted tool cutters.

The Old Dominion Nail and Iron Works, Richmond, Va., had samples of their staybolt iron on show, called the special vibratory staybolt iron. The special feature of this iron is the high elastic limit, some tests showing 40,000 lbs. per square inch.

The Ashton Valve Co., Boston, exhibited their muffler pop valves, blow-off valves, open pop-valves and gages, besides their chime whistles, in an extensive display. The steam gages having two springs were the subject of great interest to railroad men.

In the Manning, Maxwell and Moore, New York, exhibit,

Landis Tool Co.

Landis Machine Company.

Bettendorf Axle Co.

Acme White Lead & Color Co.

was to be seen their pop valves, whistles, steam gages and injectors, practically the same as at the World's Fair, making one of the most attractive shows in the main building.

The Hageman Metallic Hose for train line connections, steam or air, was a novelty in mechanical construction which made the exhibit well patronized. This hose is flexible in every plane of action and perfectly tight under all conditions of service. It cannot uncouple in service, but will easily pull apart in case of derailment of break-in-two, and cannot burst like a rubber hose. It is made of galvanized metallic tubing and has four swiveling joints.

One of the interesting things to a shop man was the Cling Surface belt on exhibit by working model, showing in comparison an ordinary belt as run in every shop using a belt drive. A small weighing scale served as a dynamometor to measure the pull on each system, showing to the eye how power was transmitted through each belt, also the force at work on the journal bearings when the ordinary belt was tightened up to the point where it could not slip, which was plainly the point of rupture, after short service, as well as the condition for abnormal friction load. The belt treated with Cling Surface was shown to give its maximum pull when running loose.

In jack construction the Duff Mfg. Co., Pittsburg, had on exhibition some samples of roller bearing ratchet screw jacks that represented advanced ideas in devices for lifting loads. These jacks are made of malleable iron and steel, with a ratchet of special construction, the direction of motion being instantly changed. The bevel gears and screw are of steel.

A car propeller or pinch bar was shown by its inventor, Mr. H. G. Gehr, of Waynesboro, Pa. This bar is pivoted to a fulcrum which fits over and slides on the rail head, the bar not coming in contact with rail, which obviates the vexatious slipping off the rail, as with the old style bar, since the fulcrum always guides the bar correctly to the wheel tread.

The Pittsburg Spring & Steel Co., had a fine exhibit of locomotive and car springs, also extension and compression springs for various special uses. While no novelties are looked for in a collection of this kind, the quality of work

Exhibit of Western Tube Co., and Representatives.

Aurora Automatic Machinery Co. Exhibit.

Norton Grinding Co.

Vacuum Cleaner Co.

stands to receive a rigid inspection, and this was invited by the exhibitors.

In pipe fittings, the Western Tube Co., had an exhibit of their several kinds, embracing the brass and iron ball joint union elbows, and tees and unions, and their union swing check. The screw joint is non-corrosive, while the ground brass joint, and iron self-seating joint does away with the need of a gasket. These are adapted for steam, water, gas or air service. All these fittings come under the trade head of "Kewanee." This firm also makes the Eurema, Y, or straightway valves.

The Lunkenheimer Co., of Cincinnati, O., were to the fore as usual, having an exhibit of valves, whistles, water gages, oil cups and lubricators. The blow-off valves of this firm are arranged with the seat separate from the body, making it easy to detach for renewal. This blow-off has two valves, one of which has a direct lift, while the other has a rotary action around the first.

Pipe fittings and valves of the Jenkins Brothers, New York, were on exhibit in their pavilion, in a collection that comprised the best of their product in globe valves, gate valves and general pipe accessories.

The Baker Car Heating Co., New York, had on exhibit their new shut steel heater, which is a riveted creation and an improved construction over the earlier heaters of this company.

The Norton Grinding Co., Worcester, Mass., exhibited some beautiful samples of high art in grinding of locomotive details, such as crank pins, valve stems and piston rods. It would be impossible to conceive a finer fit in metal than was seen in the brass sleeve shown on a heavy piston rod which had been ground and the sleeve bored to fit. The fit was so close that the temperature of the hand was necessary to free it to a sliding fit. At a temperature lower than that of the body the sleeve would remain where placed on the rod. The resistance to movement was uniform the whole length of the rod, showing it to have a true straight cylindrical surface. As a lesson in refined fitting it could not be excelled.

Morse Twist Drill & Machine Co.
Duff Mfg. Co.

Flannery Bolt Company's Exhibit and Representatives.

UNITED STATES LIGHT & HEATING CO.

ERIE ALL STEEL MAIL CAR.

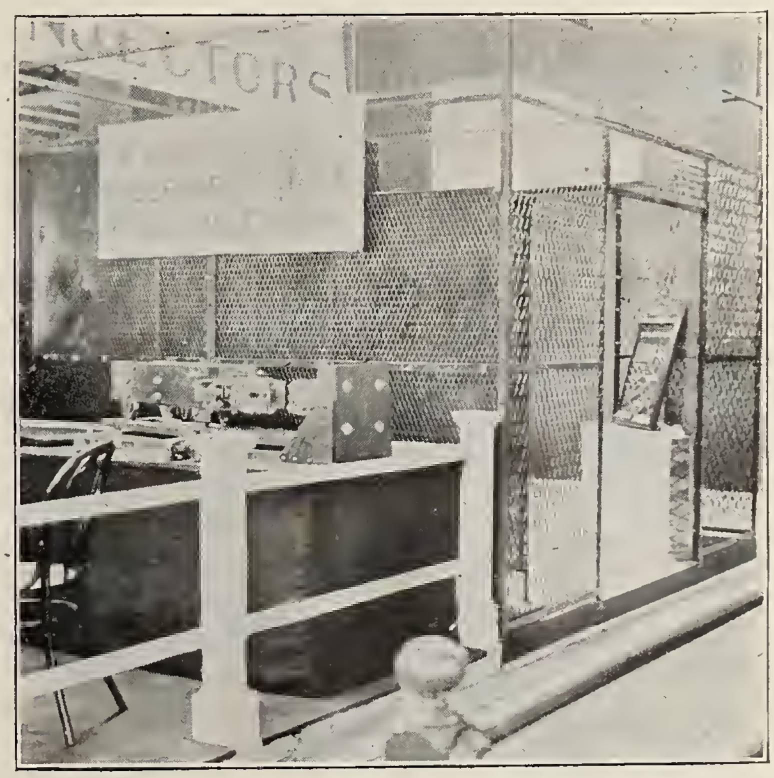
In the line of wood-working machinery, the Oliver Machinery Co., Grand Rapids, Mich., had a large exhibit in their immense pavilion. These tools comprised the heavier equipment for a railway shop, and also lighter tools for pattern and cabinet shop work. Improved features were prominent in all the tools exhibited. A swing saw had a vertical adjustment for the preservation of aligment of the saw to cut, to compensate for wear of the teeth. A universal saw bench revealed some conveniences that made it a valuable accessory to the wood working shop, the most noticeable of which was the sliding table 16 inches wide, and the fixed table 20 inches wide, besides which the top could be inclined through an angle of 135 degrees, and be secured to position at any point.

In the Manning-Maxwell & Moore exhibit was seen the Automatic Grinding Machine at work on plug cocks, such as are used for blow-off and air brake work. The machine is made to give the cock plug a vertical as well as a rotary motion in the cock shell or body which is fixed in a frame. The action produced imitates very closely that in hand grinding. The machine handles several valves at the same time, having multiple spindles on which the plugs are mounted.

The exhibit of the Acme White Lead and Color Works, of Detroit, Mich., was an attractive one, made so by the artistic arrangement of paneling around the exhibit space. These panels were of many woods, and finished as for passenger train cars inside and outside. Their "Pandect," which is a rust preventive for metal structures and cars, is a specific for the ravages of alkali, acid or gas, preventing their attack of metal most effectually, was well exploited.

The Gold Car Heating & Lighting Co., New York, had a complete showing of their heating systems for passenger trains. These comprised steam, hot water and electricity, the latter being recently adopted by the Underground Railway Co. of London, the heater for which was shown in model. All the accessories going with the several systems were shown, and in operation. Their improved regulating system, which reduces the pressure in each car, giving a tem-

PAUL DICKINSON—GEO. P. NICHOLS & BRO.



WASHBURN CO.—MERRITT & CO.

Chicago Railway Equipment Co.

Gould Coupler Co.

perature to accord with weather conditions, is a solution of the problem of healthful car heating. In this exhibit was also the Edison Storage Battery System for train lighting, the exclusive selling agency of which is controlled in this country by the Gold Co. This battery is complete in itself, giving the maximum output with low weight and small space. The lamps have direct connection with the battery in this system.

The Safety Car Heating & Lighting Co., New York, had their exhibit of the new mantle Pintsch lamps at the Hotel Raleigh, and also in a Pennsylvania car, in full operation during the congress. The beautiful soft glow of these lamps gave an impression of fairyland to the surroundings such as no rub of Aladdin's lamp could preduce. These lamps are used with the ordinary Pintsch system, but with the advantage of more and better light at a less cost.

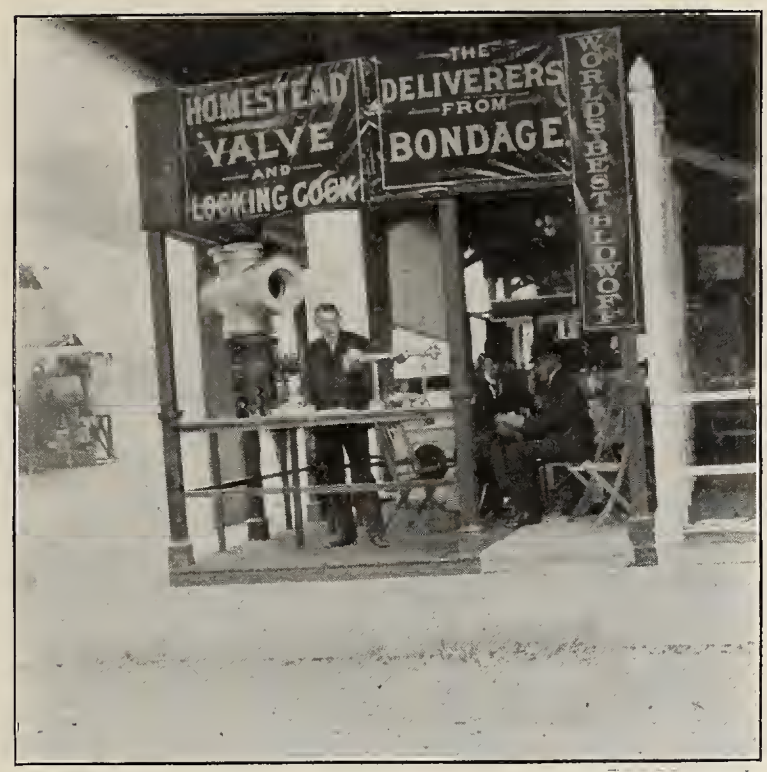
The Chicago Car Heating Co. had their vapor system of car heating in full operation in their exhibit. By this system there is no pressure in the radiating pipes, which are open to the atmosphere. Steam traps and drip valves are therefore not used, and the freezing of these parts is eliminated. The radiating pipes in the train are automatically filled with steam at 212 degrees, with a uniform temperature throughout the train, regardless of the train pipe pressure.

The Pyle National Electric Headlight Co. had an interesting exhibit of their lightning system, with its generator, the current being taken by their automatic adjustable arc located in the focal point of the reflector. The working of this lamp is automatic in the most complete sense, the carbon being thus held in the focal plane, and the turbine being governed to a close regulation, so that no attention is required other than to start and stop. One of these lamps was set so as to spot the apex of the Washington monument at night, producing an effect on that grand old shaft which was visible for miles.

The General Electric Co. was, as usual, in a conspicuous place in it own pavilion, showing many of the specialties for which this company is famed. Among these was a com-

Sherwin-Williams Co.

Miller Wrecking Anchor.



The Homestead Valve.

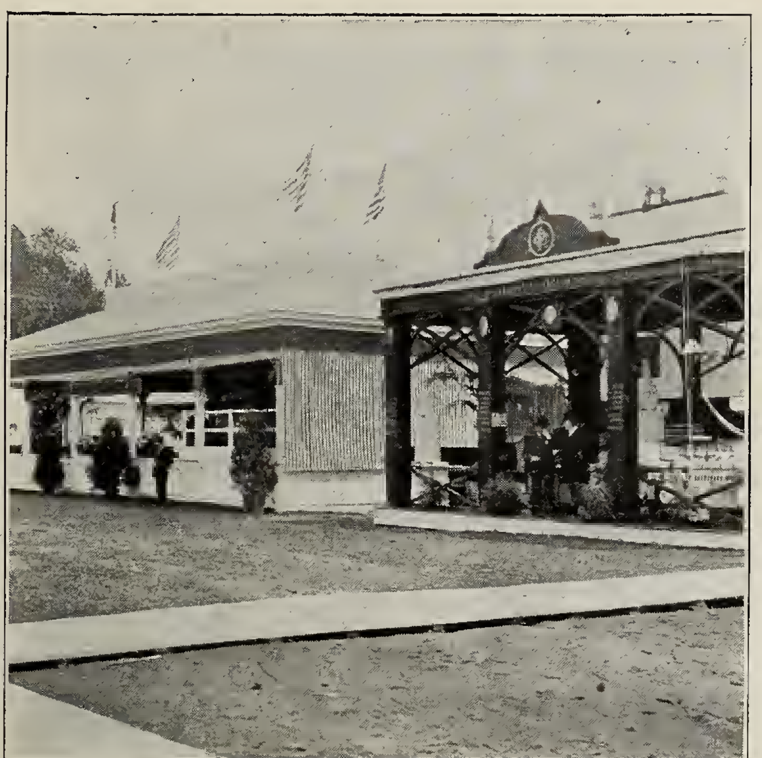
Chicago Pneumatic Tool Co.

plete working system of the multiple control for trains, the semaphore being of full size and operated by a small car on the track. One of the attractive features to the railroad man was the mutoscope exhibit of the speed trials at Hoffman's, of the electric locomotives built for the New York Central, in competition with the steam locomotives of the same road. To those who have been on an engine in speed tests, this exhibit was a thriller, showing these machines, each with passenger trains, bearing down side by side at an apparent speed of more than 70 miles an hour. Many old time locomotive men were seen with eyes glued to these mutoscopes.

The Baldwin Locomotive Works had on exhibit in their pavilion their steel wheels made from the solid ingot, also those having tires, both of which were cut in sections, as well as solid. The Vauclain system of compounding, and their balanced locomotive was covered by literature and drawings. On the track outside of the grounds was one of the new Baldwin balanced four cylinder compounds built for the Pennsylvania road. This machine excited much favorable comment on its size and workmanship.

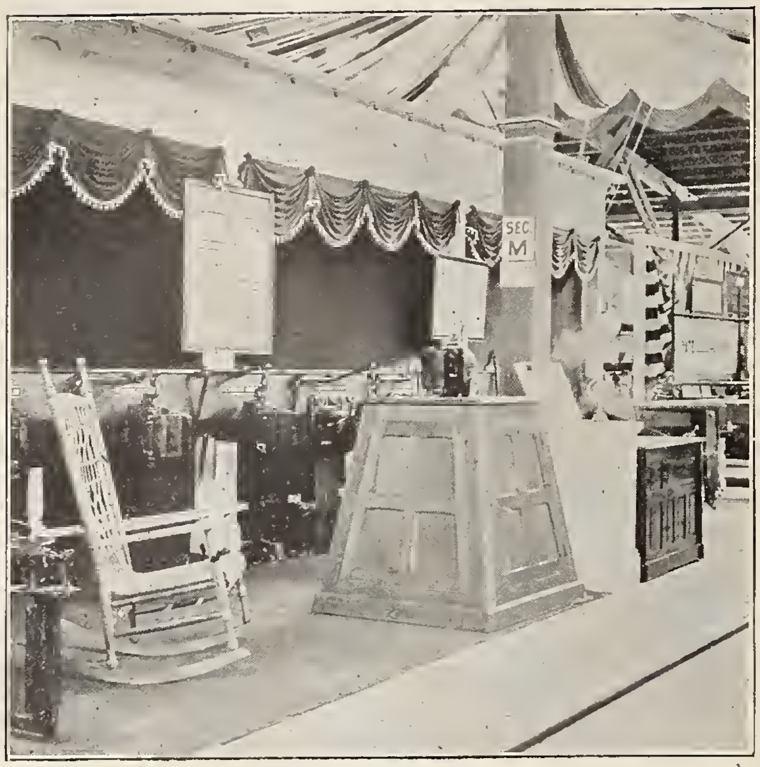
The American Locomotive Co. had a pavilion for the entertainment of their friends, and also had an exhibit on the tracks a consolidation engine built for the Lake Shore road. A distinctive feature of this engine was the Walschaert valve gear which is receiving considerable attention at this time by American roads. There were some improved points of design seen in this gear that will be likely to give it a more extended vogue. This gear is one of those having a constant lead at all points of cut-off, and is located entirely outside of the frames.

The Aurora Automatic Machinery Co. had an exhibit in their pavilion of their "Thor" pneumatic tools. These embraced drills, reversible and non-reversible, of capacities ranging from a 2½-inch drill down to watchmaker's sizes. Air machines for reaming and tapping and wood boring were seen in a large number of sizes, also a full line of hammer for riveting, caulking and chipping, all of which were in operation. One of the novelties of the "Thor" tools was an air turbine driving a portable cut-off saw, the uses of which in car work were obvious, as the little tool could be carried



Exhibits of National Malleable Castings Co., and Philip Carey Mfg. Co.

Exhibits of the Cling-Surface Co., and Dilworth Porter and Co.



McConway and Torley Co.

Crane Company Exhibit.

and operated anywhere. For dressing the edges of car flooring and roofing, this machine will fill a place now ready for it. These tools represent the best product in their line, in point of workmanship and in the amount of air used in the motors.

The Electro-Dynamic Co., Bayonne, N. J., is one of the aspirants for honors in the electric field that had an exhibit of some good things in their line. Among these was their 5-S four to one interpole variable speed motor, driving by belt a generator, to demonstrate the flexibility of working capacity, in the speed variations of from 250 to 1,200 revolutions per minute, from no load to 100 per cent overload. These motors are reversible under all conditions of service, and were in use furnishing power for various tool exhibits on the ground.

The Chicago Pneumatic Tool Co. exhibited their Little Giant motors, the Keller riveters and drills, the Bayer speed recorders, and the Bayer and Chicago drills, their paint spraying machines, besides their pneumatic geared hoists and trolleys. In connection with the latter is an automatic brake worked by air, which is used to hold the load in a given position and for any length of time desired.

The F. E. Reed Co., Worcester, Mass., had a 16-inch and 18-inch lathe on exhibit, the first, driven by a motor which was located over the headstock, while the second was belt driven. The provision for furnishing soda and oil to the machine was very complete. The work laid out on these machines was not for exhibition purposes, as some seemed to think, but just simply the everyday finish of these builders.

Merritt & Co., Philadelphia, the expanded metal people, exhibited their expanded sheet steel lockers, showing designs of various sizes for offices and shops, which were intended to cover all possible needs for wardrobes and cabinets.

The Lodge & Shipley Machine Tool Co., Cincinnati, O., had a 24-inch lathe on exhibit in the main building, having an electric drive by a Bullock motor of eight horse power. This machine was put through its paces with Novo tool steel, taking cuts with a feed of from 1-32 to 1-8 inch on high carbon

American Steam Gauge & Valve Mfg. Co.

Exhibit of American Valve & Meter Co.

Mason Regulator Company.

Barker Mail Crane & Catcher.

steel. The machine and motor stood up to the mark, leaving the burden of proof to the tool steel. This lathe is an improved tool in the fullest sense.

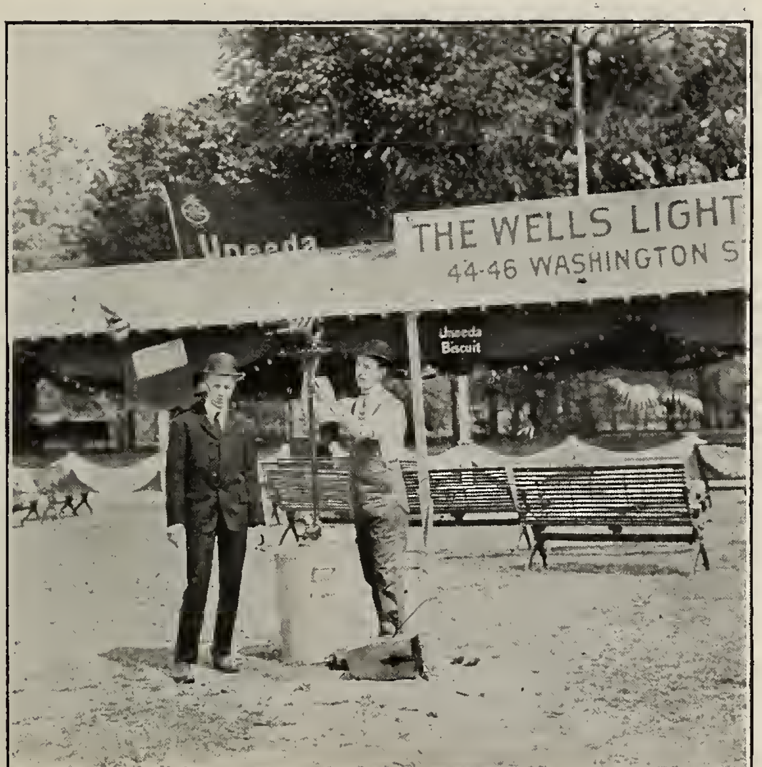
The T. H. Symington Co., Baltimore, had an exhibit in their pavilion, showing the Baltimore ball bearing center plates and side bearings in full size details, also the Symington journal box and other specialties.

The Schoen Steel Wheel Co., Philadelphia, exhibited their steel wheels, both solid forged and rolled, and illustrated the various stages of construction of these wheels by the actual object, from the billet to the finished wheel ready for mounting.

The Victor Locomotive Stoker Co., Cincinnati, O., had their stoker in active operation as a practical exhibit, showing what the stoker could do in crossing a large grate area. A wired enclosure 11 feet long by 7 feet wide served as a firebox, while the stoker was mounted on a dummy boiler head in a large steel cab of the Chesapeake & Ohio road. Conditions closely approaching those of actual road service were met by the stoker, which distributed coal evenly over the 84 square feet representing the grate. The demonstrations of the stoker were of great interest to the foreign delegates as well as others to whom it was no stranger. Maximum conditions were chosen by the owners. This is the Kincaid stoker with a new name.

The Railway Appliance Co., Chicago, had in their exhibit in the main building two motor cars operated by gasoline. One of these was for railway inspection service and made to carry four persons. A novelty in this line was the larger of these vehicles which was designed to carry eight passengers. A still larger one is constructed for operation on railway tracks, with a capacity for 30 passengers, but was not shown. They have a radius of action only limited by the means to obtain gasoline and are good for speeds above 40 miles an hour. The Oldsmobile Co. are the builders of these machines.

The Bettendorf Axle Co., Davenport, Ia., had in their pavilion an exhibit of the Bettendorf trucks and other of their



The Wells Light Exhibit.

Detroit Lubricator Co.

Armstrong Bros. Tool Co.

Railway Master Mechanic.

products, among which was the combined steel arch frame and journal box. This was a decided novelty, and attracted a great deal of attention.

The monster hydraulic riveter of the R. D. Wood Co., Philadelphia, made one of the most impressive exhibits on the ground. The capacity of this tool was sufficient to take in the longest boiler shell, the gap being over 18 feet long. Though the opening was of such an immense depth, the deflection was only ½ inch when exercising its maximum power.

One of the interesting exhibits to the motive power people was that of the Sectional Automatic car journal lubricator, which is an oil tight journal box, having the space usually given to waste filled with oil, in which was a small frame resting on the bottom of the box and carrying disks which had contact with the under side of the journal. These disks revolved by frictional contact with the journal, and kept it flooded with oil. An electric motor drove the axle at a speed as high as eighty miles an hour in the demonstrations given, to show the operation of the device, which was exhibited in a journal box having glass sides. This scheme of lubrication was tested on the Great Northern Ry. on a Pacific coast train and showed an immense saving in oil, and brass and journal wear, without a hot box in the run of over 2,000 miles. Several thousand of these lubricators have been ordered by the Japanese government.

The Crane Co., Chicago, had an exhibit of their valves, which comprised every variety of valve used for locomotive and stationary purposes. In these were pop, angle, globe and gate valves. All of these were designed for high pressure work. The removable disk seat is an important improvement in valves, since it enables the renewal of both the seat and disk at pleasure without disturbing the other points of the valve.

The Landis Machine Co., Waynesboro, Pa., had an interesting exhibit of their bolt cutting and nut tapping machines, with their dies and chasers, and examples of the high class of thread work turned out, which in point of excellence equalled the best lead screw products.

The Landis Tool Co., Waynesboro, Pa., had their very effi-

The Standard Sectional Automatic Car Journal Lubricator.

Consolidated Ry. Electric Lighting & Equipment Co.

Buda Foundry & Mfg. Co.

The King-Lawson Car.

cient grinding machines and grinding appliances on exhibit, with examples of their accuracy in fine grinding, such as crank pins, round valve fits on interior and exterior surfaces, and gage and jig work, all of which was of the most excellent character.

The Sherwin-Williams Co., Cleveland, O., exhibited their railroad paints and had photographs of their numerous paint plants where their colors are produced, making an interesting show to the visitor.

The King-Lawson dump car was on exhibit on the grounds and was the object of constant attention. This car is all steel and is the latest development of the dump principle for cars. It was built by the Middletown Car Works.

The Ajax Metal Co., Philadelphia, showed very extensively in their exhibit all their alloys used in locomotive and car bearings. In the driving journal bearings was the Plastic bronze, and in three cars was seen the Duplex bearing, which has an iron or steel back with a filling known as Plumbic bronze, in which lead has no part.

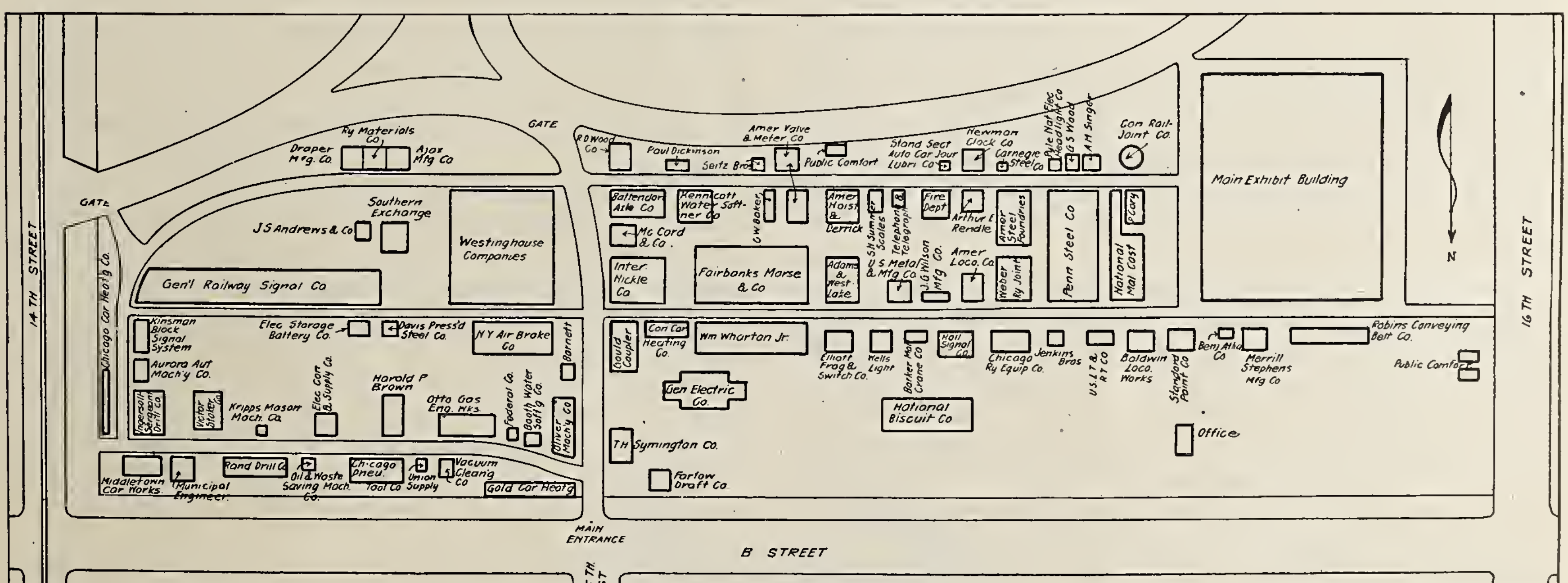
The Miller Anchor Co., Norwalk, O., exhibited their anchor for wrecking purposes and for guy wires. This anchor is made of sheet metal pressed into a shape to best resist deformation and give the greatest resistance against displacement, making an ingenious and effective device for the purpose.

The National Malleable Castings Co., Cleveland, O., had an exhibit of couplers, draft gear, journal boxes and door fastenings. Besides these, there were automatic couplers and draft gears adapted to foreign equipment. The journal box having a spherical ridge, which is a device to equalize the pressure between the brass and journal, had a great deal of attention given it.

The Lindenthal car truck was an exhibit in full sizes. This truck is an entirely new idea in truck construction, having no center plates, the load being carried on rocking side bearings, the object being to entirely eliminate curve resistance. In other respects the truck is on standard arch bar lines. The designer is the well-known bridge engineer of New York.

McCord & Co. had their usual fine display in their pavilions. Among their products were their malleable iron journal box, spring dampener, McKim gasket, McCord lubricator and Gibraltar bumping post. The latter was also shown installed in the track exhibits. The McCord draft gear, which was said to have the best points of a friction gear, was one of the new things shown.

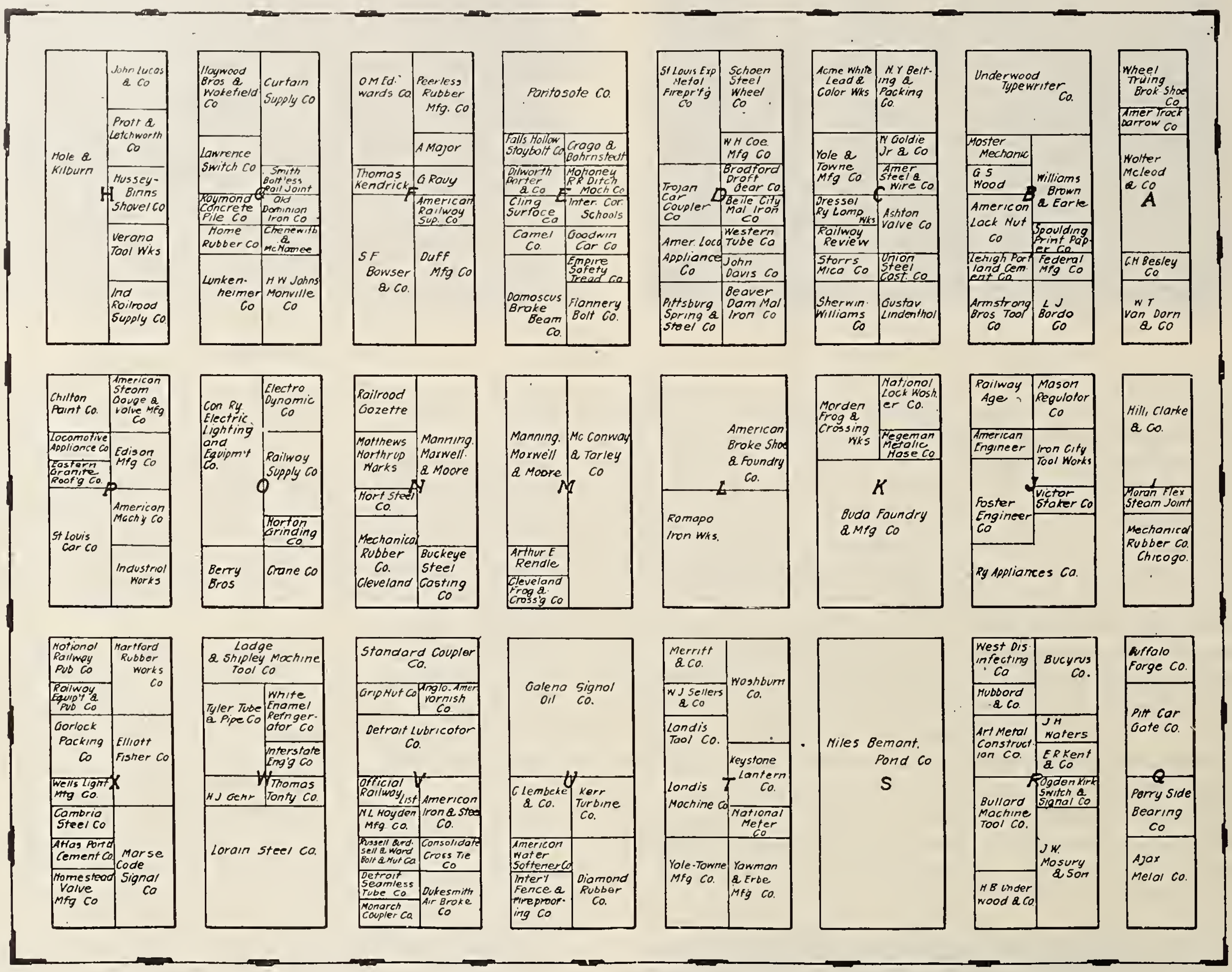
Paul Dickinson, Chicago, was on record in his pavilion



Plan of Grounds Railway Appliance Exhibition, Washington, D. C.

with his cast iron smoke-jacks and ventilators, and had a round house smoke jack which was adjustable to height and position, in full size, which was operated by a touch of the hand. As an example of a thorough understanding of smoke-jack utensils, this exhibit was in a class by itself. In this pavilion was also the exhibit of George P. Nichols & Bro., with their transparencies showing the installment of their transfer tables and turntables in some of the largest plants of this country.

H. B. Underwood, Philadelphia, had a complete exhibit of portable tools for boring cylinders, turning crank pans, and facing valve seats. The new boring bar adapted to boring cylinders and valve chests of compound engines having piston valves was also on exhibit. They also showed their two-cylinder motor for air or steam, designed for driving the portable tools. These tools achieved a world-wide fame when made by L. B. Flanders, and Pedrick & Ayer, long before the present improvements were made.



Location of Exhibits in the Main Building Railway Appliance Exhibition, Washington, D. C.

The American Steam Gage and Valve Co., Boston, exhibited their steam gages, pop valves for all classes of service, besides their improved Thompson steam engine indicator, which has a detent motion on the card drum. This motion is a convenience at slow speeds and an absolute necessity at high speed work. Anyone familiar with the indicator will appreciate the value of a device that will enable the operator to leave the cord coupled up permanently.

The Washburn Co., Minneapolis, Minn., were in evidence with their well-known couplers, showing samples for all service. This exhibit was very complete in all details, and the compound coupler, which is "not an experiment," came in for a large share of attention from car and locomotive men.

The Gould Coupler Co., New York, had their couplers in an attractive exhibit, showing their malleable journal boxes, and friction draft gear. This exhibit was the scene of many reunions of old friends. The Gould system of train lighting by means of a generator belted to the axle by a silent chain, was shown in a manner to make its operation clear to those not familiar with electric lighting.

The Detroit Lubricator Co., exhibited their new disk sight fed lubricators, as representing their latest lubricator design, which was shown in all sizes and for all kinds of service, with the view of anticipating any possible question from visitors.

The Consolidated Electric Lighting & Heating Co., exhibited in the main building their axle lighting system in full operation. The voltage in this system is constant at the lamps under any change of speed, and this was demonstrated in the exhibit to the satisfaction of the visitor.

The McConway & Towley Co., Pittsburg, Pa., exhibited freight and passenger car couplers, among which were the Kelso, Pitt and Janney, together with the Buhoup passenger car coupler and cast steel truck. The Pitt coupler was arranged to be operated by electricity in the exhibit, which showed the coupler in its various movements of locking, opening and coupling.

The Morse Twist Drill & Machine Co., New Bedford, Mass., exhibited their drills, reamers, taps and cutters. There were several varieties of drills with different methods of grooving, and also drills with holes for conveying lubricants. The reamers also were in several designs, having straight and spiral fluting, and were of the solid kind and also adjustable. The cutters embraced the solid and inserted tooth types, while the taps were of all varieties, from taper and plug, to those for special boiler making uses.

The Mason Regulator Co., Boston, Mass., exhibited their "Worlds Standard" reducing valves for locomotive, train, shop and steam heating plants, in one of the most extensive and attractive displays they have yet shown, in all sizes and for all uses under pressures.

The Vacuum Cleaner Company, New York, gave in their pavilion, constant demonstrations of their cleaning system, using for the purpose fouled draperies and carpets, removing every vestige of dirt by means of the vacuum principle, in which the air is exhausted from the tubing to which is attached the slotted metallic head for extracting the dirt. One of the most convincing demonstrations of its efficiency was shown in taking the dust out of any visitors apparel. A movement of the receiving head over the garments—and the thing was done. The barber shop in the Times building in New York is equipped with this system of clothes cleaning. The company has automobiles fitted with this apparatus for renovating offices, hotels and private houses constantly in service in New York City. The steamer "New Providence" of the Fall River Line, and the steamer "Asbury Park" of the Sandy Hook Route also, have this system permanently installed, and it is now being considered by the trans-atlantic lines. The cleaning plant of the C. R. R. of N. J. at Jersey City has been in operation for some time cleaning the passenger cars of that road, and has been found superior to any other method for removing dust and dirt, besides the most economical process. This company is successor to the David T. Kenney Vacuum Sweeping Sytem.

The Ajax Manufacturing Company, of Cleveland, were located in their own building and exhibited their well known treading, upsetting and forging machines which are equipped with a special side squeezing attachment for bolt and rivet treading for upsetting and forging purposes. More than 150 sample forgings made upon various sized machines collected from different shops throughout the country were shown.

A very unique and interesting exhibit was that of the American Valve and Meter Company, of Cincinnati, O. The Poagh Water Column with a Fenner drop spout and the Anderson Economy Switch Stand were shown and hourly stereoptican shows illustrated the complete as shown in their catalogue.

The Anglo-American Varnish Company, of Newark, N. J., whose product is too well known to the trade to need any special mention was represented by Mr. William Marshall who had charge of their exhibit space in the main building.

The only exhibit of its kind represented at Washington was that of the Barker Mail Crane Company, of Clinton, Ia., a long and short full sized Barker mail crane in working order was shown and also the Barker Safety Mail Catcher.

Among the most interesting exhibits was that of S. F. Bowser & Co., Ft. Wayne, Ind. In their large space in the main building were shown their oil house equipments for railroads and factories, shop tanks, cabinets and underground gasoline storage.

The Buda Foundry and Manufacturing Company, of Chicago, made a large and comprehensive exhibit of their track supplies, crossing gates, track drills, railroad velocepedes, switch stands, forks and frogs.

The Philip Carey Manufacturing Company, of Lockland, Cincinnati, O., in a large building of their own made a complete exhibit of their building, roofing, plastic freight car roofing, locomotive boiler lagging, train pipe covering, and magnesia and asbestos goods of all kinds.

The Chicago Railway Equipment Company, showed in their own building brakebeams for all kinds of service, bolsters for car bodies and trucks, rollers, side bearings for both passenger and freight equipment, slack adjusters for passenger and freight cars.

The Draper Manufacturing Company, of Port Huron, Mich., exhibited in their own building the McGrath pneumatic flue welder, McGrath turn table motor and the Draper valve-facing tools.

In ttheir own neat and attractive building the Farlow Draft Gear Company, of Baltimore, Md., exhibited full size twin and tandem design draft gears applied to steel and wood draft sills, also malleable and wrought iron draft gear details and M. C. B. couplers with reinforced slots.

In a very attractive and pleasant manner the Galena-Signal Oil Co., of Franklin, Pa., kept open house during the entire exhibition, and welcomed in a most cordial manner all of their friends in the railway and railway supply fraternity. They showed a complete collection of all oils used in railway lubrication.

The International Fence & Fireproofing Company, of Columbus, O., exhibited their concrete mixers, wire fences and gates and reinforcing for concrete.

In a very attractive manner the Locomotive Appliance Company, of Chicago, exhibited photographs of their Allfree-Hubbell locomotives, section and pinion of their valve gear, also the Smyth derailers, Twentieth Century derailers and Newton wrecking frogs.

Geo. P. Nichols & Bro., of Chicago, showed illuminated photographs of electric equipment for transfer tables, turntables and draw bridges.

In their own building was well displayed by the Otto Gas Engine Works, Chicago, their gas engines, pumping machinery, dynamos, air compressors, Otto water crane, tank valves, Moore track jack, Winter's automatic signal batteries and track wrenches.

The Railway Materials Company, of Chicago, exhibited in their own building a No. 2 forging furnace and a flue-welding furnace in operation.

The Standard Coupler Company, of New York City, showed their well known Standard steel platform with the attachments and the Session-Standard friction draft gear.

The Wells Light Manufacturing Company in an exhibit in the main building and also in another exhibit on the grounds showed three sizes of the Wells Light apparatus, locomotive tire remover, tripod outfit and the Wells standard oil gas lamp.

The Westinghouse Air Brake Company in their immense building exhibited air brake equipments and instruction car, steam and motor driven air compressors and friction draft gear.

Pacific Type Engine with Superheater, Erie Railroad

The problem of making time with a 600-ton passenger train on the Erie road, on a section of the line which offers resistance of a character that demands a high powerful engine, has been a live question for some time, and the engine illustrated herewith by courtesy of the American Locomotive Co., represents a machine especially designed to meet the hard conditions involved. This engine is of the Pacific type, with simple cylinders, equipped with Cole superheater, and is one of the most powerful passenger engines yet built, being capable of exerting a starting effort of 30,200 lbs. and has a coefficient of adhesion of 4.93, which is a fine reserve to draw on when lifting the train to speed. The total load of engine and train is about 797 tons, from which it is seen that the work cut out is of the most strennous kind, when taken in connection with the mountainous division, which while a strong card with the tourist is an element to cause grave concern to the operating department when speed is a con-consideration.

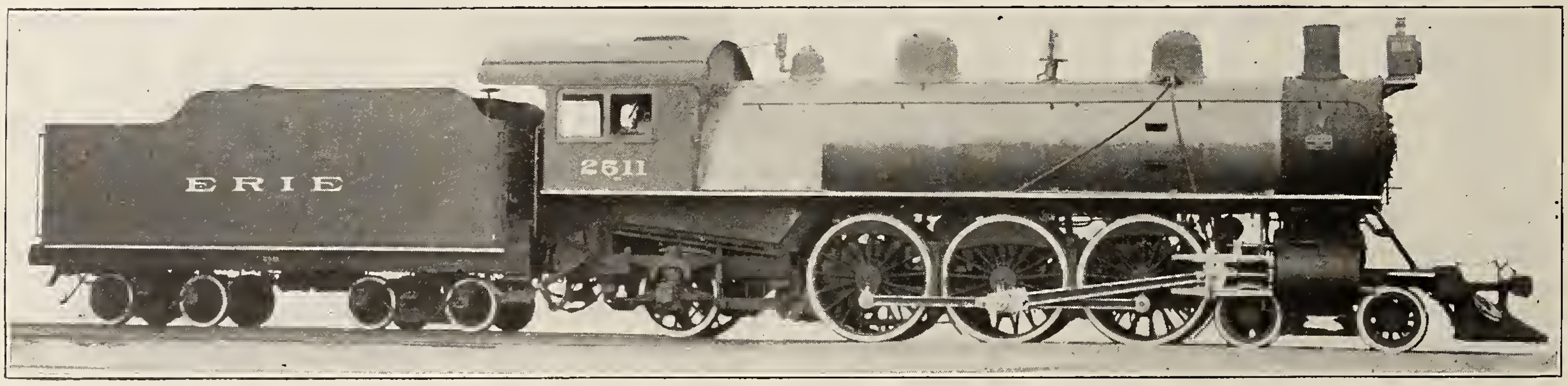


FIG. 1—PACIFIC TYPE ENGINE WITH SUPERHEATER, ERIE RAILROAD.

The resistance of speed grades and curves are such as to make necessary a machine that must develop a high horse power, and in order to furnish this, a boiler of more than ordinary capacity is required. As an aid to the end of making the most of the evaporative capacity of the latter, the superheater is applied to these engines, of which there are two in the order. The heating surface (firebox and tubes) is 4421.95 square feet, and that of the superheater is 763.75 square feet, while the grate area is 56.5 square feet. These proportions would seem to be ample, but no doubt test work will be necessary to sustain theory before definite statements can be made in this direction. The illustrations are self-explanatory, and make clear the essential points of design and construction without dwelling on them at length in the text. The detail of the superheater tubes will be of special interest at this time, because of the results obtained here and abroad in its use on simple engines, in which the saving has been pronounced, over the compounds without the superheater. The performance of these engines will be noted and results furnished in a future article in this paper. The following descriptive data gives the important particulars not covered in the above:

Cylinder, type	Simple piston valve
Cylinder, diameter	22.5 ins.
Cylinder, stroke	26 ins.
Trage gauge	4 ft. 8½ ins.
Wheel base, driving	13 ft.
Wheel base, rigid	13 ft.
Wheel base, total	33 ft. 8 ins.
Wheel base, total, engine and tender	65 ft. 1 in.
Weight with superheater	230,500 lbs.
Weight, in working order on drivers	149,000 lbs.
Weight, in working order, engine and tender, with superheater	393,500 lbs.

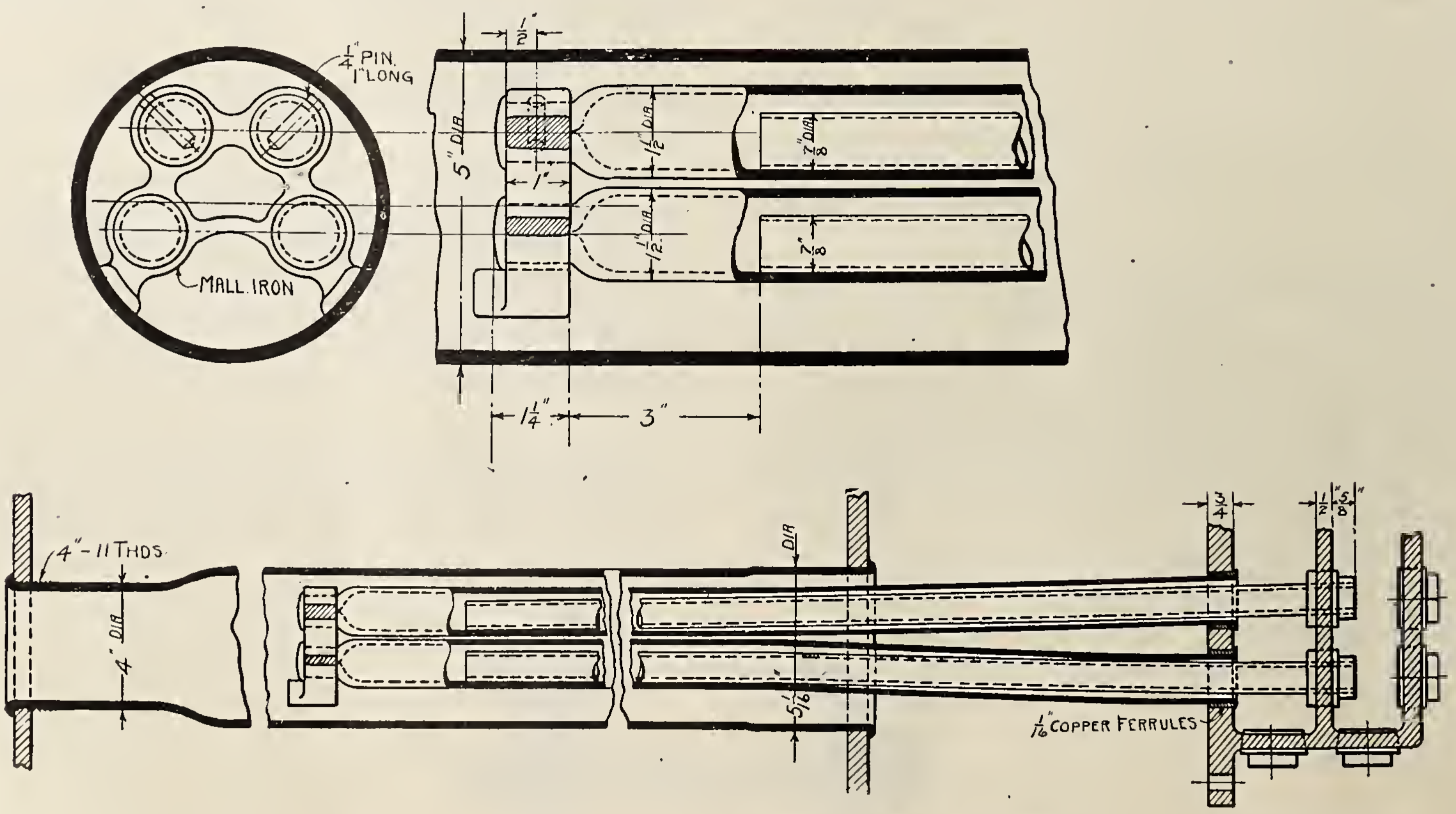


FIG. 2—DETAILS OF SUPERHEATER, ERIE ENGINE.

Heating surface, tubes ....3,119.59 sq. ft.
Heating surface, firebox ....202.35 sq. ft.
Heating surface, total ....3,321.94 sq. ft.
Heating surfaces, superheater ....763.75 sq. ft.
Track gauge ....4 ft. 8½ ins.
Axles, driving journals, main ....9½x12 ins.
Axles, others ....9½x12 ins.
Axles, engine truck journals, diam. 6½ ins. length....12 ins.
Axles, trailing truck journals, diam. 8 ins. length......14 ins.
Axles, tender truck journals, diam. 5½ ins. length......10 ins.
Boiler, type ....Straight top
Boiler, outside diam. first ring......................74⅝ ins.
Boiler, working pressure ....200 lbs.
Boiler, fuel ....Bituminous coal
Firebox, type....wide; length, 108⅛ ins.....width, 75¼ ins.
Firebox, thickness of crown.............................
Firebox, thickness of crown.............................
..............⅜ in.; tube, ½ in.; sides, ⅜ in.; back, ⅜ in.
Firebox, water space, front 4½ ins.; sides 4½ ins.; back 4½ ins.
Crown staying .... Radial
Tubes, material ....Charcoal iron
Tubes, number ....195; diam 2¼ ins.
Tubes, length ....20 ft. gauge 11 BWG.
Boxes, driving, main ....Cast steel
Boxes, others ....N. Y. cast steel
Brake, driver ....N. Y. high speed; truck, high speed
Brake, tender ....N. Y. high speed; air signal, N. Y. ES.
Brake pump ....Duplex No. 2 L. H. reservoir, 1-20-½x150 ins.
Engine truck ....4-wheel swing center bearing
.... with spring centering device
Trailing truck ....Radial with outside journal
E haust pipe Single nozzles 5⅜ ins. 5⅝ ins. and 5⅞ ins. diam.
Grate, style ....Rocking to shake in four sections
Piston rod, diam........3¾ ins.; ..piston packing, C. I. rings
Smoke stack, diam. ....18 ins.; top above rail, 15 ft. 2¼ ins.
Tender frame ....12 in. steel channels and plates
Tender frame ....Georgia pine flooring
Tank, style ....Water bottom
Tank, capacity ....8,500 gals.
Tank, capacity, fuel ....16 tons
Valves, type ....Piston 12 in. diam.
Valves, travel ....6 ins.; steam lap, 1 in.; ex. C. L. ⅛ in.
Setting ....Line and line full forward motion
.........................¼ in. lead at ¼ in. stroke cut off
Wheels, driv. diam. outside tire, 74 ins.; centers diam. 68 ins.
Wheels, driv. material, main ....Cast steel; others, cast steel
Wheels, eng. truck, diam. 36 ins.; kind Paige; cast iron spoke
Wheels, trailing truck, diam. ....
...................50 ins. kind A. L. Co. cast steel spoke
Wheels, tender truck, diam......... 33 ins. kind Paige plate

Visit of Engineer Delegates to the Schenectady Works

A TRAIN of six Pullman cars, carrying over one hundred of the engineering delegates to International Railway Congress, arrived in Schenectady, N. Y., on the morning of May 26, on their long tour, which will be finished in New York on the 27th of May. The party was accompanied in their trip from Montreal by A. J. Pitkin, president of the American Locomotive Co., and were met on arrival at Schenectady by J. E. Sague, vice-president; R. J. Gross, second vice-president; Leigh Best, third vice-president; C. B. Denny, treasurer; H. C. Hequembourg, purchasing agent; J. McNaughton, general superintendent, and a party of guests brought from New York by Vice-President Best (there is no better host imaginable). An inspection of the immense locomotive plant by the visitors, among whom was the very flower of foreign railway talent, was followed by a sumptuous banquet in the assembly hall of the works.

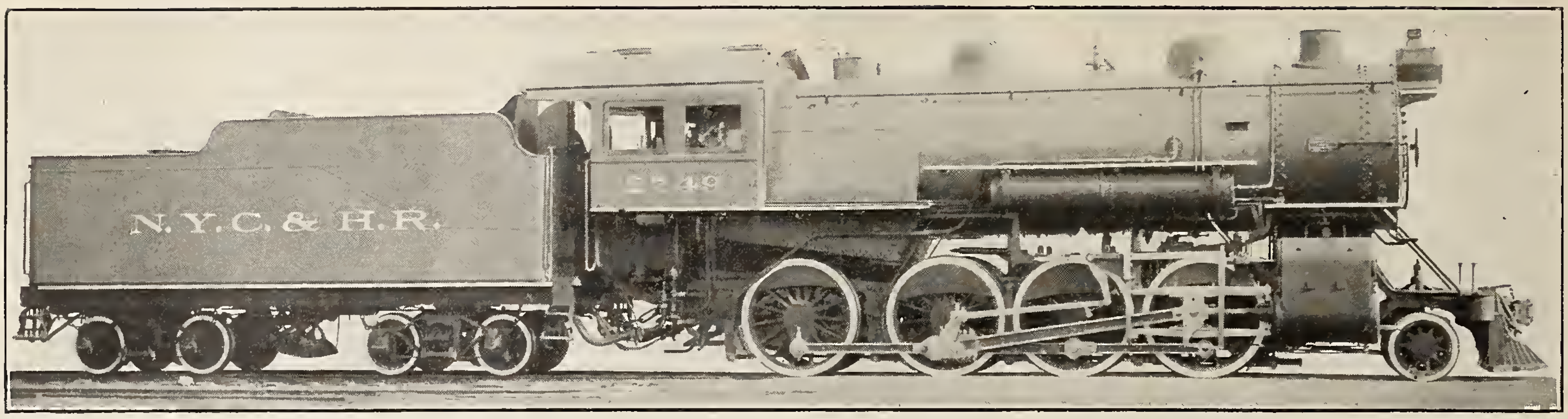
President Pitkin presided, and after the good things were absorbed, gave a hearty welcome that left no doubt in the minds of our foreign brothers that while a long way from their hearthstones, were among good friends. Mr. Pitkin called upon W. J. Clark, manager of the foreign department of the General Electric Co., who in well rounded periods got "hands across the sea" in a most pleasing welcome, referring to the fact that the visitors were working with us for the same results—common progress in the arts making for advanced railroad practice.

For the visitors, Mr. Rudolph F. de Salis, director of the North Staffordshire Railroad of England, replied to the greetings and expressed the hope that his people might have the opportunity to welcome American railway men to England. The cordial treatment accorded the visitors while here only served to make stronger ties. Mr. C. Tenni, chief engineer of the Southern Railway of Austria, Mr. E. H. Stieltzies of Holland, and M. Edouard Sauvage, chief engineer of mines and of the company of the west, also made responses, all of which were expressive of the deepest appreciation of American hospitality, and meant plainer than spoken words that au revoir would be their parting word—not farewell. After enjoying patriotic airs by the orchestra, the party went by special train of 6 cars, drawn by one of the new electric locomotives, to the trial track of the New York Central, where a speed spurt was given to the passengers. Not more than 70 miles an hour was reached, but that was satisfactory to those on the train, after which the train was taken to the General Electric Works and the party taken through the plant, which covers an area of more than 400 acres, and has 18,000 employers. It is seldom that such unstinted and open-handed hospitality is extended visitors anywhere as was given our friends from over the ocean, and from expressions heard in several languages it is certain that they were never treated handsomer than by the American Locomotive Co.

New York Central Simple Consolidation Engine

THE heavy simple consolidation engine which was on exhibition at Washington during the International Railway Congress is illustrated herewith by courtesy of the American Locomotive Co., by whom it was built at their Schenectady works for the New York Central. This engine has several distinctive features, among which is the Walschaert valve gear, which has some constructive points that appear to be improvements over the usual design of that gear, in respect of absence of complication and undue heaviness of parts, and also in the method of applying the lift arm to the valve rod, which has the function of a sliding block as well as a journal. The Walschaert gear is one that gives a constant lead to the valve at all points of cut-off, in which respect it is similar to the Joy gear which was tried in this country a few years ago and abandoned after a short period of service. There is much difference of opinion about this question of lead, but the objections raised to it for passenger service will scarcely apply in freight work, as the interest evinced recently in this type of gear in this country indicates. One important advantage in this valve gear is in its accessibility, as it is entirely outside of the frames.

This engine comes in the category of the heavy ones, weighing 221,500 lbs., in working order, and with tender 366,-700 lbs. It is but a little lighter than the Tandem compounds now on the same road, considered from the standpoint of adhesive weight, but is heavier in total weight of engine and tender. The boiler is 80 inches diameter inside at the small ring, having 3702.5 total square feet of heating surface and a grate area of 56.25 square feet. The driving wheels are 63 inches in diameter, giving a hint of fast freight service, and all wheels are flanged. The large boiler allows of the use of 446 tubes 2 inches in diameter, but there is no



NEW YORK CENTRAL SIMPLE CONSOLIDATION ENGINE.

evidence of the craze for tube surface to the sacrifice of water space, such as has been seen in so many of the large engines, as there is a bridge of ¾ inches between the flues, and a liberal water space between flues and boiler shell, and the same attention to wide water space is to be noted in the width of 4½ inches at the mud ring all around, widening to 6½ inches at the crown sheet, which cannot but be conducive to free steaming.

The details of this machine have been worked out with more than ordinary care, and this is seen particularly in the liberal amount of metal and its disposition, in the frames, and also in the frame bracing, and solid binders, which look like an unfailing foundation on which to build and carry this leviathan of the rail. The engine can exert a maximum draw bar pull of 45,700 lbs., on a dry rail, having an adhesion coefficient of 4.32. The following are the general dimensions:

Cylinder, type simple piston valve..diam., 23 in.; stroke, 32 in.
Track gauge ....4 ft. 8½ in.
Wheel base, driving, 17 ft. 6 in.; rigid, 17 ft. 6 in........
....total, 26 ft. 5 in.
Wheel base, total, engine and tender...........60 ft. 6½ in.
Weight, in working order, 221,500 lbs.; on drivers, 197,500 lbs.
Weight, in working order engine and tender, 366,700 lbs. est.
Heating surface, tubes........................3489.47 sq. ft.
Heating surface, firebox.......................185.64 sq. ft.
Heating surface, arch tubes.....................27.41 sq. ft.
Heating surface, total........................3702.52 sq. ft.
Grate area......................................56.25 sq. ft.
Axles, driving journals......main 10x12 in.; others 9½x12 in.
Axles, engine truck journals........diam., 6 in.; length, 12 in.
Axles, tender truck journals......diam., 5½ in.; length, 10 in.
Boiler..............type, straight top; O. D. first ring, 81⅝ in.
Boiler...............working pressure 200 lbs.; fuel Bit. coal.
Firebox.......type, wide; length, 108 1-16 in.; width, 75¼ in.
Firebox, thickness of crown, ⅜; tube, 9-16; sides, ⅜; back, ⅜.
Firebox......water space, front, 4½; sides, 4½; back, 4½ in.
Crown staying........................Crown Staying Radial
Tubes................material char. iron; No. 446; diam. 2 in.
Tubes................length, 15 ft. ½ in.; gauge, No. 11 BWG.
Boxes.......................driving main, C. S.; others, C. S.
Brake........................driver, West. Amer.; truck ——
Brake.............tender, Westinghouse; air signal West. J.
Brake.............pump, 11 in. L. Hand 2; reservoir, 18½x120.
Engine truck......2 wheel C. S. Frame Swing center bearing.
Exhaust pipe.......................single nozzle, 5½, 5¾, 6.
Grate.......................style Rocking, Ry. Co. pattern.
Piston............rod diam., 4 in.; piston packing, C. I. rings.
Smoke stack........diam., 20 in.; top above rail, 14 ft. 9¾ in.
Tender frame...................................10 in. channel.
Tank..............................style, water bottom.
Tank.............................capacity, 7500 gallons.
Tank.............................capacity, fuel 12 tons.
Valves.......type, piston 14 in.; diam., 6 in.; steam lap, ⅞ in.
Valves.................................ex. lap, line and line.
Valve Gear...............................type, Walschaert.
Setting.........................Line and line at full stroke.
Wheels.....driv. diam. outside tire 63 in.; centers diam., 56 in.
Wheels..............driv. material, main C. S.; others, C. S.
Wheels engine truck..................................
......diam., 33 in.; kind, Krupp No. 3 C. I. spoke center.
Wheels, tender truck, diam., 33 in.; kind, Paige steel tired plate.

Personals

Mr. R. D. Fildes has been appointed assistant superintendent of shops of the Lake Shore & Michigan Southern at Collinwood, O.

Mr. G. W. Tompkins has been appointed master mechanic of the Wabash, Chester & Western, with offices at Chester, Ill., vice Mr. E. Danks, resigned.

Mr. William Stellwagon, formerly master mechanic of the Philadelphia & Reading at Palo Alto, Pa., died at Pottsville, Pa., on April 26, aged 74 years.

Mr. G. A. Gallagher has been appointed master mechanic of the Illinois Southern, with office at Sparta, Ill. Mr. Gallagher was formerly master mechanic of the Swan River Logging Company.

Mr. T. M. Downing has retired from the position of superintendent of motive power of the Mobile, Jackson & Kansas City.

Mr. E. C. Roddie has been appointed general foreman of the Illinois Central machine shops at New Orleans, La., succeeding Mr. R. H. Gray, resigned.

The jurisdiction of Mr. E. T. White, superintendent motive power of the Baltimore & Ohio, has been extended to include the Pittsburg system.

Mr. F. W. Cooper, formerly with the Atlantic Coast Line, has been appointed master mechanic of the Lehigh Valley at East Buffalo, N. Y., to succeed Mr. J. H. Fildes.

Mr. J. J. Kelker, general foreman of the Cincinnati, Hamilton & Dayton shops at Lima, O., has been appointed master mechanic at Dayton, O., to succeed Mr. W. H. Sloat.

Mr. D. McKinley has been appointed general foreman of the car department of the Pere Marquette at Muskegon, Mich. Mr. F. L. Fox has been appointed general foreman at Ionia, Mich., and Mr. J. F. Mann has been appointed general foreman at Saginaw, Mich.

Mr. C. T. Walters has been appointed master mechanic of the Minot division of the Great Northern. Mr. S. J. Fero has been appointed traveling engineer of the same division.

Mr. S. M. Dolan, formerly master mechanic of the Southern, has been appointed master mechanic of the St. Louis, Iron Mountain & Southern at the Baning car shops, Argenta, Ark., to succeed Mr. Evan Jones, resigned.

Mr. Alexander Kearney, who recently resigned as superintendent of motive power of the Baltimore & Ohio at Pittsburg, has been appointed assistant superintendent of motive power of the Norfolk & Western, with headquarters at Roanoke, Va.

Mr. F. H. Clark, formerly superintendent of motive power of the Chicago, Burlington & Quincy lines east of the Missouri river, has been appointed general superintendent of motive power of the entire system, with headquarters at Chicago. Mr. F. A. Torrey, formerly assistant superintendent of motive power, has been appointed superintendent of the lines east, in place of Mr. Clark.

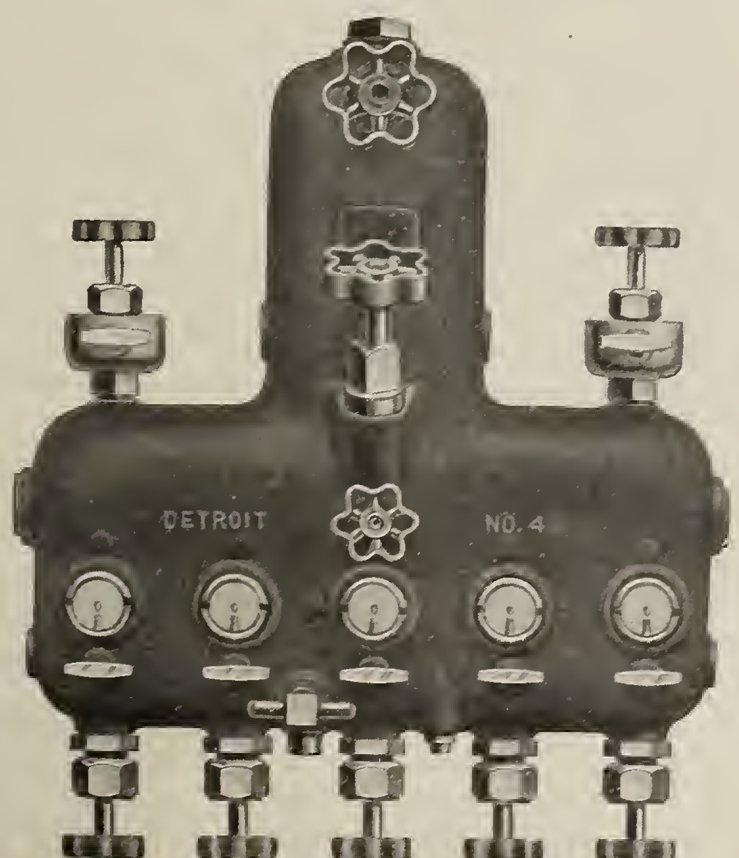
Mr. E. A. Miller, division master mechanic of the New York, Chicago & St. Louis at Conneaut, O., has been appointed superintendent of motive power of that road, with headquarters at Cleveland, O., to succeed Mr. W. L. Gilmore, who has resigned to engage in other business. Mr. Harry MacBeth, foreman of the roundhouse at Buffalo, N. Y., has been appointed master mechanic at Conneaut in place of Mr. Miller.

Mr. H. C. Van Buskirk, general master mechanic of the Ft. Worth & Denver City, has been appointed superintendent of motive power of the Colorado & Southern, with headquarters at Denver, Colo., to succeed Mr. A. L. Studer, resigned.

Fay & Egan Building An Addition

J. A. Fay & Egan Co., the large makers of wood-working machinery of Cincinnati, Ohio, are bound to clinch their claim of being the largest makers of this machinery in the world. They have found their business increasing at such a pace that it has been found impossible to fill their orders with their usual rapidity. This will now be remedied by a large five-story building that they now have under construction by their plant, having a space of about 50,000 square feet. It will be used as a shipping warehouse, and will serve to contain the finished machines ready for shipment, instead of as heretofore, leaving the tools in the respective departments in which they are built. This will give them more room in all the departments and facilitate very much the shipping of their machinery. The warehouse will also serve as a show-room, so visitors having limited time may see the different tools all finished without having to go through all the factories.

In this connection it is not amiss to say that the Fay & Egans could easily use double the space their shops now occupy, but limited land around that part of the city prevents their acquiring more property than the above mentioned lot.



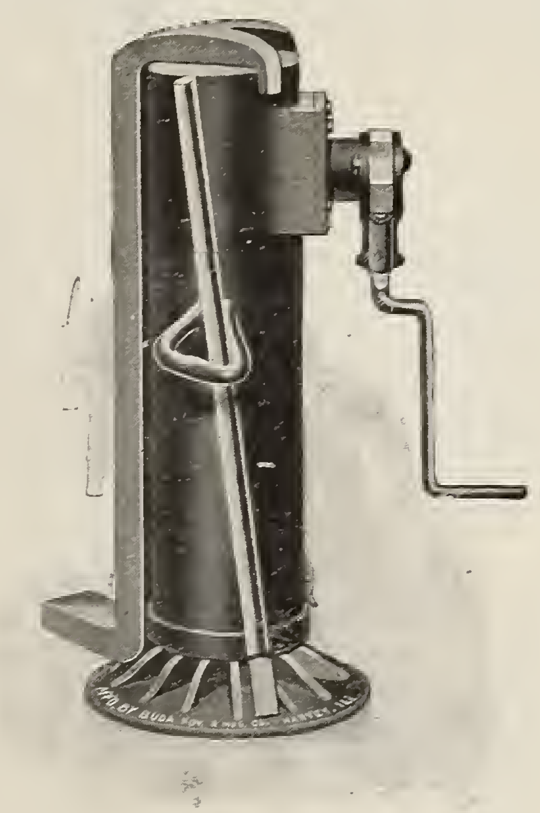
DETROIT FIVE FEED LUBRICATOR.

The Detroit Five-Feed Locomotive Lubricator

The Detroit No. 41 Five-Feed Locomotive Lubricator, bulls-eye pattern, is attracting a good deal of attention at the present time, especially in connection with balanced compound locomotives. It performs the same service as has been done by two lubricators (one double-feed and one triple-feed) in the past and it takes up much less space in the cab. The feeds can be arranged to feed against either high or low pressure as may be desired.

Ball-Bearing Locomotive Jack

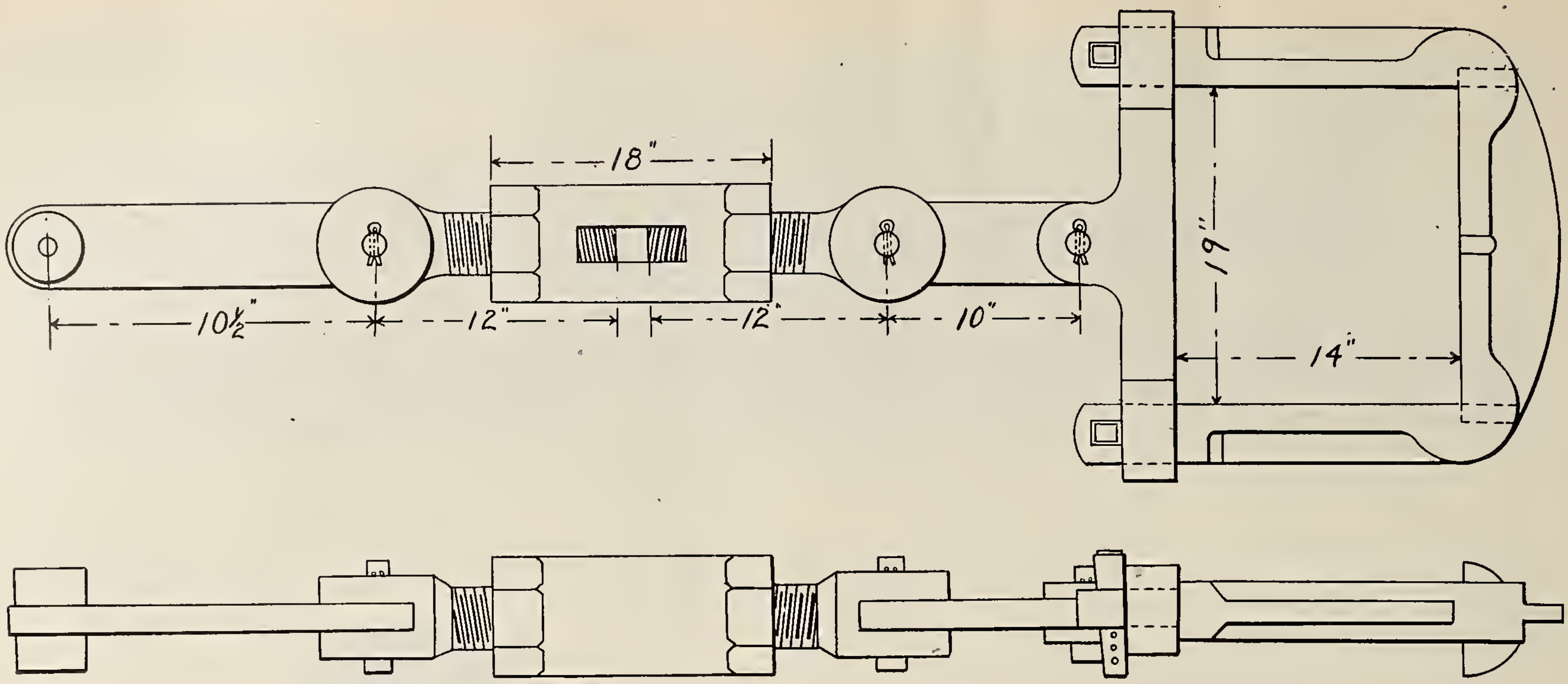
Among the recent new things which the Buda Foundry & Manufacturing Company, Chicago, Ill., have added to their list of railroad appliances is their style 110 ball bearing Locomotive Jack, an illustration of which is shown herewith. It will be seen that the internal working parts are thoroughly protected from dirt of any kind and from the weather. This


BUDA BALL BEARING LOCOMOTIVE JACK.

is an essential feature for this class of jack, as it is of importance that it be in working order when deeded. In height it is 24 inches, has 11-inch rise; diameter at base, 13 inches; capacity, 25 tons; weight, 149 pounds. A hook for low set loads is provided, making it thoroughly serviceable for locomotive work. The component parts are of the best material and the workmanship careful to a degree that the makers give it their full guarantee.

The Ideal Emergency Coupler

A scheme worked out on mechanical lines, having for its object a partial elimination of the trials attendant on break-in-two's, is shown in the drawing of the Ideal Emergency Coupler presented herewith. It is manufactured by the West Virginia Malleable Iron Co., Point Pleasant, W. Va., from the design of a practical railroad man who knows too well of the terrors of a pulled out or broken draft-gear, and what it means to get into clear by the aid of the crude and barbarous chain method. This device consists of a yoke at one end, the purpose of which is to pass around the center plates of the disabled car, while at the opposite end is a plain bar link which engages with the knuckle slot and pin in the uninjured draw-bar, the knuckle being removed for the purpose. The function of the turnbuckle at the center is of course, to take up slack. The portability, efficiency, and ease



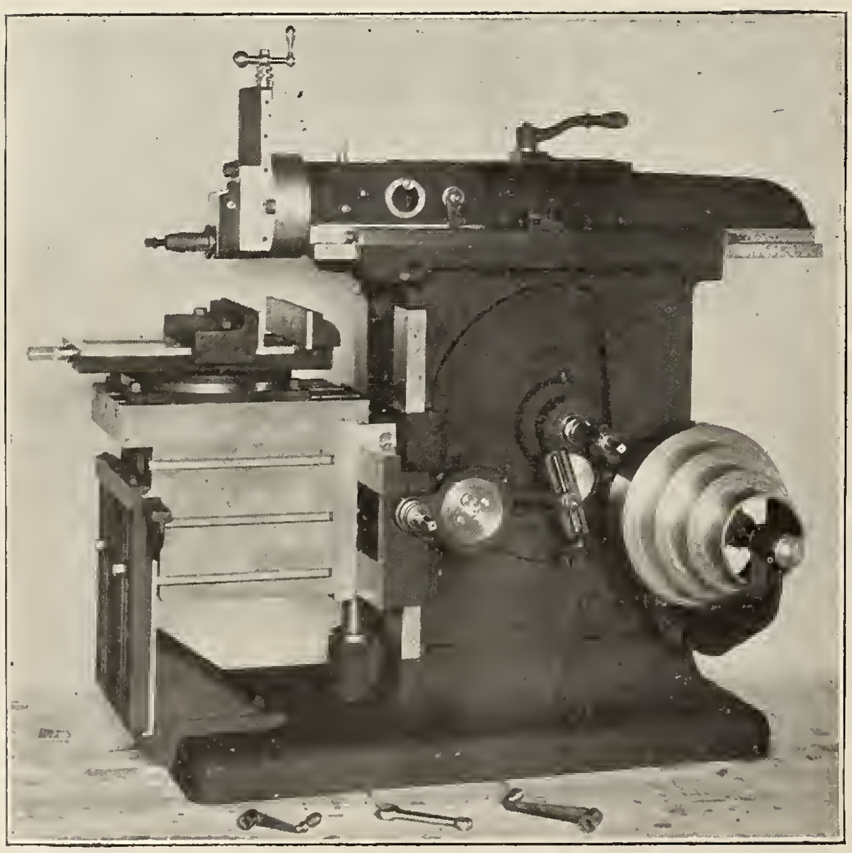
THE IDEAL EMERGENCY COUPLER.

of application of this coupler are its recommendations, it being light and strong, and only necessary to pass the yoke around the center plates and drive the keys to place at one end, and drop the knuckle pin in at the other, to be ready to go. Those who have worked against time by the old make-shifts will be able to appreciate the value of an emergency coupler that will reduce the probability of lay-outs due to parting trains, and will not object to it as a part of the caboose equipment.

Twenty-Inch Crank Shaper

The accompanying illustration shows a combination crank shaper, 20 inch. back geared, with quick return automatic down feed, extension base, complete with vise, countershaft, and wrenches, as manufactured by the Stockbridge Machine Company, Worcester, Mass.

The column of this shaper is of the latest box pattern extended three inches on top in front and is very deep, giving a bearing surface for the ram of 32 inches. The ram is of box pattern 46 ins. long, 11 ins. wide. It is driven by combination crank motion, giving a quick return and an even cutting speed the whole length of the stroke. The position of the tool is capable of being changed from the front of the machine in a very short time. The head which carries the tool has its swivel accurately graduated and can be set to any angle, and clamped in position by two bolts holding it perfectly rigid. The slide has a travel of 9 ins., fitted with automatic feed. The ratchet wheel for vertical feed of the tool head is made of steel, and the notches are cut with a fine pitch for satisfactory power feed on hard material. The screws are provided with a graduated collar reading to 64th of an inch. The collar is so arranged that it can be set from zero at all times without regard to the position of the screws. When using the automatic feed to head, the dog which operates the pawl can be set so as to do its work at the extreme side of the return stroke. The table is of box form, with a working surface on top 14x20 ins., and on one side 14x15 ins. It has three T slots for clamping work to it, and an adjustable knee support is provided. It can be raised sufficiently above the saddle to allow T bolts to be put in from the back as well as from the front. The hooks over the saddle wihch give greater rigidity to the table than when bolts alone are used.



STOCKBRIDGE 20-INCH SHAPER.

The stroke of this machine, which is 20 ins., is capable of being readily changed from the front of the machine, and the index and pointer are in plain view showing the length of stroke. The cross feed is 26 ins. in length and automatic in either direction. It is operated through a rod which adjusts itself in position on the bar. The screw is fitted with a graduated colar reading to 64ths of an inch, the same as on the down feed. The automatic feed with both head and table are adjusted while the machine is in motion as well as when stopped. The vertical movement of the table is 13 ins. by means of beveled gears and the telescopic screw. The screw is provided with ball bearings. The greatest distance from the top of table to bottom of ram is 16 ins. The rocker arm is made so that a 4-in. shaft can be passed through under the ram for keyseating.

The vise is of the swivel-base pattern, and can be clamped to the table by two bolts fitting in the T slots. The jaws which are steel faced are 12x3 ins. and open 12 ins.

All packings on this shaper are tapered. The driving gear is 20 ins. in diameter and has a 3½-in. face. This, together with back gears and a four-step cone to carry a 3-in. belt makes this a very powerful machine, but besides this machine, in common with all their shapers, is equipped with the Stockbridge (two-piece) crank motion which gives a powerful and even cutting speed the entire length of cut, together with a quick return which is about twice that of other crank shapers made.

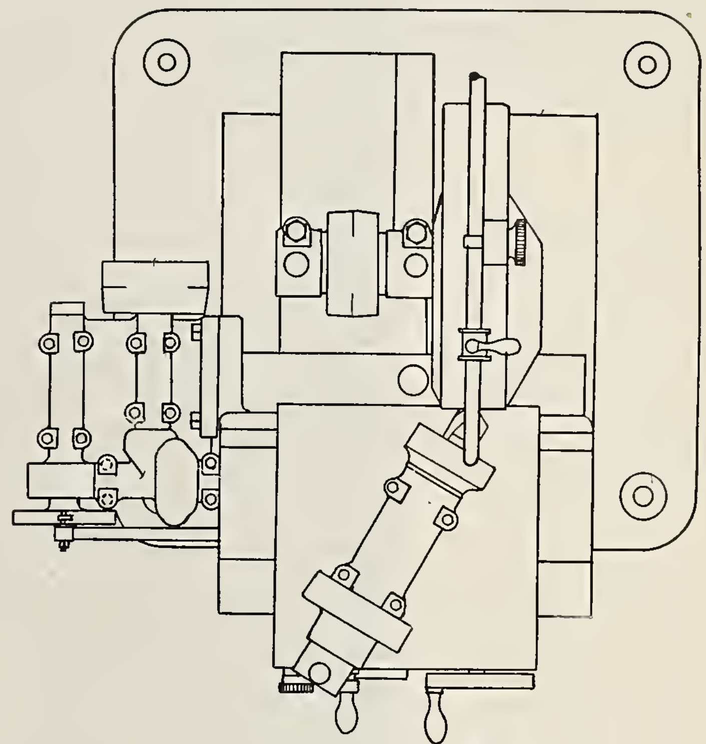
The machine is of the best quality material and workmanship; all gear and T slots are cut from solid metal, all bearings are amply large and all flat-sliding fits are hand-scraped. The finished weight of the machine is about 3,200 lbs.

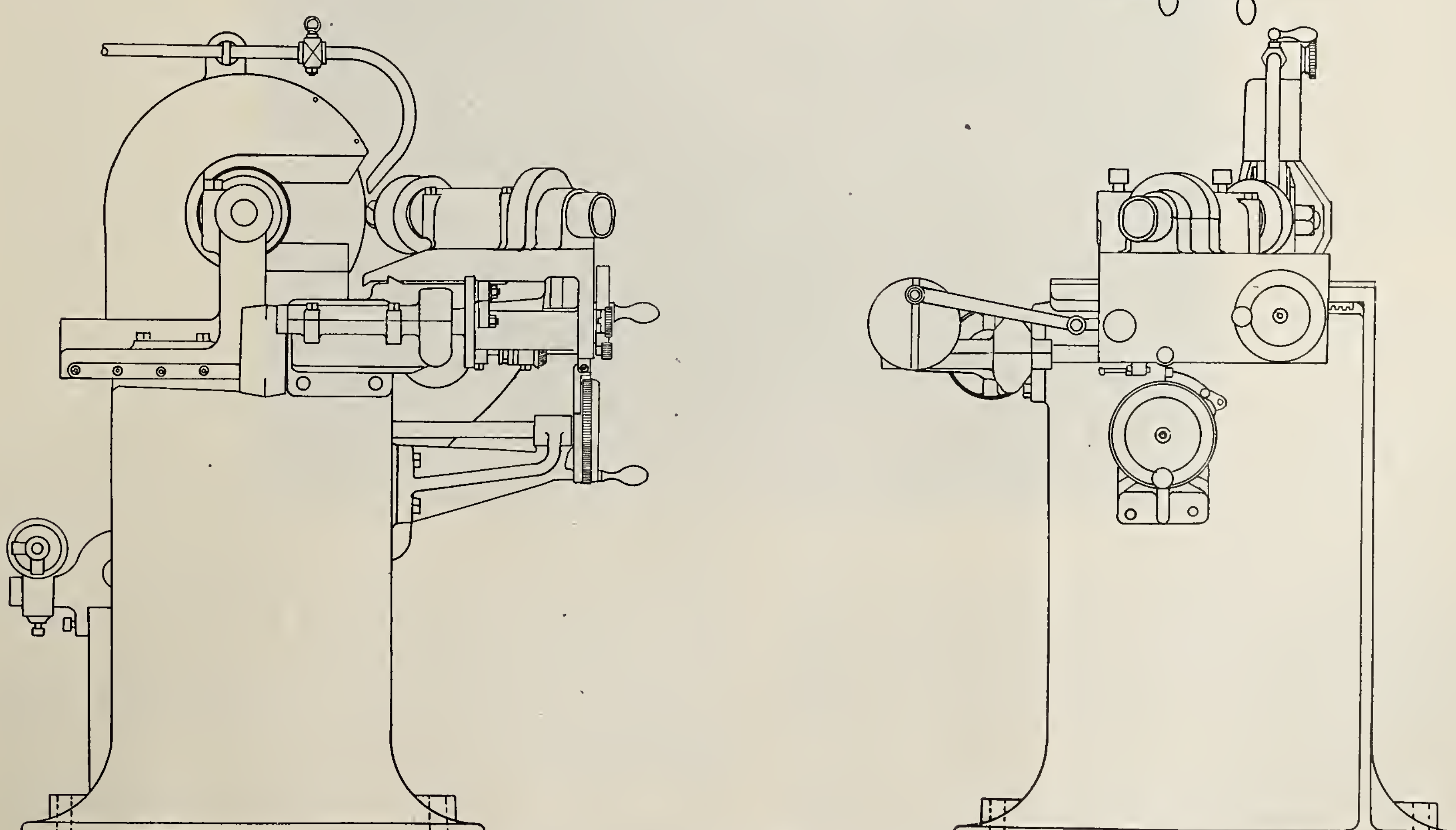
New Machine Shop Appliances

A tool of more than ordinary merit, considered as a sample of inventive excellence, and a device that is needed in every shop where metal is worked, is the automatic drill grinder of the Geo. R. Rich Mfg. Co., of Buchanan, Mich., that was on exhibition among the American Railway Appliances at Washington, D. C. Our illustration is from a working drawing of the single wheel machine. They are, however, built in three styles, single, double and triple grinders, and are designed for rapid work. This machine quickly restores a broken drill to usefulness, an operation performed not only with expedition, but extreme accuracy.

The grinder is mounted in a frame that has a forward and back adjustment by means of a hand wheel and screw, while the chuck or drill holder with the broken drill has three motions, that is, one of revolution, by which the drill point is made to present every portion of its face to the grinding wheel, and also a motion of translation by which the drill point is made to traverse the face of the grinding wheel by means of a crank motion actuated by a worm and wheel. In addition to these movements the drill holder has also one to and from the wheel. An automatic stop capable of being set for any movement required, throws out the feed automatically and prevents grinding beyond a predetermined point, making it unnecessary to give the machine any attention after placing the drill in the holder. To sum up the operations, the drill is placed in position, the feed stop is set for the amount of stock to be removed, when the machine does the rest.

Another tool shown by the "Rich" company was an expanding mandrel that excited pleasurable emotions in the observer who had in the past been obliged to maul the ordinary solid cylindrical variety, in and out of a job. This mandrel is of steel, hardened and ground taper, on which is fitted a spiral steel sleeve also hardened and ground, the bore corresponding to the taper of the mandrel, and the outer surface parallel and true. They come in sets of fifteen, but are sold singly when so ordered. The sleeves being made in helical form, have a range of expansion that covers sizes from one to six inches in diameter. An important advantage possessed by these mandrels is that they are especially adapted for work requiring a smooth hole, it being impossible to score or otherwise roughen the bore of any object turned, and this fact taken in connection with the equally vital one that a slight pressure only is needed to secure or release a job, makes the tool one that no up to date shop will do without.

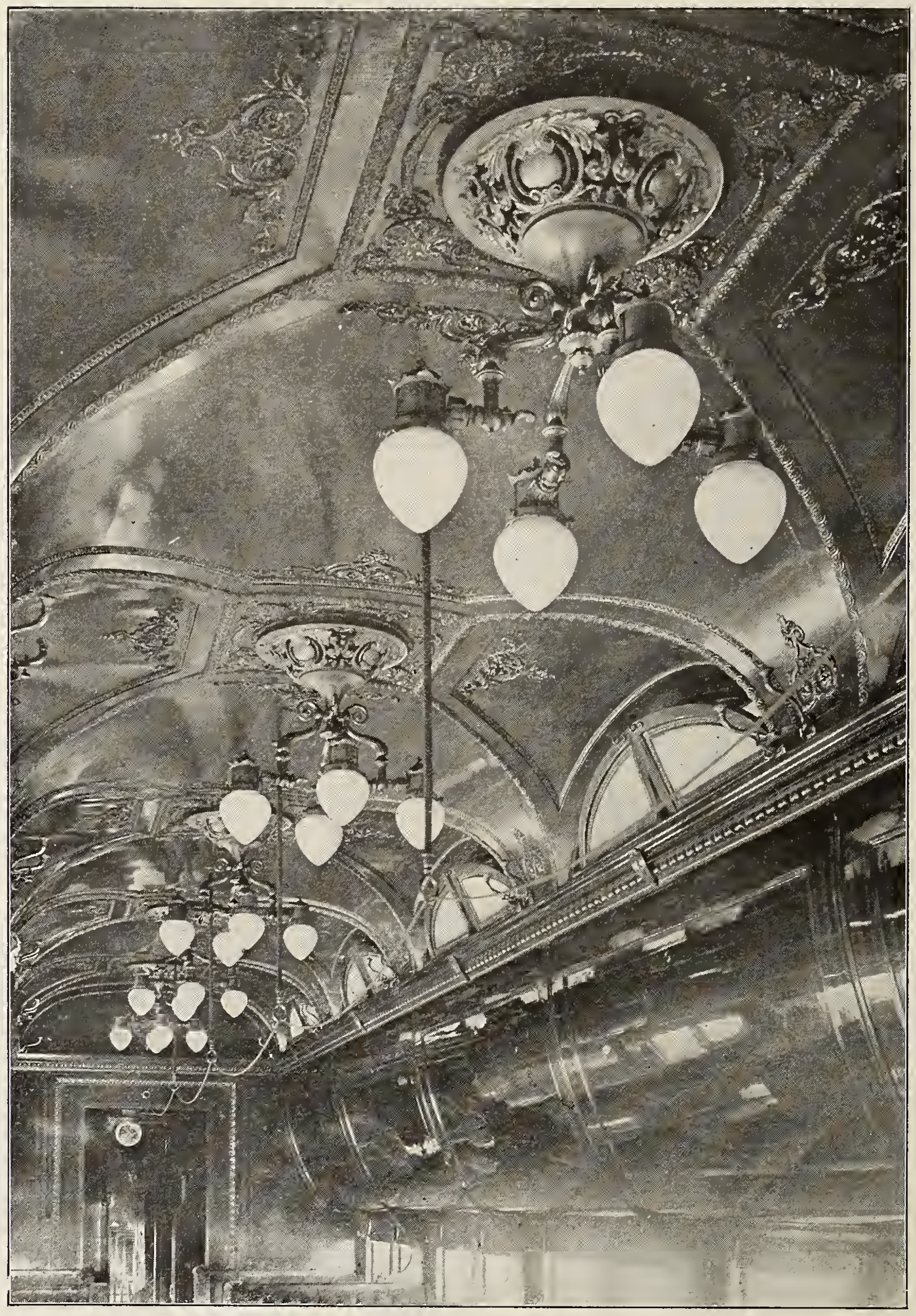




Automatic Drill Grinder, Rich Mfg. Co.

New Pintsch Mantle Lamps

While important improvements have been made in the devices for illuminating passenger cars during the past few years, there is a demand from many quarters for more light under economical conditions. The Pintsch Company has now met this demand after two years of experimenting, and have placed in service a lamp of special design which brings into use a mantle of unique and original form or shape. This mantle is of an inverted type about one inch in diameter and is so arranged as to provide a suitable jet. he lamps are given by the present satisfactory standard Pintsch lamp for the same consumption of gas, and actual service tests indicate the life of the mantle is at least three months. The ease of renewing the mantles, the absolutely smokeless flame and the cleanliness insured add to the list of advantages which should be mentioned. The simplicity, efficiency and economy of the Pintsch System are retained in using this light and in cases where it is decided to adopt the new light a very important saving would be made because the lighting equipment as now used on the majority of cars throughout the



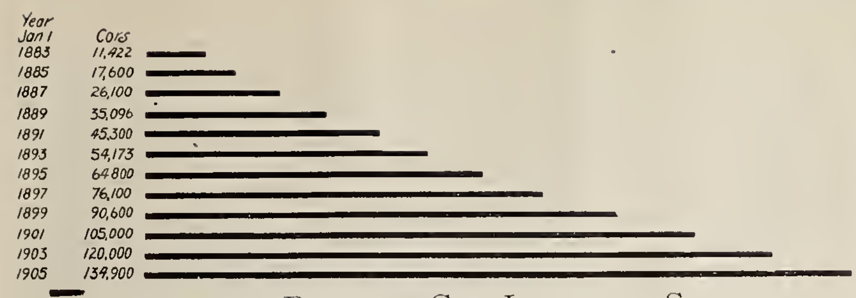
New Pintsch Mantle Lamps.

shown applied to a Pullman sleeping car in the cut and the mantles used, and which give a soft white light—are contained inside of the globes; the mantle and globe being so fixed together that they are fastened to the lamp proper by means of a screw socket as readily as an incandescent lamp can be put in place.

The results obtained can be appreciated when it is understood that the illumination given is 33 candles per foot of Pintsch gas used, or an efficiency of about three times that country is available and there is involved only the small cost of renewing the lamp fixtures.

As the working parts of the lamp are simple and compact, the ornamental features will not be limited thereby, and as the illustration shows, the lamp can be made to enter largely into the decorative scheme of the car.

The further extension of the Pintsch Company's supply stations during the last year makes the gas available in all parts of the United States, Canada and Mexico, and at places



Progress of Pintsch Gas Lighting System.

where only a small supply is required the policy of the company is to furnish transport holders to be placed on flat cars running to the gas plants for charging.

In connection with this lamp the following statistics compiled by the Julius Pintsch Company of Berlin, which give a very comprehensive report of the application of Pintsch gas for lighting railroad trains, buoys and beacons throughout the world, may be interesting. From this it will be seen there are 134,855 cars, 6,191 locomotives, 1,516 buoys and beacons, equipped with this system of lighting, and 364 special gas works fitted up to manufacture and compress the gas.

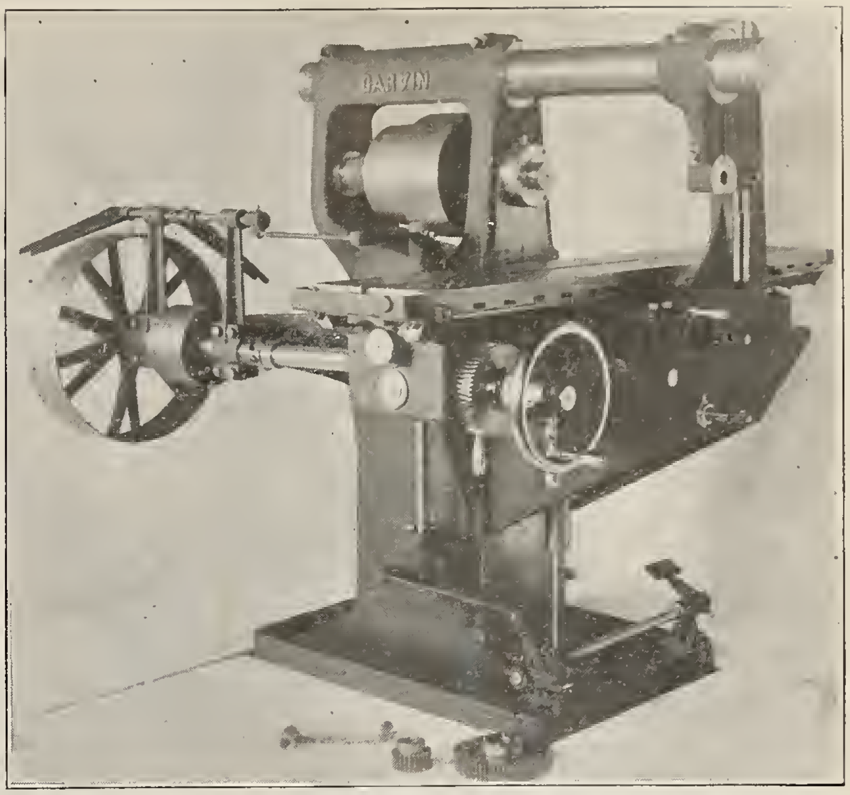
Progress in the use of the Pintsch Gas Lighting System to December 31 1904:

	Cars.	Locomotives.	Gas Works.	Buoys and Beacons.
Germany	46,200	5,930	70	140
Denmark	45		3	21
England	20,500		80	280
France	8,000		20	250
Holland	3,800	5	12	100
Italy	1,570		5	20
Switzerland	410	2	1	
Austria	5,525		15	5
Russia	4,000	170	22	30
Sweden	800	53	6	5
Servia	220		1	
Turkey	120			
Bulgaria	117			
Egypt	200		4	80
Canada	600		4	243
Brazil	1,400	31	2	45
Argentine	1,200		13	10
Chili	50		2	
Australia	3,000		10	40
India	11,600		19	
United States	25,200		71	208
Japan	150		2	35
China			1	25
Mexico	150		1	
Total	134,855	6,191	364	1,516

Garvin Milling Machine

A milling machine designed for the rapid milling of brass trolley wire hangers, is shown as a fine type of special tool, though its excellent qualities are not confined to the work named. It is fitted with power feed, quick return, and automatic stop motion. The drive is by a five-inch belt, and the feed is driven from the countershaft by a 24-inch pulley, through bevel gears to a large steel worm running in oil and meshing into a spiral rack or nut cut out of the solid, and located under the table. The hand feed of the table is by the hand wheel seen on the front of the saddle, this wheel being so clutched that it is not affected by the rapid action of the quick return. Changes of feed are provided by change gears shown at the front of the saddle.

The feed is made to stop at the end of the cut by automatic shifting of the feed belt, and the work is taken out and the



Garvin Milling Machine.

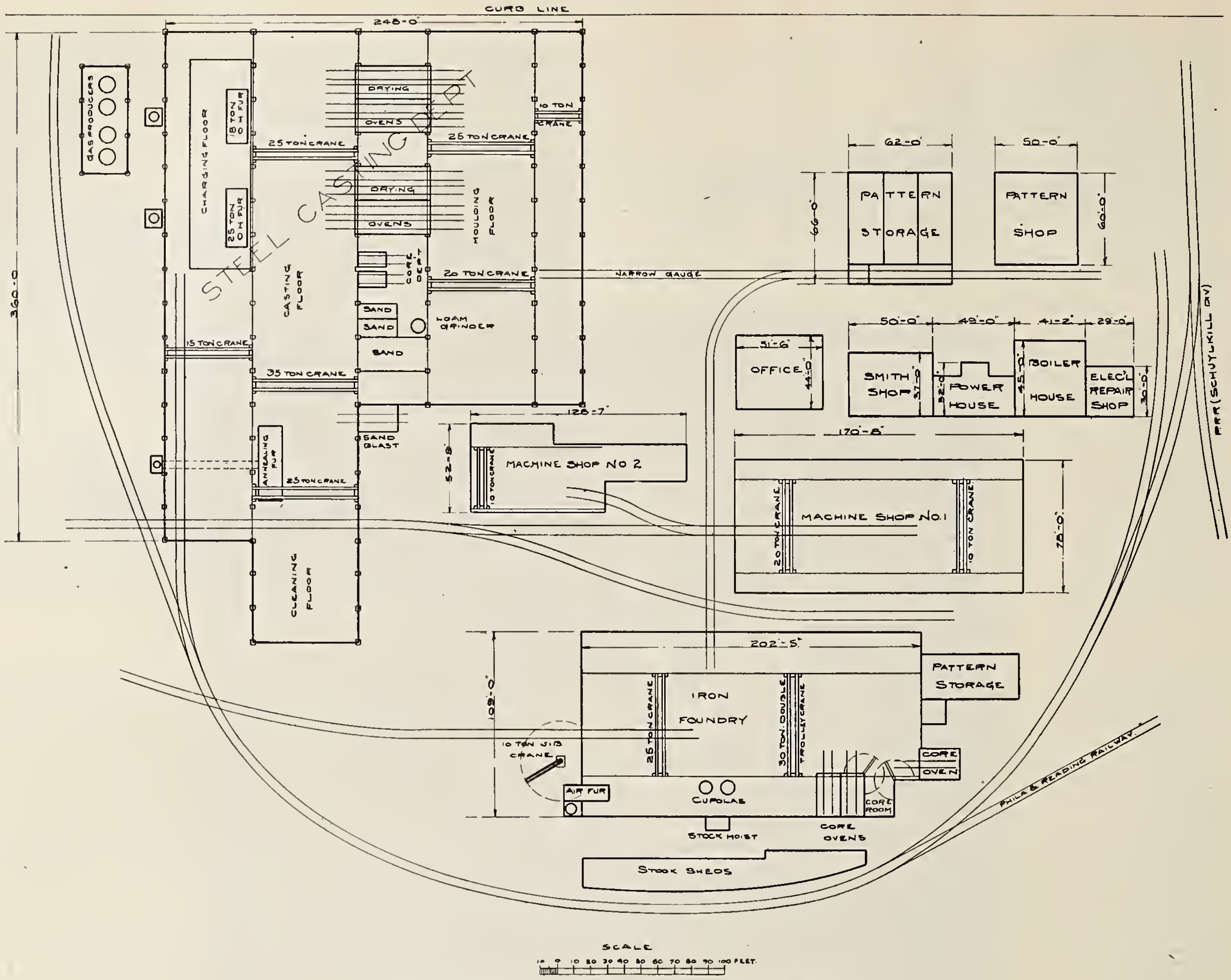
quick return thrown in, by the action of the treadle shown. The machine is controlled from either side, special provision being made to check, all over-travel. A long saddle is provided, and is supported by a very wide flat top knee, the saddle being adjusted in and out by stop nuts, and is bolted down underneath by four bolts with swing handles. The vertical adjusting screw does not pass through the floor. The reverse is operated both by automatic trips, and by hand or foot from either side of machine, and the cutter is about five inches in diameter.

In operation on trolley hangers, they are held in a special fixture, and the chips flying up from the cutter are caught by an exhaust pipe and thrown into flour barrels, two of which hardly measure the capacity of the machine per day. A still further benefit of the exhaust in addition to the removal of chips is, that it circulates air to the cutter with a needed cooling effect. The length of the automatic feed is 50 inches, with an in and out adjustment of two inches, with a feed of 48 inches per minute, the speed of the spindle being 550 turns per minute. The table is 62x13 inches, the floor space covered is 5 feet 6 inches and the weight of the tool in working order is 4,900 lbs. This fine machine is one of the recent products of the Garvin Machine Co., of New York City.

Birdsboro Steel Foundry & Machine Company

This plant is located at Birdsboro, Berks county, Pennsylvania. It is located on the lines and has shipping facilities over the Pennsylvania Railroad, Schuylkill division, main line of the Philadelphia & Reading R. R. and main line of the Wilmington & Northern R. R. Birdsboro is 49 miles from Philadelphia, 139 miles from New York and nine miles from Reading. The New York office is at 52 Broadway. The plant consists of a steel foundry 248 feet wide and 360 feet long, an iron foundry 109 feet wide and 202 feet 5 inches long, No. 1 machine shop 78 feet wide and 170 feet 8 inches long; No. 2 machine shop 52 feet 9 inches wide and 128 feet 7 inches long; smith shop 37 feet wide and 50 feet long, power house 32 feet wide and 44 feet long; boiler house 41 feet 2 inches wide and 45 feet long; pattern shop 50 feet wide and 60 feet long, pattern storage 62 feet wide and 66 feet long.

The steel plant is laid out with the moulding floor parallel to the casting and cleaning floors. The steel plant is of brick and steel construction with slag roof. The crane runways to



Birdsboro Steel Foundry & Machine Co.

the moulding floor and casting floors are 30 feet from the ground; crane runway over the moulding floor in the leanto 18 feet from the floor and crane runway over the furnaces and scrap floor 22 feet from the floor. The moulding floor in the leanto is equipped with a 10-ton crane 30-foot span. In this floor are moulded the small castings. Also in this floor is a gear moulding machine for making machine moulded cast steel gears up to 60 in. diameter and 18-in. face.

The main moulding floor is equipped with one 20-ton and one 25-ton 5 and 10-ton auxiliaries respectively. These cranes have a span of 60 feet. Between the moulding floor and the casting floor are four drying ovens 40 feet long and 18 feet wide. Also two core ovens, sand blasts and loam grinders. This portion of the building is 220 feet long. The casting floor is equipped with two 25-ton cranes with 5-ton auxiliaries and one 35-ton with 10-ton auxiliary. The span of these cranes is 60 feet. The length of this portion of the building is 360 feet. In this portion of the building is the dry floor, chipping floor and the machine shop for cutting off the sink-heads. This portion of the building is also equipped with an annealing furnace 10 feet wide, 10 feet deep and 40 feet long. Adjoining this portion of the building right at the cleaning floor is a sand blast.

Parallel to this floor is the building in which are the open hearth furnaces, the remaining portion of this part being taken up at present with scrap storage. This portion of the building is served by a 15-ton crane, 50-foot span. This crane travels over the open hearth furnaces and the scrap piles. The furnaces are respectively 18 and 25 tons capacity. Parallel to the steel casting plant is the gas producer plant containing four 10-foot gas producers. Above the moulding floor leanto is a pattern storage 30 feet wide and 220 feet long in which are stored patterns in active use; the patterns which are used so regularly that the storing of them in the regular pattern storage would not be warranted.

It will be noted that the tracks through the core ovens extend into both the moulding floor and the casting floor. The cores are therefore loaded with the flask by the cranes in the moulding floor and shoved into the ovens. After being thoroughly dried the cars are drawn out of the oven by the cranes in the casting floor, the flask removed, the car is lifted from the tracks and placed on a track, not shown, but located between the ovens. This track has a down grade into the moulding floor. By this means almost as soon as the car is unloaded it returns to the moulding floor, is placed by the crane therein on to the oven track and is ready for unloading. The flasks after being shaken out are placed on a car which is between the sand bin and the end of the building. The car is shoved through to the end of the moulding floor where the flasks are unloaded. It will be noted by this means everything is practically continuous.

The iron foundry consists of a moulding and cleaning floor, 60-foot span, with a leanto on each side about 29 feet wide. The main runway is equipped with one 25-ton crane with a 10-ton auxiliary. The other crane being equipped with two 15-ton trolleys. The height of the runway for these cranes is 25 feet above the floor. In the leanto on one side are made all of the small castings and on the leanto on the other side is situated the core-room served with two 3-ton gib cranes, two core ovens, two cupolas of 5 and 10 tons capacity per hour and one air furnace with a capacity of 20 tons. The air furnace is served by a 10-ton electric gib crane. At one end of the foundry is another core oven and also a pattern storage for patterns in active use. Iron castings have been made weighing as much as 40 tons per single casting. This building is of brick and steel construction with a slag roof.

Machine shop No. 1 has a main floor 30 feet wide with leantos on each side 24 feet wide. The main floor is served with one 20-ton crane, height of runway 20 feet, and one 10-ton crane, height of runway 40 feet. This building is of stone construction, three stories high.

On the first floor are the heavy tools, second floor the light tools and the third floor is used at present for storage of diamond drill machinery and equipment therefor.

Besides the small tools this shop is equipped with an 18x22-foot boring mill, one 8-foot square planer 24-foot bed, one 5-foot square planer 16-foot bed, two 60-inch lathes, two horizontal boring mills, besides sundry lathes, shapers, keyseaters, etc.

Machine No. 2 is of frame construction and is served by one 10-ton crane having runway 15 feet from the floor. This shop is equipped with three 40-inch Lathes and one 40-inch Gun Boring Lathe. This last lathe having a bed about 40 feet long. The balance of the shop is used for erecting small machinery.

The smith-shop has three fires and one 800-lb. hammer.

The power-house is equipped with one 500 cu. ft. compound air Ingersoll-Sargeant air compressor; one 160 h. p. Ames Engine direct connected to a 100 h. p. General Electric generator; one 350 h. p. Westinghouse compound automtaic direct connected to one 250 h. p. General Electric generator.

The boiler-house is equipped with one 100 h. p. Babcock & Wilcox, one 100 h. p. Gill water tube and one 200 h. p. Edge Moor water tube boilers.

Adjoining the boiler house is the electrical repair shop.

The pattern shop is of brick construction, slate roof, three stories. The first and second floors are equipped with machinery and benches for making patterns and the third floor is used as a lumber storage.

The pattern storage is of brick construction, slate roof, three stories. The building is divided lengthwise by a 13-in. brick wall into three departments. This building is served by a three-ton elevator.

At present the plant employs about 500 men.

The products in the steel foundry consist of steel castings for locomotives, rolls and pinions, rolling mill castings, machine moulded steel gears, castings for general machinery and high pressure. The capacity of this plant with its present equipment is about 1,000 tons per month.

The products in the iron foundry consist of castings for their own work, air furnace rolls and pinions, rolling mill castings and general jobbing work. The capacity of this plant is about 750 tons a month.

In the machine shops, besides the building of their special machines, namely, belt lacing machines, Wagner cold saw cutting-off machines and Diamond prospecting drills, they make a specialty of rolling mills, rolling mill machinery, hydraulic machinery, and punches and shears.

They also build all kinds of machines and tools from blueprints and specifications, having furnished in the past gas engines, test cutting machines for armor plate, ingot cars, slab cars, riveters, steam hammers, cotton compresses, etc.

While they have changed their name they still continue to make Diamond drilling machines and carry on a business of prospecting, having at present four crews at work in different portions of the United States.

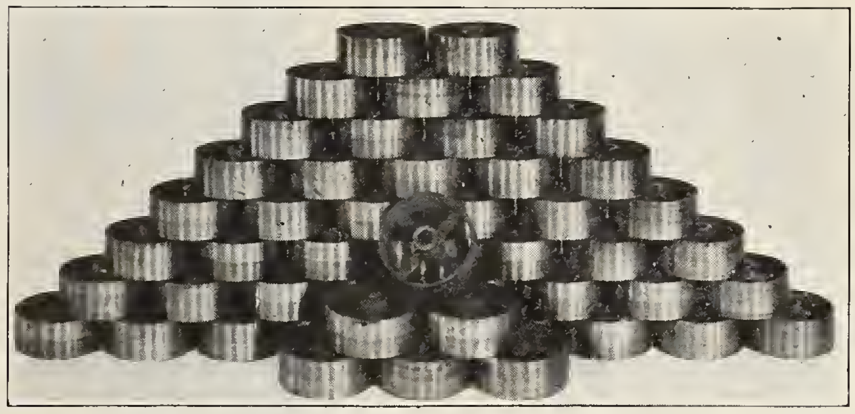
The demand for belt lacing machines has never been greater since the placing of this machine in the market. They now have in service some 3,000 machines.

The demand for the Wagner cold saw cutting-off machines is large and present indications are that it will exceed their anticipations. The amount of business this year in these machines has already equaled their sales during 1904, the first year the machine was put on the market.

The Grinding Machine as a Stock Remover

The rapid forging to the front of grinding machinery as a factor in removing stock, and its adoption in progressive shops, is one of the things to excite the admiration of the shop bred man who has not been in close touch with the methods, but recently devised to do things on lines entirely foreign and strange to old practice.

It is not so long ago that the grinding machine and its possibilities were unknown. Many shops were thought to be in luck if the irregular polygon standby, in the shape of a grindstone, was provided for grinding tools. The emery wheel afterward made its appearance as a tool grinder, from which lowly beginning was evolved the grinding machine of today, a machine that has enabled the shop manager to do better work and at less cost, than any other appliance yet



Output of Landis Grinding Machine.

devised for metal working, for both rough and finished output, producing a quality of work never dreamed of in the philosophy of the wisest "chip."

The Landis Tool Co., of Waynesboro, Pa., the well known builders of universal and plain grinding machines, send us a photograph of a pulley output of a lot of fifty, from one of their machines. These pulleys are crowned, 8 inches in diameter by 3¼ inches face. An eighth of an inch was ground from the rough casting at an average time of twelve minutes for each pulley, or what is equivalent to a ten-hour day for the lot of fifty. There is no comparison possible between the grinding process within certain limits, and that of removing stock by turning, for the reason that the grinding wheel not only roughs out, but finishes to size, and with a degree of accuracy maintainable by any other process yet devised. This exhibit stands as a fine endorsement of the grinding machine in a field heretofore monopolized by the lathe and boring mill. Their show of high class grinding at the International Railway Congress at Washington, embraced piston rods, valve stems, crank pins, etc., together with the machine that produced the results.

Portable Tools

Portable tools have long since shown their efficiency and value in the economy of shop operations, in the one item alone of portability. When a little tool can be taken to the scene of trouble and with a few simple adjustments be placed in the way of getting results, its place among the revenue earners of a shop is up near the top. Our illustrations embrace some well known tools in this line, manufactured by H. B. Underwood & Co., Philadelphia, Pa., and will be recognized as a part of the outfit of every up-to-date shop, whether in the private field, or the large railway plant. Fig. 1 represents the cylinder boring machine which is an indispensable

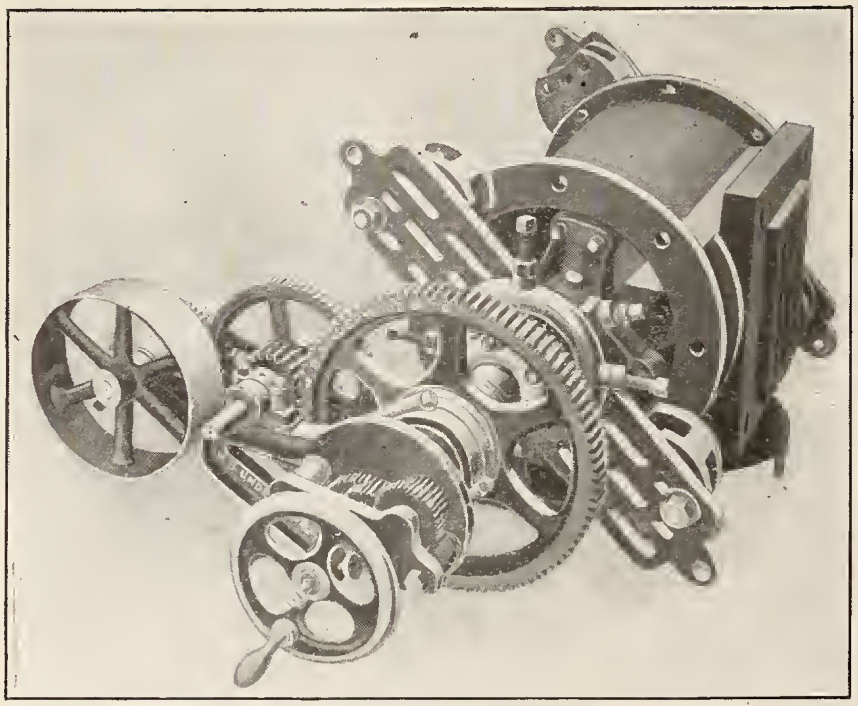


Fig. 1—Underwood Cylinder Boring Machine.

article in any shop. The machine is shown applied to a cylinder detached from the frame, but its strong point is apparent for trueing up in position worn locomotive cylinders for which it is specially adapted, although it is a no mean factor on new work. This machine is made for crank or belt power, and for any size cylinder, from four inches to sixty inches diameter and to bore any length from one foot to ten feet, and besides these elastic conditions the firm will make a machine to fit any special requirement when so ordered. Since the advent of the compound locomotive, a special boring bar has been devised to suit that range of work, but it is special only in the sense of covering the needs of that type of engine. This tool is one that no road can afford to ignore, because of its utility in trueing up steam chests for piston valves.

In the rotary planer shown in Fig. 2 is one of the time-tried devices that no machine shop can do without, for with it a worn valve seat may be faced true at an expenditure of time and cost that makes the old file and scraper method pale into insignificance, and the results are so much more satisfactory that the two ways of doing the job are not comparable in any sense. No hand dressing of the seat is necessary after the facing operation with the tool, in fact the seat is in a better condition right from the tool than any hand work can make it. These machines will face a rectangle from 18 inches across the corners in the small size, to 36 inches in the large sizes. The ball joint adjustment in clamping to position on the steam chest studs is a refinement that effectually prevents springing of the machine and insures true work.

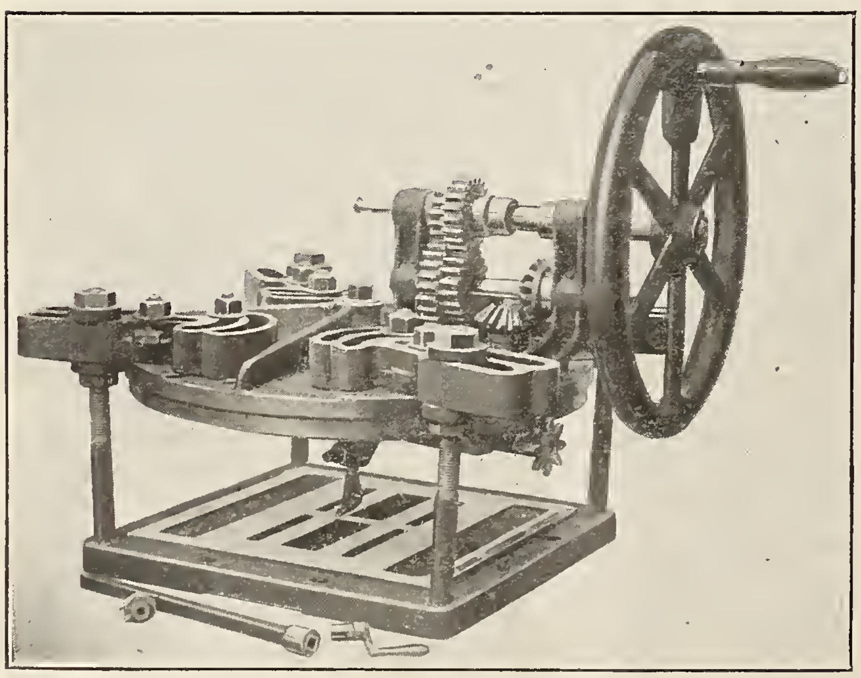


Fig. 2—Underwood Rotary Planer.

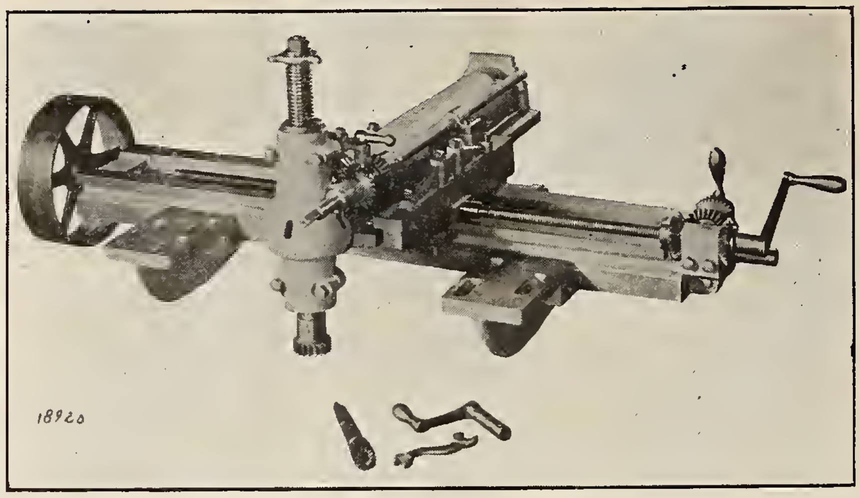


Fig. 3—Underwood Portable Milling Machine.

Among the best of these special tools is the portable milling machine, which is designed and constructed especially for facing valve seats in solid steam chests. Its value, however, for this character of work will not be apparent in a railroad shop, but there are contract shops where its need is a pressing one, and there is also a range of work in locomotive repairs where this tool would be a welcome device, for the reason that it has a power feed in both directions, and is equally efficient in any position, horizontal, vertical or inclined. It is arranged to run by hand, steam, air or electricity.

There is one other portable tool made by these builders that is of more than passing merit, and while not illustrated here will be mentioned, namely, the crank pin turning machine. This device is portable in the truest sense, as it can be applied to the crank pins of any engine, and will put the worst worn journal in as good a condition as when new. The facility with which this machine will true up a worn crank pin journal is a revelation to those who have not witnessed its performance, and the quality of work is faultless. The file is still used on flat pins to some extent on roads that don't know about this machine, but the barbarous practice does not prevail with the wise shop manager.

New Improved Detent Motion for the American Thompson Improved Indicator

The greatest improvement added to the steam-engine indicator since the advent of this instrument of precision into the engineering field, is the new improved detent motion, which the American Steam Gauge & Valve Mfg. Co., Boston, Mass., have added to their well-known American Thompson improved indicator. This attachment makes the indicator particularly applicable to high speed stationary and marine steam engines, locomotive and gas engines. With this attachment, it is possible to connect the indicator to high speed reducing motions and stop the drum of the indicator without unhooking the cord or stopping the engine. The stopping and starting of the drum carriage of the ordinary indicator whenever it becomes necessary to change cards is usually attended by many vexatious happenings; this is entirely avoided by this new attachment. Cards may be taken in rapid succession, this being particularly desirable on tests where the load is variable and on locomotive tests where it is particularly desirable to take cards in rapid succession; in making a test of this kind, it is important, during certain periods of the test, to get as many cards as possible. With an ordinary indicator not equipped with this new improved detent motion and where an indicator is equipped with an old style paul and ratchet detent, it is not possible to take as many cards as should be taken in order to get accurate results of the tests. The locomotive indicator is fitted with a 1½-in. paper drum and is particularly adapted for high speeds and the severe conditions to which it is subjected.

The detent motion is continued within the paper drum, and is operated by means of a lever below the drum carriage. To stop the paper drum, this lever is moved in the direction traveled by the paper drum. When released, it is returned by means of the auxiliary spring to a position ⅛ of an inch beyond the end of the stroke, making it impossible for the drum to engage until desired.

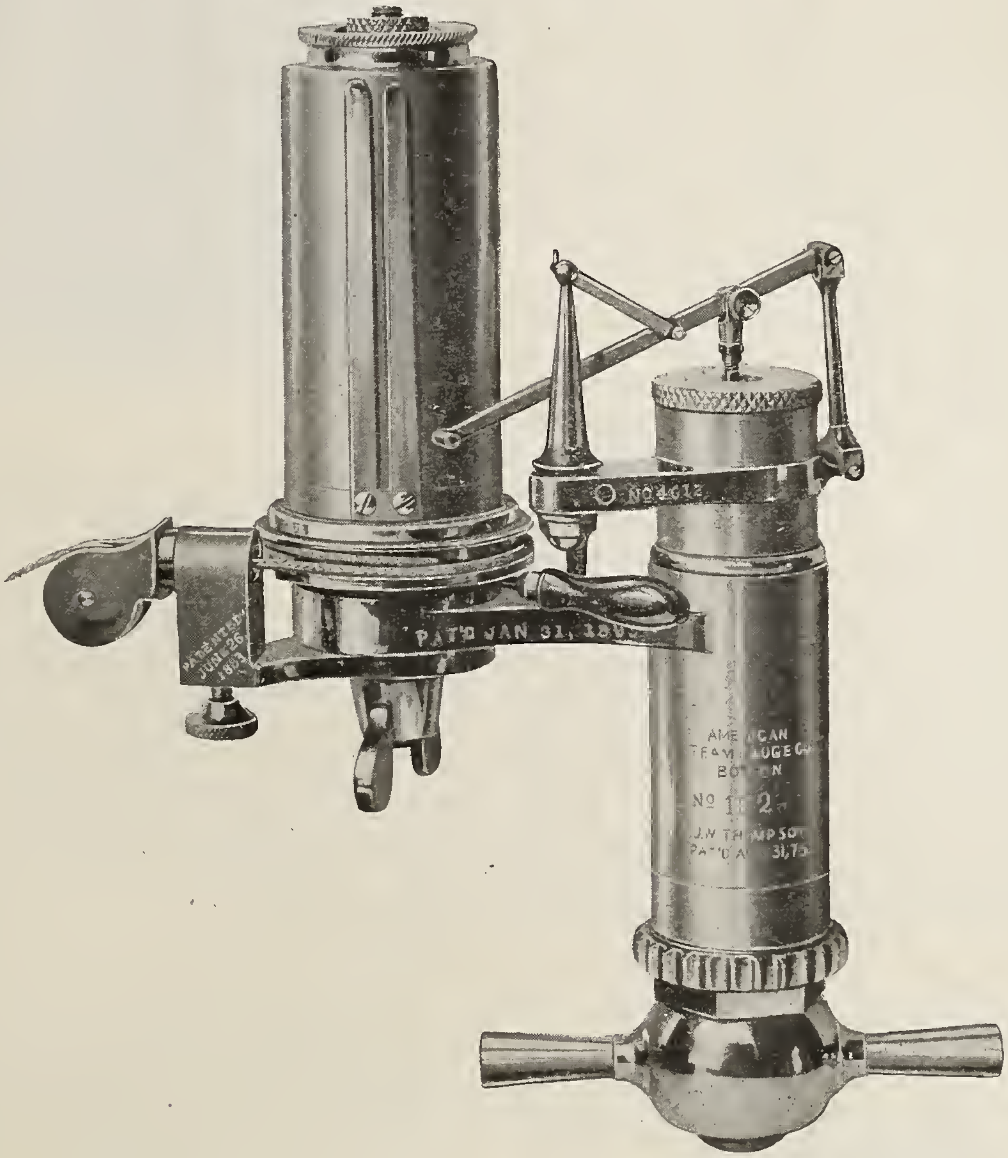
The drum carriage having the full tension of the main drum spring continues to rotate in the usual manner, preventing any whipping or sagging of the cord. This allows the indicator to be used with the detent motion in connection with a reducing wheel connected directly to the indicator.

The drum is supported on the spindle by means of a collar held stationary by a pin engaging the slot in the spindle, on which rotates an outer sleeve, which acts as a bearing and guide for the drum. To the stationary collar is fastened the inner end of the auxiliary spring, the outer end being fastened to the auxiliary spring case, which is held stationary in the paper drum. The tension of this spring is such as to cause the drum to return to its position before the return stroke of the drum carriage.

When in action, the drum is controlled by a pin engaging a hole in the grooved wing at the bottom of the drum. By turning the lever, this pin is lowered on the return stroke of the drum carriage, releasing the drum, which is returned beyond the end of the stroke of the auxiliary spring. The lever is then returned to its original position, allow the pin to elevate again. When the card is changed and ready to take another diagram, the drum is turned forward by means of the milled rim on top. This causes the pin to engage the hole, being guided by an incline, causing the drum to rotate in the usual manner, the motion being smooth and without shock, there being no chance to break the cord as with the old style paul and ratchet detent motion.

The parallel motion used in connection with this make of indicator is the well-known original Thompson parallel motion; the ratio of the lever being three to one, makes a very stiff and rigid motion, making it impossible for the slightest error to escape being shown in the diagram. The piston and other working parts of the instruments are made as light as is practical to make them. The piston head and steam cylinder are made of special mixture of composition which gives an equal expansion under the varying thickness of metal; this is particularly desirable in reducing friction at this point.

The accompanying cut illustrates their make of indicator fitted with the detent motion. The great advantage of this attachment will be readily appreciated by the users of the indicator, and it has added considerable merit to the already popular instrument.

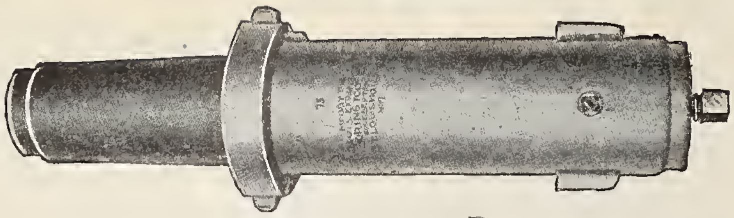


DETENT MOTION ON THOMPSON IMPROVED INDICATOR.

Wheel Boring

The history of machine shop operation abounds with records of devices that have improved the output of machine tools and raised them from the position of a sluggish means to an end, to that of an important saving factor in the struggle to run a plant within a stated appropriation. No other tool has profited more in this respect than the boring mill, which through the application of the reasoning faculties of a mechanic to that detail of the machine which produced the results aimed at, namely, the boring bar, the output is multiplied to an extent as to almost make it a crime to continue in the old way.

The Davis expansion boring tool as manufactured by the Davis Boring Machine Co., St. Louis, does its work without taking into account the personal equation of the operator. It



DAVIS BORING BAR.

is all in the tool, which to outward appearances is simply the old bar, but the business end of the bar, the end with the expansion cutters, is the point that attracts the attention of all interested in getting all the work possible out of a tool, and at the same time preserving sizes to a standard. This the Davis tool will do, and it is said to be the only tool that will do it, for the reason that the adjustment of the cutters to size is absolutely correct by means of the positive expansion screw, and this accuracy is maintained up to the point where the cutters are actually ground away to zero.

With these tools it makes no difference which way the fit is made, whether turning the axle to fit the hole, as is customary and necessary where the variation in size of holes is enough to destroy a fit, as is the case with the old solid cutter, or boring the hole to fit the axle. Boring to fit an axle has been done with the old cutter, but at a cost that puts the operation out of the possibilities of standard practice, for the reason that the wheel is either tight to bursting, or too loose to be safe. The expanding cutter will bore a fit with accuracy, and will do it as quickly as such fit can be made on the axle, and this is a point of the greatest importance when it is considered that in fitting new wheels to old axles, the latter is, by the old process turned to the wheel bore, with a slight reduction in diameter of the axle fit, which is well known to be an unprofitable operation for two reasons, one of which is the unnecessary reduction from a standard size, and the other presenting a new raw surface, when the old one already condensed from the previous fit is in the best condition to receive the new wheel.

The Landis Bolt Cutter

Our half-tone of the Landis Machine Co.'s single head bolt cutter, shown in Fig. 1, represents high art in bolt cutting tools, in every sense dear to the mechanic who has encountered the difficulties attending the production of true threaded work. This machine has a capacity up to two inches, but is made to cover any size to order. They are made single and double head and are in use in the best shops in this country, which is a recommendation amply sufficient to show the high esteem in which they are held. Those who have used the hobbed die know all about the trouble experienced to get an approximation to passably fair work, and it was the difficulty attending the production of decent results by the old method of die construction, that is responsible for the high development of the Landis system, a system conceded to be the essence of perfection in screw cutting.

The die is in the form o four chasirs made of flat sections of steel, having the threads milled on the entire length of one flat side. The throat is formed by beveling the front edge of the chasers, which are shown in the four die holders and separately in Fig. 2. These chasers are set at a tangent with

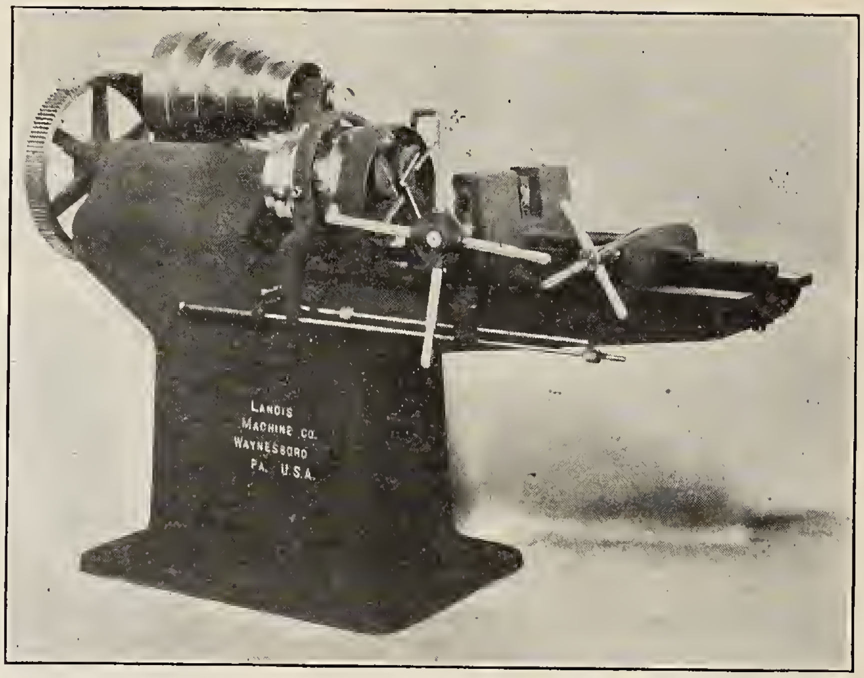


FIG. 1—2-INCH SINGLE HEAD LANDIS BOLT CUTTER.

the bolt, and always at an angle to harmonize with the pitch of the thread, being held in the holders that are secured to spindles in the head, which simultaneously open and close the dies.

There is no annealing, hobbing or retempering of these dies. A simple grinding operation is all that is necessary to give them a renewed lease of life, and this operation may be continued until the chaser is ground away too short for the holder, which is a feature of no small moment when the price of steel and labor is considered. The accuracy of pitch found in the work done with these chasers is marvelous, and closely approaches the best work turned out with the lead screw.

The chasers will cut left as well as right hand threads, by cutting on opposite ends, different chaser holders being used. For pipe threading, special dies are used. A marked advantage in the pipe die is, that one set of chasers will cut all sizes of one pitch in either right or left-hand threads; 11½ pitch will cut all pipe from one to two inches inclusive, while three sets of dies cover the entire range from ¼ to 2 inches, inclusive, giving the same results as would be obtained from dies made especially for each size.

The same is true of the bolt dies. The ⅞ and 15-16 inch dies being of one pitch, one die will answer for both diameters. 1 1-16, 1⅛, 1 3-16 and 1¼ inch bolts all have the same pitch and one set of dies only are required through that range of diameters. An object lesson in accuracy of pitch is presented in the half-tone of a one inch screw of 8 pitch, showing a 24-inch scale above it. Of course the reduction necessary to fit these columns does not show the work at its best, but the fact is that there was no visible variation in the pitch in the length of the scale. A still better example was seen in the one inch screw at Washington, D. C., in the Landis exhibit of the American Railway Appliances, when the screw was 60 inches long surmounted by a 48-inch scale. Human vision could not measure any difference between the scale graduations and the thread pitch. In the latter case the

FIG. 3—AN OBJECT LESSON IN SCREW CUTTING WITH LANDIS CHASERS.

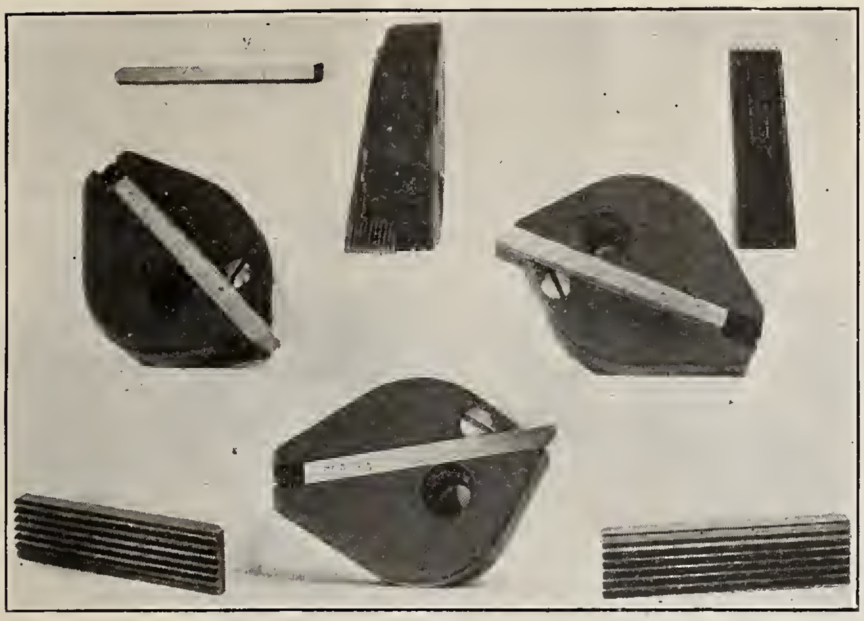


Fig. 2—Chasers and Holders of Landis Bolt Cutter.

chasers reduced the bar from 1⅛ to 1 inch in diameter while cutting the thread, which will come under the head of a remarkable performance, when it is understood that no distortion was present.

The secret of the exceptional work done by these chasers lies in the fact that the cutting is at all times done by the front teeth, while the back teeth do no cutting whatever, but take bearing on the work a little back of the face of the chasers, and thus perform the function of a permanent hardened lead nut, whose bearing surface is renewed every time the chaser is ground. This lead screw action is unobtainable with the ordinary die, and is a feature that attracted great attention in connection with the Landis bolt threading and nut tapping machines shown at the International Railway Congress.

McGrath Pneumatic Turntable Motor

The engravings show the McGrath pneumatic turntable motor. Its component parts comprise a motor box, frame, gear and friction wheels, and hinge bracket. The motor box is bolted to the side of the frame (Figure 1), and between the shears of the frame are the machine-cut gear wheel and flanged frictional wheel, 25 inches in diameter. These are bolted together, bushed with a bronze bushing, and revolve on a 2-inch steel axle. Directly behind these wheels is a cylinder of 10-inch bore. The hinge bracket is bolted to the side of the turntable, and the frame is attached to this by a 2-inch steel pin, which allows the motor frame, etc., to rise and fall with the unevenness of the circle rail in the pit, and also allows for the tilting of the table. Inside of the motor box are the oscillating brass cylinders, 4 inches by 4½ inches. On their crank shaft, outside of the motor box, is a steel pinion which engages the 25-inch gear wheel.

When the air is admitted to the motor box it also enters the lower part of the 10-inch cylinder in the frame. This forces its piston rod up against the arm of the hinge bracket, and so forces the friction wheel down in contact with the circle rail in the pit. Both ends of this frame cylinder are fitted with stuffing boxes. The piston rod extends through the lower end of the cylinder, and to it a brake shoe is attached, which slides up and down in ways in the frame. When air is admitted to the upper end of the frame cylinder it forces this brake shoe against the rail, lifting the friction wheel from contact with the rail and bringing the back of the motor frame against the bracket, which effectually stops the table at any point.

Figure 2 shows the motor attached to a table, also the position of the platform and of the operating handle. The motor is reversible and under complete control from the operating lever. The lower part of the operating lever rod is connected to a rotary valve which admits air to the motor box and to the lower part of the 10-inch cylinder. The reversing valve in the motor box is connected with the operating lever and is so arranged that when the latter is on the center the former is also, and all the ports are closed. This also closes the rotary valve and opens the relief port underneath it, which allows the air to escape from the motor box and from below the piston in the 10-inch frame cylinder. When on the center the operating handle is directly over the rod operating the brake valve. By lifting the handle of the operating lever, which is pivoted in the center, the opposite end presses down the brake-valve rod and opens the valve, admitting air to the top of the 10-inch cylinder and forcing the brake shoe against the rail. When the handle is lowered the brake valve closes, and the pressure above the piston in the frame cylinder is relieved by the air escaping through a relief port in the brake valve. This arrangement makes it impossible to operate the brake and the motor at the same time.

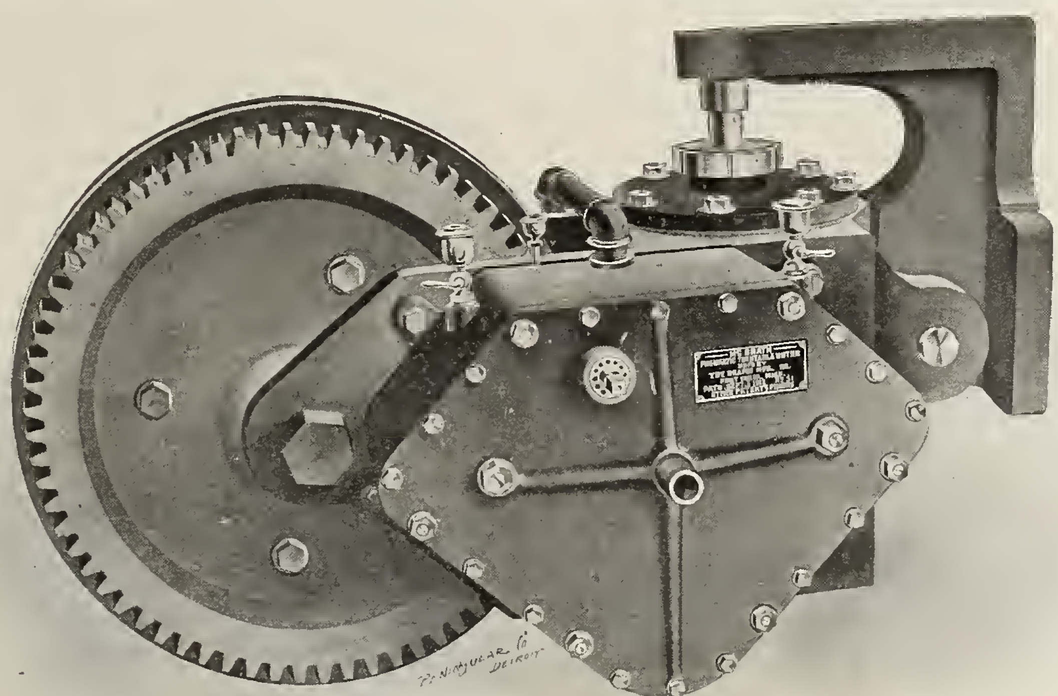


Fig. 1—McGrath Pneumatic Turntable Motor.

There may be three independent sources of air supply to the motor: (1) Connected to a shop plant and conveyed through a revolving connection in the center of the table; (2) from the air pump on the engine being operated and coupled either to the hose on the tender or pilot; (3) from an engine standing on the track near the table, and connected through the revolving connection, the same as from the shop plant. The last is convenient in many cases to turn cars or

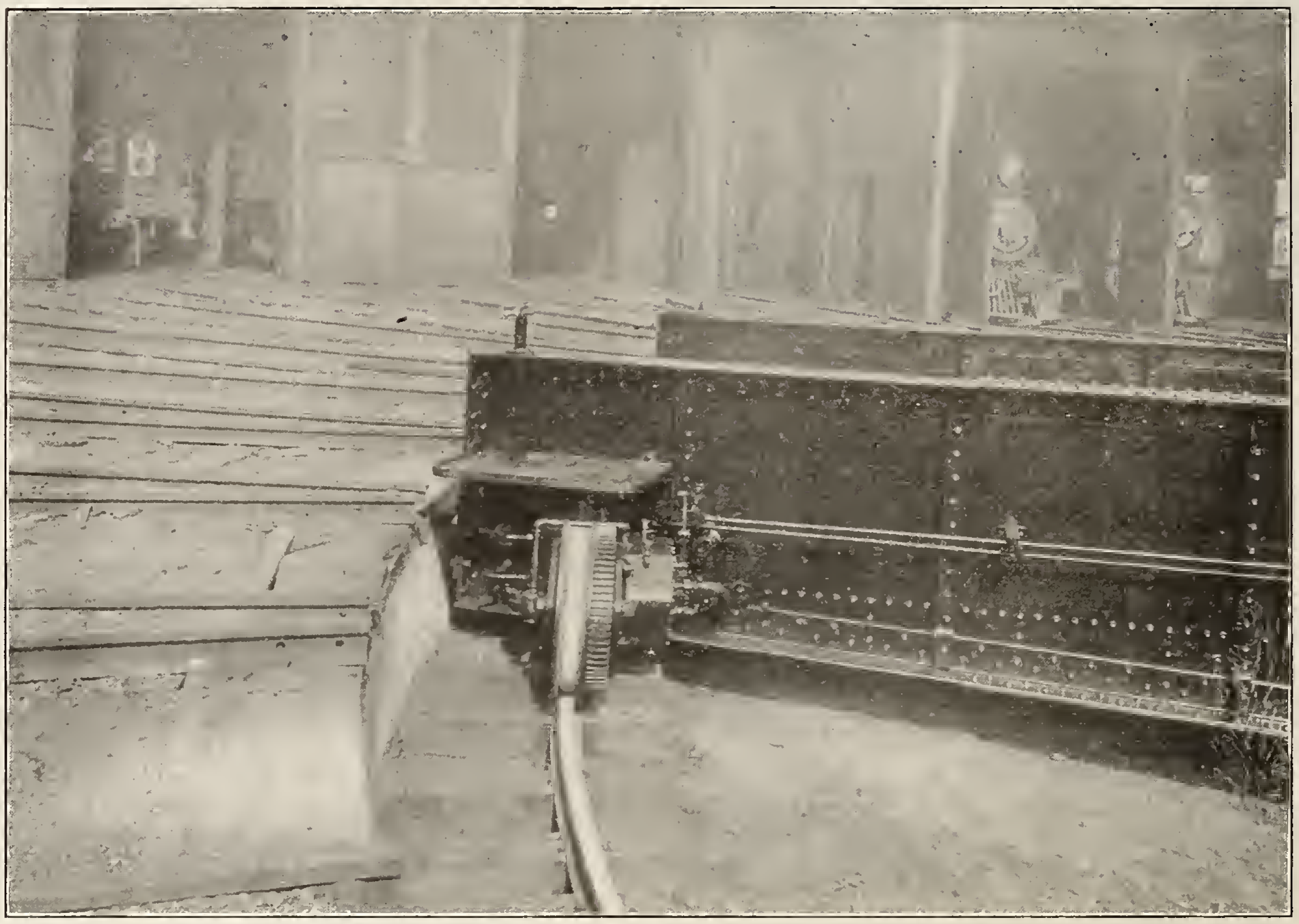


Fig. 2—McGrath Pneumtic Turntable—Motor Attached.

a dead engine when the shop plant is not available. When this plan is used, a circular pipe can be placed around the top of the pit, with hose attachments at convenient intervals around the table.

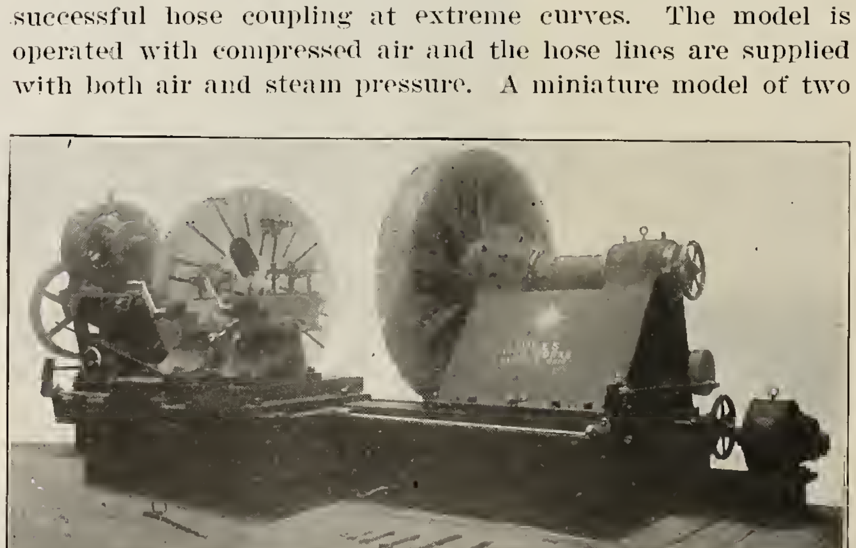
These motors are made by The Draper Manufacturing Co., Port Huron, Mich. Installations have been made for a number of roads, including the Grand Trunk, Baltimore & Ohio, Pere Marquette, Lehigh Valley, Philadelphia & Reading, Long Island, Santa Fe and Canadian Pacific.

The Exhibits of the Westinghouse Companies at the International Railway Exposition

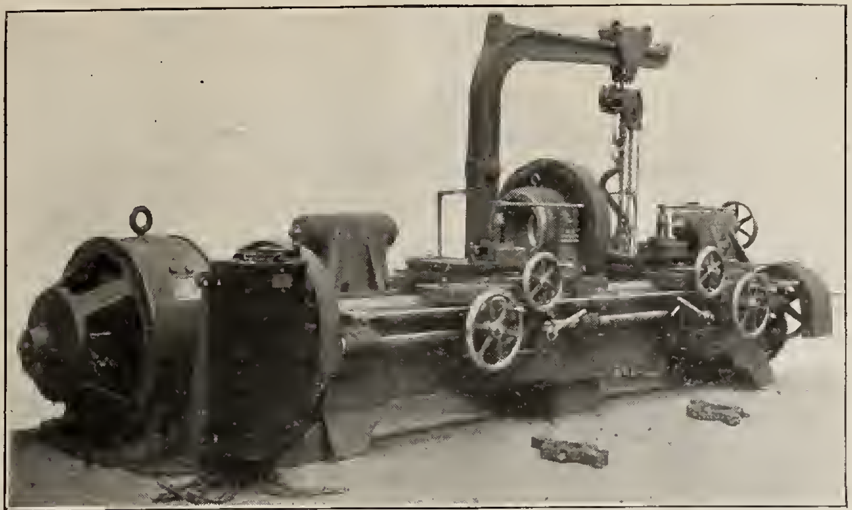
The Westinghouse building at Washington is the largest structure on the grounds, apart from the headquarters building devoted to the grouped displays of the smaller exhibitors, and presents in an attractive and orderly arrangement the most remarkable combination of Westinghouse products ever brought together under a single roof. The brake and coupler appliances of the Westinghouse Air Brake Company and its associated interests are shown under conditions approximating those of actual practice; the Union Switch and Signal Company has installed full-size safety apparatus of all standard types; the Westinghouse Electric & Manufacturing Company exhibits for the first time complete operative equipments of its latest forms of multiple control systems for alternating current and direct current traction, with important auxiliary sub-station apparatus, and displays also an interesting collection of heavy railroad shop tools driven with Westinghouse motors; the Westinghouse Machine Company has set up, open for inspection, a 600 horsepower steam turbine identical in size and type with the Westinghouse turbine that ran continuously for 3962 hours at the St. Louis Fair; and Nernst lamps and Cooper Hewitt lamps peculiarly adaptible, respectively, for decorative passenger station and train illumination, or for economical terminal shed and tool shop lighting, are used liberally throughout. The dome of the building is lighted with four big electric signs, flashing the name Westinghouse, and large banners at the entrances carry the names of the twenty-six Westinghouse companies of the United States and Europe represented in the joint display.

Mr. Frank S. Smith, one of the resident Westinghouse commissioners at the Louisiana Purchase Exposition, is the managing director, and Mr. C. W. Townsend is in immediate charge of the installations of the Air Brake Company.

The brake and coupler pavilion display includes many operative exhibits. The Westinghouse automatic air and steam coupler is demonstrated by an arrangement of two short car platforms modeled to represent the ends of passenger and freight cars, together with a locomotive pilot, one car platform being so mounted as to permit a variation of four inches in its height and a propulsion at a considerable momentum toward either the pilot on one end or the other car platform on the other, provision being made also for the illustration of successful hose coupling at extreme curves. The model is operated with compressed air and the hose lines are supplied with both air and steam pressure. A miniature model of two



Niles Driving Wheel Lathe in the Westinghouse Exhibit at Washington.



NILES AXLE LATHE IN WESTINGHOUSE EXHIBIT AT WASHINGTON.

complete car trucks and frames fitted with air and steam and signal hose coupling and air cylinders supplements the heavy exhibit, and both are in more or less constant operation. The automatic hose coupler has been brought into new prominence during the past season as the only practicable device promising a prevention of the high steam losses in train line service which have been the subject of renewed discussion by railroad economists. The recent adoption of the Westinghouse coupler for the passenger equipment of the Duluth & Iron Range Railroad and for trial service on the Great Northern has introduced it into important new districts, and the report of the economies effected by its use on the Long Island Railroad is awaited with great interest. The Westinghouse magnetic brake is shown also in operation, by an arrangement of a moving track; the Westinghouse friction draft gear is displayed on a testing rack on which it is compressed with an air force of approximately 150,000 lbs., a slow and serial release without recoil demonstrating a feature of prime importance in its operation; and the locomotive driver brakes and the automatic slack adjusters of the American Brake Company, racks hung with valves of various forms shown in section, and several types of motor drivers and steam air compressors complete the display. The operation of Westinghouse air brakes is completely illustrated in the "instruction car" of the brake company on the special track at B and 14th streets, in charge of the company's regular instruction corps.

The motor-driven tools on exhibit are all equipped with type S shunt-wound motors, for constant speed or variable speed service, and for operation on direct-current circuits at 220 volts. The prominent feature of this display is a giant locomotive driving wheel lathe, weighing over 100,000 lbs., built at the Ohio works of the Niles-Bement-Pond Company, equipped with a 40-horse power motor mounted at the top and direct-geared to the revolving and feed mechanism, and with a five-horse power motor of 1,050 revolutions per minute, for traversing the movable head. The large motor had a speed variation of from 490 to 980 revolutions a minute, and gear changes provide a total range of cutting speeds of from 10 to 25 feet a minute on all diameters of wheels from 48 to 90 inches. The face-plates of the lathe are mortised to receive the crank pins, thus permitting the "chucking" of the wheels close to the plates, the absolutely rigid hold on the tires under the heaviest cuts greatly facilitating the operation of the machine, which has a capacity of trueing six pairs of driving wheel tires in a ten-hour day. The great weight and strength of this machine and the high capacity of the motor applied to it are an interesting example of the improvements in heavy shop machines brought about in the past few years by the advent of new tool steels. Another Niles machine on exhibit is a double-axle lathe, driven by a 20-horse power motor of from 340 to 1,200 revolutions a minute, mounted on an extension to the bed plate and gear-connected to the mechanism, the machine having a total cutting diameter of 12½ inches, capable of turning the largest axles, and being built with two carriages so that both axle ends are turned simultaneously. Other tools on exhibit are a Putnam roughing lathe, driven by a 50-horse power motor of from 500 to 1,000 revolutions a minute; and a Sellers universal tool grinder, driven by a 7½-horse power motor of 975 revolutions a minute, mounted on a bed-plate extension, and belt-connected to the driving shaft.

Notes of the Month

The locker manufacturing plant of Merritt & Co., Camden, N. J., was visited by fire on May 23rd, but the damage was confined to the paint rooms, shipping department and one stock room. The loss was fully covered by insurance and there will be no delay in filling orders as the manufacturing department was not injured at all, but was running as usual the day after the fire.

The H. A. Rogers Co., report their machinery department as being very busy, and state that they have recently ordered several carloads of machine tools from Cincinnati concerns. These machines are for the Garfield plant of the American Smelting & Refining Co. of Garfield, Utah. The H. A. Rogers Co. also report some very promising inquiries for their machinery department.

The Simplex Railway Appliance Company has just been awarded a contract for 20,000 truck bolsters, to be used under 10,000 cars to be built by various car companies, for the Baltimore & Ohio Railroad Company. The cars of which these Simplex truck bolsters will form a part are all of 40 and 62½ tons capacity, including box, coal and gondola cars. This order represents in money the largest order ever given to one concern for bolsters.

The H. B. Smith Machine Co., Smithville, N. J., have issued a very neat five color folder relating to their gold medal blue badge and their heavy outside moulder and a cabinet smoothing planer. The gold medal blue badge was awarded at the Louisiana Purchase Exposition. The cuts of the machines are surrounded by a laurel wreath of victory, as they won the gold medal at the Exposition. These pamphlets will be gladly furnished by asking for them.

The Cleveland and Elyria factories of the Federal Manufacturing Company have been purchased by the Garford Company with capital stock of $400,000, and with Arthur L. Garford as its president. The Garford company will continue to manufacture railway curtains and curtain fixtures and parts for pleasure automobiles and commercial power vehicles. By the transfer of these two factories to the Garford company the liquidation of the Federal Manufacturing Company has been completed—a liquidation which has been in slow process of accomplishment for almost a year back.

Mountain and Lake Resorts is the title of an attractive publication issued by the passenger department of the Lackawanna Railroad. The book is intended to give readable and reliable information about vacation places along that road, and its 128 pages are filled with suggestions for those seeking summer homes. The various hotels and boarding places, their location, rates and facilities are accurately described. More than one hundred half tones add to the interest of the book, and a brightly written love story entitled "A Paper Proposal" completes its contents. The book may be had by sending the necessary postage of ten cents to T. W. Lee, general passenger agent, Lackawanna Railroad, New York City.

Mr. W. L. Miller has organized the W. L. Miller Company to manufacture and contract for complete power plants, automatic locomotive boiler washing equipment, using water heated by waste heat for washing and filling; for vacuum heating system for round houses, shops and terminal buildings, and for boilers, engines, pumps, heaters and piping. Mr. Miller, the president, was formerly connected with the Erie Heating Company, but severed his connection to form the new company, which has offices in the Fort Dearborn Building, Clark and Monroe streets, Chicago.

We are just advised by John F. Allen, manufacturer of the Allen portable pneumatic riveting machines, that they have recently received an order for seven of their machines to be delivered to the following plants of the Am. Car & Fdry. Co.: Memphis, Tenn., one riveter; Jeffersonville, Ind., two riveters; Madison, Ill., four riveters. This shipment will make a total of 60 Allen riveters now in use by the American Car & Foundry Co., whose plants will now be fully equipped for all present requirements and using exclusively the Allen riveters of the compression type. It is evident that any future requirements in the way of riveting machines will be requested from the John F. Allen company.

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company the old board, consisting of Edward F. C. Young, John A. Walker, Edward L. Young, William Murray, George T. Smith, Joseph D. Bedle and George E. Long, was unanimously re-elected. The board of directors re-elected the former officers, namely: Edw. F. C. Young, president; John A. Walker, vice-president and treasurer; George E. Long, secretary. Judge Joseph D. Bedle was also re-elected as counsel. The stockholders present expressed themselves as thoroughly satisfied with the management of the company by its officers. Of the total number, 7,345 shares, there were represented 7,145 shares.

The New York Public Library is paying particular attention to collecting current trade catalogues and similar publications. Their collection now numbers over 30,000 pieces and, as fast as possible, is being catalogued and shelved in a way to bring out the names of firms or companies issuing the catalogue and the articles listed therein. They would be glad to secure a satisfactory collection of catalogues of every manufacturer not represented on their shelves today, and to secure from each one of these manufacturers an effective assurance that they shall receive specimens of whatever printed matter he may issue in the future. Obviously the value of such a collection cannot be overrated, and obviously its value increases in direct ratio to the increase in the number of pieces from individual manufacturers.

The Northern Electric Co., Madison, Wis., have issued their bulletin No. 46 on direct current generators. A unique feature of literature of this company is that in nearly all cases the apparatus illustrated represents machinery purchased by some one to do something better or cheaper than has been accomplished before. They have never entered the electric lighting field, on account of this branch being well represented, but have put their whole energies into the industrial field. The average commercial man is usually far away from a factory and cannot call on a man on short notice to repair machinery, so this company design their apparatus to be simple, rugged, practically fool-proof and can be operated by any intelligent shop man or engineer. A glance at this bulletin will show that their apparatus is simple, readily accessible, compact, sturdy, symmetrical and superior. The bulletin has 70 illustrations of apparatus and details of electrical machinery of different installations and gives some valuable ideas in what can be done with direct current.

Merchant & Evans Co., home office Philadelphia, Pa., 517 Arch St., announces that it has purchased from Merchant & Co., Inc., all its property and assets, and assumed all its debts and liabilities. Mr. Powell Evans—who was vice-president for a number of years and president for the past year of Merchant & Co., Inc., with full knowledge of its business and methods—has organized and controls and is president of the new company; and solicits a continuation of all present associations for the new company, giving his assurance of prompt and efficient service in all future transactions. Merchant & Evans Co. will continue, with greater activity than heretofore, the manufacture and distribution of metals, adhering rigidly to the high principles and conservative methods which have always characterized the business founded and built up by Mr. Clarke Merchant, and which contributed largely to its success. The old organization and personnel remain with the new company unchanged.

Among the recent sales made by F. M. Hicks & Co. are the following: Waterloo Cedar Falls R. R., 3 locomotives; La Crosse & Southeastern, 3 locomotives; Midland Valley R. R., 3 locomotives; Cape Girardeau & Chester R. R., 1 50-ton engine; American Car & Foundry Co., 1 switch engine; Columbus & Lake Michigan, 1 engine; Little Rock & Hot Springs Western, 1 50-ton locomotive; Minneapolis, Red Lake & Manitoba, 1 mogul; Manistee & Northeastern, 1 50-ton 10-wheeler; Mississippi Central, 1 55-ton passenger engine; J. E. North Lbr. Co., 2 locomotives; Quebec Southern, 2 50-ton moguls; So. Dakota Central, 2 locomotives; Santa Fe Central Ry., 3 50-ton moguls; St. Louis & Hannibal, 1 locomotive; Toledo & Interurban, 1 engine; Union Saw Mill Co., 2 10-wheel engines; Bessemer & Lake Erie, 1 parlor car, 1 coach; Gulf & Ship Island R. R., 1 parlor car, 1 combination; La Crosse & Southeastern, 2 coaches, 2 combination, 1 chair; Midland Valley R. R., 1 private car, 10 coaches, 4 baggage cars, 2 combination; N. Y., Pa. & So. Western, 8 coaches, 4 combination cars; Waterloo & Cedar Falls, 2 coaches, 1 combination car; So. Dakota Central, 1 coach; Texas Central, 2 parlor cars; Union & Glen Springs, 2 coaches, 1 baggage car; Union Saw Mill Co., 1 coach, 1 combination car; Louisiana & Arkansas, 3 coaches; Newton & Northwestern, 1 coach, 1 combination car; Greenwich & Johnsonville, 1 coach; St. Jos. Valley Traction Co., 1 gasoline electric motor car; Boyne City, Alpene & G., 1 coach, 1 combination car; American Rice Cereal Co., 1 private car; C. L. Tallmage & Co., 1 private car; Ahnapee & Western Ry. Co., 10 50-M. capacity flats; Dairy Shippers Despatch, 55 refrigerator cars; Champion Construction Co., 12 flats; Sagua La Grande, Cuba, 40 flats; Buffalo Union Furnace Co., 30 ore cars; Kenefick Construction Co., 12 flats; La Crosse & Southeastern, 8 flats, 1 dump car; Lehigh & New England, 10 flats; Midland Valley R. R., 30 flats, 40 box cars; Marinette, Tomahawk & Western, 10 flats; J. E. North Lbr. Co., 30 flats; Newton & Northwestern, 10 flats; Patton & Gibson, contractors, 20 flats; Pittsburg, Carnegie & Western, 60 flats; Preston Lbr. & Coal Co., 11 flats; N. Y., Pa. & So. Western, 100 box cars, 50 gondolas, 10 flats; The Bradley Co., Tomahawk, Wis., 10 flats.

Technical Publications

Electric Railways.—A practical and theoretical treatise with illustrations, by Sidney W. Ashe and J. D. Keiley. 172 illustrations, 280 pages. Published by D. Van Nostrand Co., on electric railways, embodying the recent developments in electric traction, has led the authors to prepare this volume. Their aim has been to treat the subject from a theoretical as well as from a practical standpoint, so as to produce a book which could be used as a text in technical institutions as well as a general engineering reference book for those interested i

as a general engineering reference book for those interested in
railway problems. With this object in view, the use of calculus has been avoided, the differential co-efficients being employed but occasionally. Where calculus methods appear, the same formulae are expressed in addition in algebraic form.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

The Cleaning of Passenger Equipment in Shops Preparatory to Varnishing

We doubt if there is any other item of labor that nettles the aggressive and progressive foreman painter more than the above-mentioned, on account of the time and expense usually required to perform it satisfactorily. Other work seems to move along with rapidity and economy, but with a liberal gang of washers he has to wait, as it were, for the cleaning. The cars are so long in service and so dirt-begrimed that it is a severe tax on the elbow grease of his men and a strain on his patience to get them clean and ready for the painters to perform their tasks upon. True, some shops—notably piece-work shops on a sort of "two for a quarter" plan—manage to get along without any of these troubles. Also some day-work shops, conducted on the enterprising plan of how many cars can be gotten out on the slick-and-promise method, do not appear to lose any sleep over it—nor any dirt from the corners of the interior finish! Until in a few years they are a sad comment on this style of work and have got to be side-tracked for new equipment, or else led up to the varnish remover tank, like beef to the slaughter pen, and let the gore run until a new order of things is brought about.

Now is this the wisest way to do things? We rather guess not—not for the company that pays the bills. Cars should be made scrupulously clean every year while in the shops; for they will not stand much show of getting cleaned at terminals; and to do this it will take soap and water and a plenty of it, especially the latter, and elbow grease and pumice stone and, last but not least, the eternal vigilance of the foreman painter to follow it up, who does not mean to but comes pretty near breaking one of the Commandments, if not somebody's head, when he comes to inspect some of this work that these cheap laborers have done who come to-day and go to-morrow. He may sadly reflect why it is that the company does not pay more and get men who will stay after they have spoiled some work and learned to do it rather than to keep hiring men to spoil it for the painters to mend and make good. But he may take his time out in reflecting. He may as well try to regulate the tariff as to convince his superiors of the importance of this matter. In this connection we may state, however, that thirty-five years or more ago when Warner Bailey ran the B. & M.'s Lawrence shop, and the passenger cars were a straw color, he used to have three men who would clean a coach (some of which are still in use) from deck to trucks in one ten-hour day; and they were clean, too, for all they got before varnishing was a little touching up. But those cleaners got what the varnishers get today—two dollars per day; and they earned it. It therefore cost but $6 to clean body and deck of a 50-ft. coach which was then painted light-yellow. It comes perilously near those figures today for cleaning, or trying to, a Pullman-colored car that afterwards has to be "cut in"—too often to hide the smoke and grime that ought to have been scrubbed out. But, be it said, that in the former days there was such a contrast between the color of the car and its dirty appearance that half the time was not consumed in squinting at it in a dark shop with a lamp in one hand to see if the dirt is all out and the color clear, as is too often the case now, especially in the winter months when the work has to be done. (The public has the blessed privilege of going to the seashore or mountains in the long summer days in the cars when we ought to have them to work on.)

Now as to materials in car cleaning, which has often been threshed out in our conventions, in those "good old days" before referred to, soft soap, pumice and water were the detergents in the hands supplied with scrub brushes, sticks for corners, and sponges. And how the soft soap used to go! Sometimes on legs of firemen and others who came to steal it to wash overalls. The writer once remembers having to charge to his shop for one month's use 17 bbls. at $3 per bbl.! How that old master car builder, peace to his ashes, did rave! and how equally surprised was he, and others taken aback, when suddenly we vetoed the soap and introduced soda cleaning at a tremendous saving in cost, but to the soap maker's dismay, who was hard to convince, yet had to admit, that on the outside of a car at least was already deposited free of cost to us one of the ingredients of his soap, viz., grease from the engine, that had coated it all over evenly in the steam and smoke, the oil from the cylinders, etc., mixing with it; and all that was needed was a weak lye and sufficient labor to unite the two on the work and produce a soap right where it was wanted, when lo! the work was done. Well, the soap maker was a sadder and wiser man and sought other fields of usefulness while we have since, for twenty or more years, gone on in the even tenor of our way, cleaning the exterior bodies of coaches with a sal soda solution of about one pound to two gallons of water, while we use a stronger solution on the trucks of caustic soda.

On the interior entirely different conditions are met and a solution of oil soap and water is the better material here, as the surface is freer from the oil and smoke of the exterior, scrubbing with pumice when necessary to revarnish, but using a hard brush only when otherwise is the case. In all cases use plenty of clean water to float off dirt and soap or soda. It is better if a shop can have good drainage and be fitted with hose for exterior washing. Especially is this handy and effectual in flushing off trucks and steps after they have been slushed with lye to cut the grease and remove the dirt and filth from toilet room hoppers. The accountants may complain of the city water used but water is the cheapest thing in the shop, if not in the world. The master car builder may dislike to see the floor flooded in cleaning the interior for fear it will rot his underframing, but it is best to use water enough to clean the car interior properly, even if the floor has to be mopped up. Jimmy or Johnny wiping a car interior with a bucket of muddy water is what raises Ned with it.

Now, if there is any better way to do this work, please pass it along. Willing workers will do much at reducing the cost of any work, and drones do much to raise it. The aggressive foreman painter should see to it that none of the latter class are among his crew at all hazards.

To the Editor Railway Master Mechanics:

An article under the title "Varnish and Paint Remover" from the "Railroad Paint Shop Dept." of your May issue has been called to our attention. In this article a letter from Messrs. Kay, Totten & Winter, patent attorneys of Pittsburg, is quoted. Without submitting a detailed criticism of this letter we feel it incumbent on us to hand you the following information for publication. One of our constituent companies had their counsel thoroughly examine the Ball patent several years ago and since this letter from Messrs. Kay, Totten & Winter has been circulated we have instructed our attorneys to carefully examine the Ball patent again. In each case counsel advised that the Ball patent can in no sense be construed as an anticipation of the Ellis patent and that removers made under the Ellis patent—namely, Phenoid, Adelite and Eclipse—are substantially different from anything claimed in the Ball patent and are in no wise affected by the Ball patent. The Ellis patent is for a waxy bodied remover and the Ball patent is not. Yours truly,

Chadeloid Chemical Company,
By H. B. Chalmers, Secy.

The Chadeloid Chemical Company of New York City also send out the following circular letter.

To the Public and Trade:

You are hereby notified that the patent infringement suit between the Ellis-Chalmers Company and the Adams & Elting Company has been terminated.

The Chadeloid Chemical Company is now sole owner of United States patent No. 714,880, granted to Charleton Ellis on December 2, 1902, for paint and varnish remover, and of all patents and patent rights relating to paint and varnish removers heretofore owned by the Ellis-Chalmers and Adams & Elting Companies, both in the United States and foreign countries.

Repeated investigations by several independent experts in chemistry and patent law show that our patents are basic and controlling in all countries. All infringers will be prosecuted to the full extent of the law. The trade is cautioned against dealing with parties claiming rights under mere improvement patents. Beware of infringements. We shall enforce our patents not only against infringing manufacturers, but also against infringing jobbers, retailers and users.

Licensees.—Our only present licensees are:

Ellis-Chalmers Company, Dedham, Mass., for Phenoid.

Adams & Elting Company, Chicago,, Ill., for Adelite.

Gould & Cutler, Boston, Mass., for one year for Eclipse.

P. D. Dods & Co., Montreal, Canada, for Phenoid.

Foreign Agents.—Arthur Vles, 15 Rue Bleue, Paris, for Adelite and Phenoid.

Todd & Lamb Company, Limited, Sydney and Melbourne, Australia, for Adelite and Phenoid.

Respectfully,
Chadeloid Chemical Company,
By H. B. Chalmers, Secy.

D. J. Gilleland.

Among the Supply Men

D. J. Gilleland.

It is a pleasure to embellish our page this month with the portrait of one who needs no introduction to the railroad trade. This is all the more a pleasure on account of his enforced absence from his accustomed travels, taking care of his invalid wife at Tucson, Arizona, where he has spent the winters and most of his time for two years, closing up their elegant home at Evanston, Ill. But he hopes to return there with Mrs. Gilleland early in June for the summer at least.

Mr. Gilleland was born in Michigan, where he spent a part of his early life on a farm. He was in the government service the last two years of the Civil war, after which he went to railroading and served some fifteen years as locomotive enineer and conductor. He then resigned from that service and went to traveling, and has been most of the past twenty-four years in the varnish trade; and was for a time with the Hildreth Varnish Co., where we first knew him; and was vice-president of that company, we think, when he resigned and connected himself with the Flood & Conklin Co., varnish makers, Newark, N. J.; and has been with that successful firm for eleven years and still retains his relation with them, with whom he is very pleasantly associated.

Mr. Gilleland has for years been one of the most successful salesmen who ever went on the road, his success being well-nigh phenomenal, being well liked by all with whom he has had business dealings. He is much attached to his family and friends, spending much time, as before-mentioned, with Mrs. G., who is in poor health, but tries to see his friends as often as conditions will permit. Mr. and Mrs. G. have one child, a son, attending Cornell University.

Elizabethport, N. J., April 28th, 1905.

Editor Railroad Paint Shop:

Complying with the request of Mr. D. A. Little, in March issue of the "Master Mechanic," viz: that he would like to hear from me through these columns on the question of sand-blasting and painting of steel cars.

In 1902, the C. R. R. of N. J., under the directions of Mr. H. G. MacMasters, 910 steel coal cars were painted as follows:

The exterior only was sandblasted, all other parts scraped, (where necessary) cars primed both exterior and interior, the sand-blasted parts only, given a second coat. An inspection of these cars recently showed 75 per cent in good condition and in my opinion will run two years before repainting will be necessary; about 20 per cent in fair and 5 per cent in poor condition. The 25 per cent referred to above were painted under unfavorable conditions, viz.: outside in a damp atmosphere.

Sand-blasting assists the paint in the preservation of the steel; but find that the parts not directly exposed to the weather, viz.: underneath the car, will wear as well without the sand-blasting as the expoused parts will with it, except the joints where lapped, which in my opinion, should be thoroughly cleaned and painted before riveting.

Another great menace to the point on steel cars is the water pockets formed especially in pressed steel sills, channel shape, when the flange is formed at an angle of about 75 or 80 degrees from the vertical, forming the water pocket above mentioned.

Cleaning and painting the interior has proved to be of no benefit on account of the wear and tear due to the nature of the lading.

Again referring to the exterior, it does not pay to paint over the scales, neither does it pay to scrape, as the sand-blast is far superior in every respect and invariably better results.

Very truly yours,
F. A. Weis.

Notes and Comments

The death of Mr. L. M. Butler was announced at the May meeting of the N. E. R. R. Club. He was an ex-president, also a veteran master mechanic of the N. Y., N. H. & H. R. R.

Note the letter in another column from Mr F. A. Weis in response to a request from Mr. D. A. Little in a former issue regarding the benefits of sand-blasting steel cars before painting. It is Mr. Little's contention that locomotive tanks should be so treated before painting and he wanted this information in support of his contention. He certainly appears to have the argument.

In preparing this issue under the sweat of sudden summer heat we can but think that it will find many readers at Manhattan Beach at the M. C. B. and M. M. conventions, and hope our friends there will enjoy the surf as did we at Atlantic City last September. The very thoughts of it makes us want to go for a bath ticket.

"The Painter and Wood Finisher" is the name of a bright little monthly that comes to this office from President John Lanferseik's town—Columbus, Ohio. It is edited by R. H. Forgrave, is $1.00 per year, and more particularly designed for the house painter's end of the business, still helpful to all who wield the brush. Address "Painter and Wood Finisher" Publishing Co., 41 Gay St., Columbus, Ohio.

We learn that the veteran foreman painter of the Pennsylvania R. R. West Philadelphia shops, Frank P. McCullen, joined the ranks of the P. R. R.'s pension army April 1, and is succeeded by his assistant, Henry Hoeffelfinger, who in turn is assisted by a Mr. Miller. Mr. McCullen was one of "the old guard." He has turned out a lot of work from those shops in his day. Piece work has been the order of the day here, as all along the Pennsylvania Lines for years, but once there and told how many cars per day, week and month were turned out, we could not see how it could be done with a shop of that capacity, even at piece work.

Glad to join in the rejoicing that our associate, Fred S. Ball, of the P. R. R. shops, Altoona, is better and at last accounts on the road to recovery from a long illness. April 20 we received a note from D. A. Little saying he had been very ill for nearly six weeks with pneumonia and heart trouble and the outlook then was quite serious. In the same letter Mr. Little informed us of the death at Geneva, N. Y., of E. A. Cole, a former associate, who was forman painter with the J. G. Brill Co., car manufacturers, Philadelphia, Pa. We have written for and hope to obtain data for a suitable obituary.

Once we thought work was a curse; then it came to us that it was a necessary evil; and yesterday the truth dawned upon us that work is a blessed privilege.—The Philistine.

Foreman painters found out the truth of the above long ago. In fact, they have largely been compensated in "blessed privilege;" which, however, lacks the important element of being legal tender at the grocer's. Any blessing can be overdone. A minister once congratulated one of his women parishoners, calling when she was very busy, saying, "The Lord has blessed you with a large family of children." "Yes," she replied, a bit out of patience, "but I wish he would not bless me to death." She had ten, one or two annually.

We apologize for a little shrinkage in this department last month and plead as an extenuating circumstance that we were caught with little done by the request for "copy" sooner than usual by the editor-in-chief on account of getting out the paper earlier to move the office to another building on another street. We did the best we could under the strain, and if any apology needs to be made for this issue lay it to the first dose of rheumatism, which has kept us awake o' nights, wearing us out, walking the floor one morning 1:00 a. m. to 2:30. This is a poor inspiration to do our regular duties, not mentioning side lines. Still, what we lack in length and breadth we will endeavor to make up in thickness.

The Boston & Maine had completed 1,260 cars of its passenger equipment for paint and varnish for the ten months ending April 30, the output for March being 206 cars and for April 177. This leaves about 255 cars to be done in May and June, including all "odds and ends" and some summer cars that will not need varnishing. The general shop output was 152 cars ahead of last year and 67 cars ahead of the year before, so all arrearages are more than made up with a fair prospect of completing the entire equipment, if the scattering cars of the last end of it can be obtained from service in time, which it is hoped will be done.

Benzine, especially of a low gravity, may cause no end of trouble if varnish remover is cleaned off with it. This will be all the more emphatic unless changed often during the process. The succeeding coats of varnish cannot be coaxed to dry over it. If a ceiling is thus cleaned off and painted there will be trouble in making a gold size dry thereon when decoration is applied. There is something that will sweat out through everything and stop the drying of the next coat. If refined wood alcohol, or "Union" alcohol, is used there will be no trouble at all. Of course different removers will need different things to clean them off with, but these directions will apply to many, if not the most, of them.

Every good Sunday School scholar knows that Methuselah lived to a ripe old age of something like nine hundred summers, but if he had spent them all in a railroad paint shop, where there's something doing, and attended the convention of the M. C. & L. P. A. every September, there would still be something for him to learn about the deviltries of paint and varnish—unless he had been like a very few today who think they know it all! As old as the painting business is and as often as questions concerning it have been threshed out there are new kinds coming up constantly. One occurred in the writer's shop the other day to disturb his tranquility, too complicated almost to describe, that caused him to go back and sit down and scratch his bald head, after venturing several explanations that did not seem to explain.

Our young "protege," as it were, down on the Maine Central at Waterville (Mr. John Stocks), where they have six months of winter—and likely a thermometer with a subcellar to let the mercury drop to its heart's content—and a month or two of spring and two or three months of autumn, with just a little streak of summer in between, writes (May 4) that he has about twenty more cars to come into paint shop and is likely to complete their entire equipment in season for summer business, though he is badly handicapped by an evanescent gang of workmen who come today and go tomorrow, like the old woman's soft-soap she was making from the house grease and lye from leached ashes. This was particularly the case with the car washers, who stick in the winter, to be housed, but migrate in the spring, like the birds, because the pay is too small to hold them.

Somewhat hearse-like in appearance, passing by where this writer sees them in a train of coaches with mahogany sashes, are Pullman parlor cars with sashes painted the body Pullman color of the car. It is an all-overish look to the car, for all that breaks the monotony of color now is one wide gold stripe near the bottom of the car, a few narrow ones around the windows. Still, it is more sensible than trying to maintain the natural mahogany wood on the exterior of sashes, with the consequent perishing of varnish and the working of the smoke and dirt and the frequent planings and scrapings to bring them out bright again, until the sashes are getting so thin as to rattle or are thrown away and a new set has to be made. It is a settled fact long ago that varnish wears the better on a paint foundation. Hence, we believe in reproducing the mahogany effect in paint, which can be readily, cheaply and accurately done by the gelatine roller process.

By an exchange we learn of the death of G. H. Rattenbury, for many years foreman painter of the Cedar Rapids, Ia., shops of the B., C. R. & N. Ry., which occurred about April 1 from heart failure. He was a member of the M. C. & L. P. A. and was present at the Chicago convention in 1903, according to the records. He is survived by a brother, John Rattenbury, formerly master painter of the C., R. I. & P. Ry. If any one will send us a photo and obituary of the late Mr. Rattenbury we would be glad to insert the same in these columns. A son, George, in Denver, Col., is in charge of the painting on the Colorado & Southern R. R. We never made the acquaintance of the deceased, though we enjoy the friendship of his brother, John. He was well spoken of, however, in our exchange as a man who was of genial, sunny disposition and thoroughly capable and progressive as a foreman.

Mr. J. T. Gordon, general foreman car department B. & M. R. R., Concord, N. H., has resigned, effective June 1. He retires to his farm in Gilmanton, N. H., to spend the remainder of his years in its quiet comfort, having put the bulk of his life into railroad experience. Mr. Gordon was superintendent of rolling stock of the Concord & Montreal R. R. at the time of the lease of that road to the Boston & Maine, July 1, 1895, having held various positions in the mechanical department previously. At the time of the lease the departments were divided and Mr. Gordon was made general foreman of the car department, which position he has held since continuously.

Mr. Gordon is succeeded by Mr. E. T. Millar, heretofore chief draughtsman of the B. & M. car department, whose office was in that of the master car builder in the Union station, Boston, Mass. Mr. Millar will occupy Mr. Gordon's Concord residence.

The New York Central has adopted a distinctive stencil for its equipment which is already being applied to freight cars. It is the words "New York Central Lines" in an oval panel with black ground and surrounded by a stripe. This desgin may be used also on the sides of locomotive tanks in place of the road's initials as now in use. It is used on the road's stationery, folder covers, etc. When several designs were submitted we learn that our friend Butts' was accepted as the most suitable. It is said that all passenger equipment of the various roads in the N. Y. Central pool is to be lettered "New York Central Lines" instead of "New York Central & Hudson River," using the same style and size of letters as heretofore, and placing it at either end of letter board, near the canopy, the initials of the various roads for identification. This seems to us a very sensible arrangement and change. The New York, New Haven & Hartford would do well to follow suit with "New York & New Haven Lines" or "New York & Boston Lines."

Our associate, W. O. Quest, in sending his article on paint spraying in another column writes a personal letter from which we make the following extract which accounts for his long silence and will be of interest to all his friends:

"I am still among the living, but I assure you my late days have been full of trouble, having had something like ten months solid sickness; came near losing my wife and second daughter, but as both are now slowly but surely recovering, there is great rejoicing in the Sgh. "Questic" tribe, and as a consequence I feel like doing something besides nursing my woes. As a beginning I am sending a criticism on the expressed opinion of "The Railroad Gazette" which appeared in the "April" number. "The Painter's Magazine," which I somehow managed to overlook until yesterday when here breaking my fourth consecutive Sabbath in getting our large summer equipment in shape for picnic season. As the spraying machine crank of our association I must keep up my reputation."

We recently had the pleasure of a visit from our fellow-associate H. M. Butts, of the New York Central. On a trip to the B. & A. shops of that line at Allston we met him in Boston and induced him to come to Lawrence and stay over night with us. Next day we accompanied him to Boston and Allston and saw our old friend Hibbard at those shops. He expects to meet with us at Cleveland next September. Mr. Butts showed us an experiment they are trying at the Exeter St. yard in Boston in terminal cleaning with a revolving brush with motor and compressed air attached as with a boring machine. It strikes us that if this machine can be made light enough for an operator to hold up to the car continuously a big stride will be made toward successful yard cleaning, for it will reduce the cost of labor in scouring up the dirt one-half if not two-thirds. It works all right; the only drawback is the weight of the machine. The oil cleaner is applied to the work as usual and the scouring is done with the machine and then the work is wiped off with waste by hand. One would naturally think the revolving brush would throw the material in the face of the operator and around, but it does not. Supposing this would be the case, a shield, or housing, was made for it, but this was abandoned as unnecessary. This machine ought also to be exploited in cleaning glass in shops, sandpapering, rubbing, etc. In cleaning it licks out beads, etc., to perfection.

One hundred and twenty-five more copper-covered coaches are being built for the New York, New Haven & Hartford R. R. by the Wason Mfg. Co., Springfield, Mass., and the Bradley Car Co., Worcester, Mass., the contract being about evenly divided between the two concerns, or, to be more exact, one has 60 and the other 65 to build. Nine or ten are already delivered and the balance to arrive in July. The copper is all enameled to match the body-color of the road, or is supposed to; but those we saw put us in mind of the time long since familiar to organ grinders—"Wearing of the Green." Interior there are painted and decorated headings, in light green tints with gold decoration. They are finished in mahogany throughout, varnished and rubbed to a dull finish and fitted with continuous bag racks. The latest letters of the raised variety that are screwed on the exterior of these cars over the copper are of aluminum; hollow, but composed entirely of that metal. They formerly used a brass or gilt finished letter that tarnished badly. That seems to be the hardest feature to overcome in this kind of a car. So far as the interior is concerned these cars are all that could be desired, but we are yet a little skeptical about that kind of an exterior treatment. We should prefer the enamel directly on the wood, after bringing up the surface in the usual way, omitting the copper, and putting the raised letter on as usual.

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO
Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago
TELEPHONE - - MAIN 3185

Eastern Office: Room 714, 132 Nassau Street, New York City.
Telephone: - - 3524 John

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.
Communications on any topic suitable to our columns are solicited.
Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.
In remitting make all checks payable to the Bruce V. Crandall Company.
Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent

Vol. XXIX. CHICAGO, JULY 1905. No. 7.

Contents.

The Manhattan Beach Conventions

ONCE again have the two representative associations of Master Mechanics and Master Car Builders held their annual sessions, and with an attendance that was a flattering testimonial to the constantly growing interest of the members, as well as the higher railway officials, who have given these associations the moral support that has been so largely responsible for the excellent records of these bodies, and helping them to achieve the measure of success that has brought to them a world-wide fame. The choice of Manhattan Beach as the place of meeting by the executive committees of the two associations, afforded a change of scene that will linger as a pleasant memory to many who were not familiar with the changing moods of old ocean, the crooning of which also served as a lullaby to relieve the tension on the strained nerves of the workers, as well as tempering the atmosphere to a point that made the visitor grateful.

The American Railway Master Mechanics' Association opened first this year, in their thirty-eighth annual convention, having a budget of subjects not second in importance to those of any previous meeting. Among these was the paper on superheated steam in locomotive work, which is a subject of the liveliest import and interest to motive power officers at this time, and the consideration of the question is good evidence of the spirit of progress actuating the members of the association, and such action will leave its impress on steam economy in an unmistakable way. There is no other one question any more entitled to a thorough investigation than superheating steam in locomotives, and it is a matter for congratulation that the author of this valuable paper presented it in such a masterly manner as to make the best points of the subject perfectly clear. This exposition was needed for the reason that superheating is just being introduced here and reliable literature on the subject was very scarce.

Another matter of great moment, and one that curiously invited discussion as a side issue, and was not presented by itself, was the distortion of steel wheel rims and spokes due to tire shrinkage, when the latter paper was presented. One of the strange things connected with rim and spoke distortion is the fact that the steel wheel center has been lightened to a dangerous degree and that the loosening of tires was not considered as having any bearing on that fact. The action recommended to be taken in placing stock in the spokes and rims with the view of giving the proper resistance to make shrinkage of tires effective, is one of the moves for advanced practice that will prove the steel wheel to be right when correctly designed, in other words, the spoke should have sufficient strength as a column to sustain the load coming on it without flexure.

The report on flexible staybolts, when made, is expected to throw considerable light on the most serious causes of staybolt failure, and it is a cause for regret that the committee engaged in the reseaches of expansive action in fireboxes was unable to present its report, owing to the lack of time in which to complete the experimental work it was engaged on. The work of this committee, when completed, should be of the greatest value to the association, for the reason that the magnitude of the expansive forces at work in fireboxes has always been a vague quantity in the older forms of fireboxes, while there is practically nothing known of them in the large construction of the newer types. It will be one year hence before this information will be available, but the time will have been well spent if means are found to successfully combat staybolt breakage.

A most interesting discussion was had on the question of the mechanical stoker, a device for firing locomotives, not as well known yet as it will be, for there is no doubt of its efficiency in the work it is designed to do, as it will place coal on the grate where and when needed. The fact that it does not furnish a panacea for the emission of smoke, does not impair its efficiency as a tireless fireman.

W. P. Appleyard, President Master Car Builders' Association 1904-1905.

The device is yet new, and there seems no reason why it cannot be made to perform its functions in such a way as to equal the best work of the expert fireman, economy of fuel and elimination of smoke. When this is done, and the fuel is taken automatically from the tank to the firedoor, then will the stoker stand as one of the greatest improvements ever applied to a locomotive, since it will not only solve the problem of covering large grates, but will do so to the best purpose.

These subjects, while not comprising by any means the whole of the work before the convention, have the merit of being absolutely new to the association, and of more than passing interest because of their vital connection with the economics of railway managment. The same interest, however, was manifested in the hold-over subjects, which have been before this body for some time, for the purpose of a thorough threshing out.

The Master Car Builders' convention, which was the thirty-ninth annual meeting of this body, opened on Monday, June 20, with its armor on, and the same aggressive spirit that choracterized the sister association, whose labors ended on the preceding week. The work of the association contemplated the solution of some nice problems in car design. One of the most important of these is that of arch bars for cars of fifty tons capacity. This question is not possessed of such complications as to preclude an early arrival at tangible conclusions when strength alone is considered, but the all-important point of the

Peter H. Peck, President Master Mechanics' Association 1904-1905.

mechanics of the question by which dead weight may be reduced, is involved, and has received but little attention. An arch bar of rectangular section, such as proposed, may be made safe for the load, but there are other sections that are equally strong for the purpose, and lighter.

Closely allied to safety of arch bars is the wheel for cars of fifty tons capacity. In the discussion of this matter, it was noticeable that the same pleas were entered for good material, as was the case a few years ago, when provision had to be made for safety in wheels for thirty ton equipment. There was an additional demand in this case, however, for a wheel flange one-eighth inch thicker than ever before used, and the arguments in support of this increase were well backed by irrefutable data. The fact that locomotive driving wheels have long been set in, to an amount equal to the proposed added thickness of the cast iron wheel flange, without detriment to frog or curve guard rails, would seem to be a strong argument in favor of such increase in thickness, but no decisive action was taken other than to authorize a conference with the American Railway Association with reference to the contour of the wheel in relation to the rail. There is no doubt that the proposed increase would be beneficial on wheels for high capacity cars, but there is ample room for investigation of the strength of cast iron wheels, and such investigation is the only opening through which a rational specification can be formulated, since the deciding factor after design is necessarily the material used.

The rules of interchange, and interpretation thereof, have many times engrossed the attention of the M. C. B. Association, but in no previous instance has there been any more complicated situation presented than that referring to responsibility for loss of cars destroyed in the Kansas City flood. Losses by act of Providence have many times constituted an almost perfect shield in evasion of responsibility, but it is scarcely to be expected that the parties to the agreement will attempt to go counter to the rules made by their representatives in the association.

The subject of safety appliances is a perennial one, and has been one of the live questions for several years. On this occasion the secretary of the Interstate Commission presented some thoughts of his own on safety appliances, and incidentally complimented the association on the evident progress made in the direction of safety devices since the last convention, saying that the standards and rules adopted by the association, so far as they affect the interchange of cars, are better observed now than at any previous time. This is a high compliment from one who is in constant touch with the association through the inspectors of his commission.

The work of both bodies has been a record one at the conventions just closed, not only in the amount of work handled, but in the way it has been cleaned up to a finality. There are some questions continued (as always), but the subjects will benefit by further consideration. The attendance has been one never eclipsed in the history in the associations, with reference to numbers, and will go into history as one of the most successful meetings from the standpoint of results attained, ever held by the two organizations.

The Thirty-Eighth Annual Convention of the Railway Master Mechanics' Association

THE 38th annual convention of the Master Mechanics' Association was opened in the ballroom of the Oriental Hotel, Manhattan Beach, New York, ten o'clock Wednesday morning, June 14, 1905, with President Peter H. Peck, of the C. & W. I. R. R. in the chair. The attendance of members and guests was larger than at any previous meeting. Upon the invitation of the president some of the past presidents of the Master Car Builders' and Master Mechanics' Association took seats on the platform with the executive officers. The president then read his address which dwelt on the subject brought out last year in the address of President Brazier of the Master Car Builders' Association in regard to consolidating the two organizations. The president said that at the joint meeting which was held in New York last December it was decided that the time was not ripe for such a move. Other points in the address dwelt on the report of the committee of boiler design, standards and heating surface. The president stated that the committee on boiler design had decided to put their efforts for the past year towards further experiments with locomotive front ends. These experiments were carried on at Purdee University. The president recommended that standard design should be adopted for a locomotive practice. He did not see why a standard could not be adopted for 17, 18, 19, 20 or 21-inch cylinder, also piston heads, packing rings, piston rods, cross heads, driving boxes, shoes and wedges, eccentrics and straps, steam chest and covers. A strong argument in favor of these suggestions was taken up in referring to the trouble following experiments in driving wheels. Since they have been made standard, manufacturers can keep a stock on hand and the roads suffer no delay in getting them at any time. On the subject of heating surface and grate area the president gave figures in square feet and acres of the total heating surface and grate area of all the locomotives in the U. S. These figures were introduced to show how fast power increases in comparison to the slow plan adopted in shops and shop tools. In closing his remarks he declared his pleasure at seeing so many members and friends present, wishing them all an enjoyable time during their stay. He also assured the secretary of the appreciation of the executive committee and himself for the hard work and valuable assistance that he had rendered.

The secretary's report showed that the membership of the association at the present time is 793, of which 738 are active, 17 associate and 38 honorary. The number of roads having representative members in accordance with the amendment of the constitution in 1904 was 30. The secretary explained that a number of the roads had misunderstood the meaning of the representative members. He said that this was not to increase the dues, but for the purpose of carrying out tests. In such a case if there was not enough money in the treasury each road would then be assessed according to the number of hundreds of engines in use.

The treasurer's report showed a balance of $15,535.29 on hand.

Mr. Edouard Sauvage, chief engineer of the W. R. R., of France, was present at the meeting and upon the motion of Mr. Sinclair he was invited on the platform and the privileges of the floor extended him.

LOCOMOTIVE LOADING.

Mr. C. H. Hogan (N. Y. C. & H. R. R. R.) presented the paper: "What should be the practice underlying the proper loading of locomotives on the basis of conducting transportation with the greatest efficiency and with least cost—considering all the factors individually?" After reading the report he added in behalf of the committee they were unable to secure a dynamometer car and other facilities at the time to make tests, so they sent out a circular letter to all members which was heartily responded to. It is the opinion of the committee the dynamometer car should be used in making these tests and that the results of tests should afterwards be used to determine the resistance of curves and grades. The president then declared the paper open for discussion, with the remark that locomotives were frequently rated in the West by the master mechanic putting a tonnage on the locomotive; after which the superintendent adds more, then the trainmaster adds more and when it comes to the general manager the train is loaded, but not economically.

Mr. J. F. Walsh (C. & O.) called attention to a mistake in reading the paper in regard to determining approximately what an engine will pull up a given grade. Their method is to take ⅜ of the number of feet rise in grade per mile. This figure is divided into the tractive power which will give approximately what an engine will pull up a given grade.

Mr. W. G. Wallace (D. M. & N.) was of the opinion that the rating of locomotives should be governed by the amount of traffic and the importance of trains, and determined by the operating officer and the representative of the locomotive department, thus enabling all engines in service to produce the highest revenue and as a fixed one not be applicable to the different positions.

The rating should be left to the representative officers of the road or divisions on which the locomotives are employed. He believed that an established rating for locomotives would not be applicable to all the different classes of service.

Mr. H. H. Vaughan (C. P. R. R.) thinks that a comparison of the excessive lengths of tonnage rating in regard to their economy would be interesting to show the practice of the different roads. He thought that the complaints against heavy tonnage were principally on the part of the motive power side from a desire to avoid trouble. He was of the opinion that it is economical to keep the tonnage up pretty high to a point where, under good conditions, an engine can handle that tonnage and not reduce it, say 10 to 15 per cent, simply to be absolutely sure that the engine is always going to handle the tonnage. Another point brought out by Mr. Vaughan was whether it would be more economical to shop the engine at the end of her mileage or whether it would be more economical to have a secondary rating when it has made a certain percentage of her mileage, and in this way keep the engine out of the shop a month or two longer.

Mr. G. R. Henderson thought there were two reasons which militate against the subject of the paper. The first of these is the fact that the schedule for time and tonnage loading is made up by the transportation department frequently without taking the matter up with the motive power department. The officials have not got the data or information to work up the load and speed combination needed to give least cost and greatest efficiency.

The second is that some high officials have an idea that there is nothing better than a tonnage, and the division superintendent who hauls the greatest number of tons usually receives the commendatory letters, whereas another superintendent may be transporting his goods at a less cost, and yet if his trains are lighter, say 10 or 20 tons, he may not get the complimentary letters which were sent the other man.

Mr. F. H. Clark (C., B. & Q.) believed that the economical loading was somewhere between the load at which they can make 10 to 15 miles an hour. He did not believe there is economy on loading an engine so that it cannot make 10 miles or more an hour, because at a less speed than this we not only use a great many engines to get the tonnage over the road, but overtime usually begins at this point, which has quite an effect upon the result. He was also of the opinion that the broad question of the whole cost of operating trains was not receiving enough attention; that is, the question of wages of trainmen, as well as enginemen and the cost of fuel.

Mr. Sauvage stated that the principles of rating used in France were as follows: First, as to the grade of the line, they do not take the actual grade, but a certain fictitious grade, which is chosen according to the circumstances. If there is a very short heavy grade, say 1 in 60 or 1 in 70, that is not taken in consideration in reaching the value of the grade of the line if the grade is short. If the grade is not short, of course, it must be considered. Different lines are classified on account of the difficulties of hauling upon the ruling grade.

When this is done the regular tonnage of each class of engine is fixed on each section of the line. This is not necessarily the maximum tonnage the locomotive can take, but it is the regular tonnage, and the locomotive department is not obliged to take more. But in cases when they think it is possible to haul more—say the fireman or even the engine driver thinks he can haul more when the weather is fair and the engine in good condition and when the quality of coal is assumed to be good—then they may take extra weight, and they are incited to do that by a premium which they are allowed. There is a certain allowance of coal for engine drivers, and if they burn less there is a premium allowed to them for that economy. That is calculated for the regular weight, and again for extra weight cases, and in extra weight cases they have an extra allowance; but they are not obliged to do this when the weather is bad or there are any difficulties in haulage.

Mr. Theodore H. Curtis (L. & N.) stated that their practice is based on actual tests of the locomotives on the different divisions. They make no allowance for the conditions of the engine. They make an allowance for the weather conditions.

Mr. A. E. Manchester (C., M. & St. P.) stated that their ratings are determined by dynamometer tests. The results of these tests are handed to the yardmasters or superintendents who use this as their rating or loading for the engines. It usually represents the maximum power of the engine under favorable conditions .

Mr. F. M. Whyte (N. Y. C. & H. R.) stated that a good way to interest the engineer, fireman and trainmen in the economical loading and handling of the engine was to pay them on the tonnage basis.

WATER SPACES AROUND FIREBOXES.

Mr. L. H. Fry opened the topical discussion on this subject. Mr. Fry stated that upon examination of 84 modern boilers he did not find any recognizable rule connecting the size of the water space with the firebox dimensions, but that there is an increasing tendency to use wider water spaces. An increase in the width of the water space around the firebox increases somewhat the dead weight of the engine, but the advantages to be gained will undoubtedly more than offset this.

Mr. Fry did not know of any experiments which show the influence of the width of the water space or the evaporation, but thought it obvious that a free circulation of the water will be ensured by wide water legs and will help the evaporative power of the firebox heating surface. In addition to the size of the water spaces their shape has considerable influence on the evaporation and life of the firebox.

As the water in contact with the side sheets is turned into steam it must be allowed to rise to the steam space and must be replaced by other water. The water space should be so designed that this natural circulation is aided, and that the currents of steam and water impede each other as little as possible. This is secured if the firebox sheets are vertical or with a slight slope outward as they rise from the mud ring, so that the steam can rise along the firebox sheets without mutual interference.

If, on the other hand, the firebox sheets slope inward in rising from the mud ring, the steam will tend to rise from the side sheets through the water space and along the outer sheets to the surface, thus interfering with the descending water current.

The side sheets, being subject to the full effect of the fire, require an active supply of water to allow the vigorous evaporation to proceed properly. If the water spaces are cramped or badly arranged the water will fail to reach large areas of the side sheets with results detrimental to the life of the sheets and staybolts.

Another advantage obtained by the widening of the water spaces is the increased flexibility and endurance of the staybolts.

It appears that the rule for the best width of firebox water space is very much like Mr. Forney's rule for the size of a locomotive boiler, which is, make it as large as the other conditions will permit.

Mr. T. H. Curtis (L. & N.) was of the opinion that the length of staybolt did not make very much difference, as they had some as long as 14 inches which broke as fast as the shorter ones. He believed that the boiler pressure was a large factor in their life.

Mr. J. F. Deems spoke of an instance in which the side sheets were given too great a slope and the sheets burned out in five or six months.

Mr. A. E. Mitchell (Lehigh Valley) stated that the old-fashioned deep boxes between the frames were always more satisfactory. He said he always got better results by making the inner sheet and the outer sheet widen rapidly as they rose to the top—that is, the water space at the top is two inches wider than at the bottom. He always endeavored in designing engines to make the firebox as nearly perpendicular as possible.

Mr. W. H. V. Rosing (M. P.) thinks that the narrowest part of the firebox should be at the mud ring. The difficulty with cracked sheets and broken staybolts is largely due to the absence of water during certain intervals in the side sheets. He does not believe that water circulates from the crown sheet downward in the side legs of the firebox. He thinks the vertical cross section of the side water leg should be widest at the flue sheet to permit the water from the shell of the boiler to circulate downward through the side firebox leg along the outside sheet.

Mr. C. A. Seley (C., R. I. & P.) stated that the power committee on the C., R. I. & P. last year determined to adopt 4½ inches as the standard of width of the mud rings. The question of 5 inches was considered, but was not adopted on account of difficulties encountered in forging and riveting.

Mr. J. F. Walsh (C. & O.) stated that in their experience with the wide firebox the absence of the arch bar caused considerable trouble in the firebox due to leaks.

LOCOMOTIVE TESTS AT ST. LOUIS EXPOSITION.

Mr. F. H. Clark (C., B. & Q.) presented the report of the committee which recommended that the committee be continued for another year as the results of the test were not published, but would be so next year when the committee would be able to turn in a report.

SUPERHEATED STEAM AND LOCOMOTIVE WORK.

Mr. Vaughan read the paper on the above subject, which will be published in full at some future date.

Mr. C. A. Seley (C., R. I. & P.) read a sentence in the paper as follows: "One consoling fact in the experimental stage must be remembered, that no risk is being run of a loss, as whatever superheat is obtained is of value, and although if insufficient the greatest economy is not obtained, the best results will be worked up to, as a sufficient amount of evaporating surface must be retained." Mr. Seley also stated that the experience they had had with the superheated locomotive recently acquired was that the problem of lubrication had not been thoroughly worked up.

Mr. Vaughan stated that with the Schmidt superheater they obtained about 10 per cent greater efficiency than on the other superheaters. He says their saving in coal bills calculated from coal docks was from 7 to 21 per cent over the other engines. However, he states that he considered 10 per cent a good figure to use.

Mr. F. M. Whyte (N. Y. C. & H. R.) stated that if there was a saving of 10 per cent in the total coal bill, the saving of steam used in the cylinder must be about 25 per cent. He though that this would be one of the best ways of assisting the fireman.

Mr. W. Cross (C. P. R. R.) stated that he made the first test with engine No. 548 on the Canadian Pacific. He states that every car in the train and every pound of coal had been weighed and that the economy showed by the superheater over the simple engine was about 30 per cent.

Mr. Vaughan, in closing the discussion, stated that at the end of this year he would have 106 engines in service equipped with superheaters. He also stated that the engines equipped with superheaters are the most successful from the roundhouse standpoint, and that they have eliminated a great many of the water troubles. He says his intentions are at the present to reduce the boiler pressure from 200 to 160 lbs., with the intention of seeing whether better results cannot be obtained.

LOCOMOTIVE FORGINGS.

Mr. F. H. Clark (C., B. & Q.) presented the report of the committee on locomotive driving and truck axles and locomotive forging with the following remarks:

"I do not know that it will be necessary for me to read the specifications. We have three specifications—one for locomotive driving and engine truck axles, another for locomotive forgings and the third specification for steel blooms and billets for locomotive forgings. The committee does not regard these specifications as absolutely complete, but as a foundation or sort of a backbone for specifications, with the idea that railroad companies adopting them will probably want to add certain requirements to meet their conditions. For instance, it may be thought desirable by some railroad companies to allow a retest in case the test of the first axle shows defects. That your committee did not feel like going into. Some of the members in using these specifications may feel like specifying a discard of 25 per cent. While the committee thinks that is a good thing, it is rather of the opinion that most railroad companies are not in a position to see they get that 25 per cent discard, and consequently we prefer to leave that point, with others, to the discretion of railroad companies which may want to use the specifications."

Mr. Forsyth was of the opinion that inasmuch as these specifications were similar to those which will have been adopted by the American Society for Testing Materials, the following prefix should be added: "In essential features as to strength, chemical composition and excepting size of test specimen, this specification is similar to that adopted by the American Society of Testing Materials, June ...., 1905."

SHRINKAGE ALLOWANCE FOR TIRES.

Mr. J. F. Cole (Erie R. R.) presented the report, and at its conclusion read a letter from Mr. Muhlfeld which called attention to the fact that no mention is made of the use of retaining rings or similar devices, neither is mention made relative to the proper method of applying liners when necessary and resetting tires, and no mention has been made of the heating effect of brake shoe action in connection with driving wheels and other tires.

Mr. F. F. Gaines (P. & R.) did not see any reason why the committee should make a discrimination between certain diameters of wheels increasing the shrinkage. He was of the opinion that the steel wheel center required more shrinkage, but that it was not limited to any particular diameter. He thought that it was the nature of the metal rather than anything else, as it will contract and has a certain flexibility to it that cast iron has not, and if this is true of any one diameter it should be true of all. Another point which he found very unfortunate in connection with the tires was the section of tread. He was of the opinion that steel wheel centers had altogether too light a tread.

Mr. G. W. West (N. Y., O. & W.) stated that their experience with all sizes of steel wheel centers were to the effect that a greater shrinkage was required for steel wheel centers.

Mr. A. E. Manchester (C., M. & St. P.) stated that they experienced more trouble with tires loosening on steel centered wheels than on cast iron ones. He stated that it was hard to obtain a solid rimmed steel wheel. He was of the opinion that the rim of their steel wheels were too tight.

Mr. McIntosh (C. R. R. of N. J.) thought attempts had been made to make the steel wheel too light and thereby narrowing the rim to such an extent that it has not furnished a surface for the tire to bear on that is required. He was of the opinion that the difficulty of loose tires is more attributed to the light section of the steel wheel than to any difference between steel and cast iron.

Mr. W. H. V. Rosing (M. P.) stated that they had trouble with steel wheel centers and found in shrinking on the tire that the wheel dished slightly. He stated that they had a parted rim, but intended to weld the sections together in the future.

Mr. E. A. Miller (N. Y. C. & St. L.) stated that they had more trouble from loose tires on steel wheel centers than on the cast iron. He attributed this to the narrow wheel rim and also the lighter cross sections of the center.

Mr. F. M. Whyte (N. Y. C. & H. R. R. R.) spoke of experiments which had been made by measuring the wheel center before the tire was shrunk on and measuring the bore of the tire and the diameter of the wheel, placing marks upon the wheel, both upon spokes and upon the rims, and upon the disk of the wheel as well, and measuring the same points again after the tire had been shrunk on, with a shrinkage of 1-80 per foot, and with a parted wheel, with cast iron filling blocks. After the tire was shrunk on it was found that the rim was smaller in diameter; that the spokes had taken the form of the letter "S" slightly, but nevertheless markedly, and that the dishing of the wheel had been increased by 1-16 in.

Mr. J. F. Deems (N. Y. C. & H. R.) thought that to appoint a committee simply to take up the question of tire shrinkage would not cover the ground and that the subject should be referred back to the same committee or to another committee for further consideration, taking into account the old question of the design of wheel center, including that of parted rim or solid rim.

Mr. C. E. Fuller (C. & A.) suggested that the committee take into consideration the section of the spoke and rim of the steel wheel center.

Mr. F. F. Gaines (P. & R.) suggested that a committee should also investigate the subject of securing tires to the large wheel centers by means of retaining rings or shoulder bars.

LOCOMOTIVE TERMINAL FACILITIES.

Mr. D. R. MacBain (M. C.) presented the report of the committee on locomotive terminal facilities and method of heating and ventilating roundhouses.

Mr. H. H. Vaughan (C. P. R. R.) stated that their terminal facilities were peculiar in that practically at every point they handled only a small number of engines a day. He stated that the only point at which they handled a large number of engines was at Winnipeg, so that the layout of track was not of much consequence for them. He also stated that in heating and ventilating he has had considerable experience with the system installed in the Lake Shore roundhouse at Elkhart, of direct steam heating. The Canadian Pacific has eight roundhouses equipped with this system, in all cases of which the results are satisfactory. They have not only been able to warm the houses, but have been a saving in the coal consumed for heating over that which was used in previous years, the saving in coal alone being sufficient to justify the cost of putting in the heating plant. He stated that the Elkhart roundhouse was constructed with the view that the cold air entering under the doors would be warmed by the pipes in the pit and as the air ascended to the roof of the house it would carry with it the steam and smoke so common in roundhouses. This idea has been carried out in practice.

Mr. Wm. McIntosh (C. R. R. of N. J.) said that they found it impossible to obtain satisfactory results in heating a roundhouse with hot air from the horizontal direction. He stated that their roundhouse in addition to having the usual hot air pipes along the largest circumference elevated at the distance of about 8 feet above the floor and also chambers surrounding the pits through which hot air was forced and which could be directed in the pits through port holes provided for that purpose. He said that the port holes along the walls were plugged up and the total supply of air is taken through the pit which is proving successful. He thinks it is practically impossible to obtain satisfactory roundhouse heating through air pipes carried at any distance above the floor.

Mr. F. F. Gaines called attention to the fact that the cramping of motive power in insufficient room and insufficient tracks and without any rational connection of the tracks between the different operations is very much overlooked.

Mr. W. E. Symonds (K. C. S.) called attention to suggestion No. 5, which reads: "Turntables not less than 85 with (preferably) an electric motor as power for handling the same." He said that a number of roads were successfully using the power motors driven by air and that this should be considered. He also called attention that the committee did not think steel cars were desirable for cinders. He thought this looked as if the motive power officials were unable to design steel cars for this purpose.

Mr. D. R. MacBain (M. C.) stated that the line to the steel cars in the report referred to those designed for the transportation of coal. The committee thought it impossible to use these cars, as the cinders could not be distributed along the right of way for ballast, for which they are frequently used.

Mr. G. W. West (N. Y., O. & W.) stated that they had turntables operated by compressed air which worked very successfully summer and winter. He also stated that they had a roundhouse equipped with the hot air system which has proved very satisfactory. He stated that they had no trouble in removing ice from the under side of the engine in one hour. He stated that they took all the air through holes in the pit which made the house very warm and the ventilation nearly perfect.

Mr. J. F. Deems (N. Y. C. & H. R.) offered an explanation to heating of the Elkhart roundhouse. He said it was not heated with a hot blast system. He said it was heated with what he considered a rational and perfect system—that is, by an arrangement of radiating pipes in the pits and around the ends of the roundhouse.

Mr. J. F. Walsh (C. & O.) stated that they had a number of turntables in operation which were operated by air motors which gave excellent results, and at division terminals where engines turn and no power is available the tender hose of the engine is coupled on to the motor and air is supplied by the pump on locomotive for turning the table. He also stated that they had reduced their loading expenses of coal from 13 to 6 men by the installation of a center self-propelling crane. He said that it will clean out a gondola car with the exception of the corners, and 15 minutes' work on the part of a man with a shovel to get the coal out of the corners.

Mr. J. J. Ellis (C., St. P., M. & O.) stated that they hauled their ashes by a depressed track going into the roundhouse. They have a drop pit with buckets underneath the pit on a portable truck. The truck runs down an incline, and when the bucket is filled with ashes the bucket and truck run down the incline and is lifted by the pneumatic hoist and run over to the car. The fulcrum is so arranged that the bucket will dip very easily. This method saves considerable money, as all the help it requires is a dispatcher's helper for emptying and filling the buckets.

Mr. T. N. Curtis (L. & N.) called attention to the fact that the cinder pit and depressed track were opposite the coal chutes in one of the illustrations. He stated that he did not believe this good practice, as the tender will be filled with coal, part of which will roll off and into the cinder pit and ash car. He thought it a good thing to separate the coaling devices and cinder pits entirely.

Mr. William McIntosh (L. V.) called attention to the fact that nothing had been mentioned about gasoline motors for operating turntables. He was of the opinion that these should be introduced as quite a number of them were in use.

Mr. E. W. Pratt (C. & N. W.) thought that nothing but cast iron posts should be used in the cinder pit on account of the liability of dispatching a large number of engines one after the other and the pit becoming full of cinders.

STAYBOLTS.

A report of the committee on flexible staybolts was simply a report of progress. They said that they had no recommendations to make and asked to be continued.

TECHNICAL EDUCATION OF RAILWAY EMPLOYEES.

Mr. G. M. Basford read an individual paper on the above subject, at conclusion of which he stated the object was to state a need and utter a warning. He said that the paper was inspired by a desire to impress the association of the necessity for action which will compel attention to the point so long neglected.

Mr. W. D. Robb (Grand Trunk), described briefly the system adopted on the Grand Trunk. He says in their apprentice system they start with indenture papers, every boy being indentured. He signs himself and is signed by his parents or his guardian and these indenture papers prevent him from joining any union as long as they are serving their apprenticeship. At first the system was voluntary—that is, drawing and teaching, but it was found that it would not do and was therefore made compulsory. An apprentice boy is given to understand when he comes in that he has to pass an examination. Unless he passes that examination successfully he cannot enter the service. The schools start in October and end in April. A list of apprentices is given to each teacher, who are provided by the company, as are also the room, light and heat, and all the apprentice has to do is to buy his own instruments. A list of names is given to the teacher of every apprentice in the works and roll is called. Every boy who is absent has his name sent to the master mechanic, and the next day as a warning he has to give a reason for his absence. If he does not do this he is discharged. The boy has to pass his examinations before he receives his increase. All the increases received are on the indenture papers. A certain percentage is deducted from his daily rate and kept until his time is served. When he is out of his time this money is paid to him and along with it a bonus. They have found by having that system of indenture and holding the back pay they are able to hold the apprentices which they formally were unable to do. The boy has to pass an examination before he receives an increase.

The examination takes place before the shop expert, included drawing and all the subjects of the system of examination. It is a written examination, and the boy goes up before the master mechanic, receives his approval, after which it goes to the superintendent of motive power. If the examination is not satisfactory he is sent back for six months and receives no increase. If he fails on the second examination he is discharged. In addition to teaching drawing, they are now also teaching theory, applied mechanics and mathematics.

Mr. G. E. Parks (M. C.) explained the system in use on the Michigan Central for the past twenty years. They have established night schools that are held for six months in a year in which apprentices and sons of employes, who wish to take advantage of the work, are taught mechanical drawing.

Mr. S. W. Miller (Pa. Lines) stated that he did not agree with the paper in regard to the special apprentice. The paper states that it does not believe in special apprentices, and that the railroads have made a mistake for twenty years. Mr. Miller says he does not agree with this because he knows too many successful railroad officials who have been promoted from the special apprentice rank.

He does not believe that a superintendent of motive power can be made in three years' training. He says all of that period of service does, is to give the young man in whatever department he may be, a general idea of the use of tools, of the principle to be followed, of the shop practice, and of acquaintance with his fellow man. He does not believe that ten years on an average is any too long for a young man to serve a special apprentice course.

WATER SOFTENING.

The Committee on Water Softening had some experiments on water purification under way and suggested that they be continued for another year.

Mr. A. E. Manchester (C., M. & St. P.) called attention to the report of the committee where they did not approve of the introduction of chemicals into the boiler direct. He was of the opinion that water softening plants were the best possible solution but that any railroad which has to deal with lime salts or alkalies would do well to treat water in the boiler, preparatory at least to the time when they shall be able to have the water plant in full operation.

Mr. E. W. Pratt (C. & N. W.) considered it better to treat water in the boiler than not to treat it at all. He also stated that they had practically doubled the life of flues and fireboxes in some of the poor water districts by adding blow-off cocks, using soda ash, increasing the facilities and pressure for washing out boilers and following up the whole matter to see that instructions are carried out.

Mr. J. F. Walsh (C. & O.) stated that their experience had been similar to that of the C. & N. W. Before installing a water softening plant on one of their branches it was impossible to run engines more than three or four days without washing and calking. Since the installation of the water softening plant they can run the engines 30 days by using a little care in the matter of blowing off. He also spoke of a test on four similar passenger engines running over the same division, runs, etc. Three of these engines use a boiler compound and the fourth does not. The engines using the compound run two to three times as long as the other without any boiler troubles.

Mr. J. F. Deems (N. Y. C. & H. R.) spoke of an electrical purifying plant which is to be installed on the Big Four in the near future. The claims for this process over that of chemicals is that it is cheaper, besides the current can be regulated for water at its worst which will have no bad effects when the water is not so bad.

TIME SERVICE OF LOCOMOTIVES.

The report was presented by Mr. Forsyth, after which the president declared it open for discussion.

Mr. F. H. Clark (C., B. & Q.) explained that they had a standard form in which the superintendents get daily statements of the time consumed in turning engines at terminals. This statement requires the co-operation of the yardmaster and shows the time of arrival of the engine at the yard, time of arrival at the roundhouse, the time when ready for service, the time ordered, the time out and some other information which enables them to determine very accurately whether the movements are satisfactory. It does not enable them to keep the engine busy, but it has enabled them in some cases to expedite the movement of engines in the house.

Mr. F. F. Gaines (P. & R.) stated that he found it beneficial in pooled engines in keeping a record of the movement of the engine, not only from the time it starts out from a given point, but a record which will include a complete cycle of the movement of the engine. This record was useful at all times to explain why power could not be furnished quickly and also called the attention of the transportation department to the fact that they were holding out engines on the road and delaying them.

SHOP LAYOUTS.

Mr. Seley (C., R. I. & P.) presented the report of the committee.

Mr. F. F. Gaines (P. & R.) called attention to the report which seemed to question the advisability of large shops, and the use of a single shop for a railroad system. He stated that the large shop was no innovation inasmuch as the P. R. R. shops at Altoona had been in existence a great number of years and was a fair example of large shops. He also stated that the output of the Reading shops had been increased 22 per cent during the past year, making the total output a little over 800 engines. This increase had been accomplished with an old tool equipment, and only a sufficient number of tools to operate 48 out of 68 pits. On the basis of 48 pits they are getting out about an engine and a half per pit per month.

He also called attention to the articles in the appendix from the "American Engineer," saying that considerable exception is to be taken to them. He stated that tables of outputs, such as shown, are valueless unless considerably more is known about the conditions under which the output is made. He called attention to the fact that the character of traffic, grade, ballast, curvature, water supply, weight of engine, etc., vary for each locality. An instance of this character was called attention to by him where a shop in a good water locality was highly commended for its output on the unit basis. The average cost of engines repaired, however, was only from $300 to $350 per engine, or about one-fourth the cost per engine at the Reading shops. This high figure at Reading was due to the fact that the engines were run down and required considerable boiler work.

The proper proportion of floor area for each department, based on the number of stalls, is also worthless when tabulated without reference to conditions. A majority of shop layouts are deficient in floor area for machine tools and boiler work. The newer heavier power requires much more machinery to obtain the same output as was previously accomplished when engines were small. Higher strain pressures have very noticeably decreased the life of flues and fireboxes, and many recently built shops are preparing to overcome this defect by extensions.

In criticising the paper Mr. Gaines said that item one on page 15, comparing longitudinal and transverse shops should be stricken out from consideration as it applied only to localities where ground space is limited.

Item 2—From data on pages 11, 12 and 13 it is seen that the width of bay necessary with either class averages about the same.

Item 3—Admits desirability of transverse arrangement.

Item 4—Admits desirability of transverse arrangement.

Item 5—Admits desirability of transverse arrangement.

Item 6—Lifting engines. Unless at all times the middle track of transverse shop is kept open, or sufficient space between the tracks is left for standing an engine, it will be necessary to lift the engines over other engines, either to bring them in or take them out. If the middle track is kept open or space between the track is allowed, it becomes a very uneconomical distribution of floor space. He therefore fails to see any argument under this item in favor of longitudinal shops. On the other hand, granting it takes more time to lift engines in a transverse shop, which is questionable, the amount of such time is small and affects only a very small percentage of the force.

Item 7—For the same reason as given under item 6, it is questionable if it is any way at all favorable to a longitudinal shop.

Item 8—If the work is handled properly there is absolutely no difference in either system, in either time or manual labor.

Mr. Gaines added Item 8¼, which was omitted, and covers the distribution of material, access to machines and movement of men to and from tool room, which is decidedly in favor of the transverse arrangement.

Item 8½, also not given, covers the storage of wheels, handling and storage of locomotive parts during repairs, the transverse shop affording a much more flexible arrangement, as well as keeping the shop looking neater.

Item 9 being a summary of various points for and against the two systems of shops would then appear as follows: With items 1, 2, 6, 7 and 8 equally favorable, and items 3, 4, 5, 8¼ and 8½ in favor of the transverse arrangement, it would appear that the transverse arrangement is decidedly the best arrangement.

In the present practice of using so many steel castings the area of 525 square feet per locomotive pit has been found from actual experience to be ample, and with a good margin of reserve.

Mr. C. A. Seley (C., R. I. & P.) agreed with Mr. Gaines' remarks. Mr. Seley stated that he did not believe in either the longitudinal or transverse tracks, but thought that the diagonal pits adopted by the Rock Island were the proper thing. He stated that the purpose of the diagonal was to facilitate as far as possible cross connection from the engines to the departments on either side.

LOCOMOTIVE FRONT ENDS.

Mr. H. H. Vaughan (C. P. R.) in presenting the report stated that it would not be necessary to read the report, as the printed copy spoke for itself. He said that the principal work had been in raising the necessary funds to carry out the experiments. This part having been accomplished the rest would be an easy matter. The recommendation of the committee asking to be continued for another year was adopted.

HIGH SPEED STEEL.

Mr. Carney in opening the topical discussion on the above topic stated that the high first cost of the high speed steel frequently made it doubtful whether it is economical to install when old tools are in use. But when one figures the slower speed, smaller output, time lost sharpening and dressing tools and the loss of material incident to dressing and sharpening, it will be seen that the cheaper steels are too expensive to consider. A case of this kind was cited where bolt cutter dies of 10 cent tempering steel cost 26 cents and cut 100 bolts before dressing. A set of similar dies made of 75-cent steel cost 77½ cents and cut 1,100 bolts before dressing. Enough tempering steel to do the same work would have cost $2.86.

Mr. Carney also called attention to the use of tool holders for use with the high speed steel. These effect great economics, as in the instance cited where a tool 1x2 inches, 18 inches long, costing $7.89, was replaced by one 1x1x8 inch tool costing $1.87. The tool holders do not wear out and cost 5 cents a pound against 75 cents for high speed steel.

Mr. Carney also called attention to a number of things that can be made out of high speed steel and effect a great saving.

MECHANICAL STOKERS.

Mr. Wm. Garstang (C., C., C. & St. L.) opened the subject for topical discussion with a history of the growth of the locomotive and the necessity of some means for keeping pace with the firing of large boilers burning about five tons of coal per hour. The mechanical stokers tested on the Big Four have been successful in firing the long, narrow firebox as well as the wide one.

The discussion of the paper brought out the idea that a stoker taking the coal from the tender is required.

The subject was thought of such importance that a committee is to be appointed to note the progress of the stokers and report any improvements.

CHANGE OF CONSTITUTION.

The following resolution on the amendment of the constitution was adopted:

"Whereas, On account of the growth of this association and the additional burdens imposed thereby upon the officers, it is proposed to amend the constitution and provide for the election of six executive members, who, with the officers, shall constitute the executive committee as hereinafter provided."

"Be it therefore resolved, that Article 4, Section 1, Article 6, Section 3, and Article 8, Section 1, be amended to read as follows:

"'Article 4, Section 1. The officers of the association shall be a president, a first vice-president, a second vice-president, a third vice-president, a treasurer, a secretary, and six executive members; the six executive members, with the president, vice-presidents and treasurer, shall constitute the executive committee.'

"'Article 6, Section 3. Five members of the executive committee shall constitute a quorum for the transaction of business.'

"'Article 8, Section 1. The officers of the associattion, except the secretary, as hereinafter provided, shall be elected by ballot separately without nomination at the regular meeting of the association held in June of each year. A majority of all votes cast shall be necessary to an election, and elections shall not be postponed. The president, vice-presidents and treasurer shall hold office for one year, and executive members for two years, or until successors are chosen; provided, however, that three executive members shall be elected for one year at the time of adoption of this amendment. Three executive members shall be elected each year thereafter.'"

The following officers were elected:

President, H. F. Ball (L. S. & M. S.).

First Vice-President, J. F. Deems (N. Y. C. Lines).

Second Vice-President, Wm. McIntosh (C. R. R. of N. J.).

Third Vice-President, H. H. Vaughan (C. P. R.).

Treasurer, Angus Sinclair (Locomotive Eng.).

Executive Committee—Two years: G. W. Wildin (Erie), C. A. Seley (C., R. I. & P.), A. E. Mitchell (L. V.).

One year: A. E. Manchester (C., M. & St. P.), J. F. Walsh (C. & O.), F. H. Clark (C., B. & Q.).

After a short address by President-elect Ball and a presentation of a badge by the chairman of the executive committee of the Supply Men's Association to the retiring president, the convention adjourned.

The Thirty-Ninth Annual Convention of the Master Car Builders' Association

THE thirty-ninth annual convention of the Master Car Builders' Association was called to order on Monday, June 19 at 10 a. m., with President W. P. Appleyard in the chair. After the past presidents of the Master Mechanics' and Master Car Builders' Associations had taken seats on the platform, the Rev. Dr. Pray led in prayer. The president then delivered his address, in which he called attention to the fact that there were only 15 cases before the arbitration committee during the past year, some of which ought not to have come before that body at all, as similar cases had been decided previously.

The reports of the secretary and treasurer showed a membership of 607, and a balance of $3,469.38 in the treasury.

The recommendation of the executive committee making the dues for the coming year $4.00 per vote was adopted.

CHANGE OF CONSTITUTION.

The following change of the constitution was recommended by the executive committee:

"Section 2. Any person holding the position of superintendent of the car department, master car builder, assistant mechanical superintendent, mechanical engineer, assistant mechanical engineer, assistant engineer of motive power, chief draftsman, foreman of a railroad car shop, joint car inspector, or one representative from each car manufacturing company, or other company owning or operating over 1,000 cars which are not in process of purchase by other parties, may become an active member by paying his dues for one year.

"Balance of section to remain as at present.

"Also that Section 5, Article II. of the constitution, regarding life membership be modified so that either active or representative members who have been in good standing twenty years may become life members on the recommendation of the Executive Committee."

Mr. Moseley (Interstate Commerce Commission) made a brief address, in which he complimented the Master Car Builders' Association in having their standards and rules observed better than at any previous time.

He also called the attention of the members to the Johnson case, which had been decided last December. It is now a settled rule of law that for the protection of employees, railroad companies are required to equip their cars with couplers that can be coupled and uncoupled without the necessity for men to go between the cars and to maintain such couplers in an operative condition.

The decision in the case of the United States vs. the Southern Railway followed close upon the Johnson case. This decision fortified the law by holding that to use a car at all when its safety appliances are in such a defective condition as to compel men to go between the cars is in itself a disregard of law. It was also decided that reasonable care or due diligence to keep equipment in order is no defense to an action brought to recover the penalty prescribed by law; also the use of a M. C. B. defect card to cover defects to safety appliances does not relieve a carrier from responsibility for accepting a car in a defective condition. An illustration of the improvement brought about by this decision was quoted of two large systems. For the six months ending December 31, 1904, reports covering these two systems show that of the cars inspected 38 per cent and 21 per cent respectively were found to be defective, while for a period from January 1, 1905, to date, the defective cars found were but 8 per cent and 2 per cent respectively, on approximately an equal number of cars.

TRIPLE VALVE TESTS.

Mr. Wm. McIntosh (C. R. R. of N. J.) presented the report of the committee, which stated that no tests had been made during the year, and asked to have the committee discharged.

There was some doubt about discharging a standing committee, but it was finally decided that the members of the committee were to be discharged and new ones appointed.

BRAKE SHOE TESTS.

Prof. W. F. M. Goss presented the report of the committee, adding that three railroad companies had submitted shoes for test during the year. All the shoes tested met the requirements of the specifications.

STANDARDS AND RECOMMENDED PRACTICE.

The cutting out of the inside dust guard plate, leaving the sides vertical, was referred to letter ballot.

The addition of a rib on the back face of the journal box lid was referred to letter ballot.

The recommendation that malleable iron is not the proper metal for wedges in cars of 80,000 pounds or more capacity and wrought iron substituted in its place on sheets M. C. B. 15 and 18, was referred to letter ballot.

The recommendation of the committee modifying the brake shoe by the addition of a rib on the sides and increasing the length 1¼ inches on each end was not adopted.

It was voted that the lower round on ladders with wooden sides be made straight and not with an offset.

The modifications in the position of the handholds was referred to letter ballot.

It was moved that the placing of the grab iron on the roof of the car in line with the ladder applied to the car be referred to the committee on standards.

The recommendation of the committe reversing the center plates was lost.

The recommendation of the committee changing the bracket for the uncoupling rod was referred to letter ballot.

The recommendation referring to a special committee the schedules for high speed brake gear was adopted.

The recommendation of the committee changing the permanent stake pockets was referred to letter ballot.

The subject of height of brake staff was referred to the executive committee for appointing a special committee to investigate the subject.

The question of auxiliary stake pockets was referred to the committee on loading long material.

SALT WATER DRIPPINGS.

The topical discussion on the question, "The Best Method of Preventing or Minimizing the Damage to Metal Parts of the Right of Way from Salt Water Dripping," was opened by Mr. C. A. Shroyer, C. & N. W., who stated that considerable trouble is experienced by the brine of refrigerator cars dripping on the right of way and rusting frogs, splices and bridges. The only action ever taken on this subject was to direct the discharge between the rails to save the arch bars and journal boxes. Mr. Shroyer suggested that tanks be placed on the cars to catch the brine.

RIVETING YOKES.

The topical discussion on the question, "Is not the method now commonly followed of securing yokes to couplers with rivets from 1-16 inch to ¼ inch smaller holes unmechanical and ineffective? Should we not ream the holes to a good alignment, use rivets to fill them and head rivets from opposite sides, to insure, at least, filling them on one side? Is there any sense in making heavier drawbars, followers and check plates if this system of riveting spring yokes is to continue?" was opened by Mr. Wm. McIntosh, C. R. R. of N. J.

The discussion brought out the necessity of having some better form of fastening between the coupler and pocket. The present method of riveting the pocket on does not insure the lip of the yoke being in contact with the shank. By drilling the hole in the coupler it was thought that considerable breakages of this nature would be eliminated.

Other fastenings between the coupler and yoke which would be more flexible were referred to and received favorable comment. It was finally decided to refer the subject to the coupler committee to report on at the next annual convention.

AIR BRAKE HOSE.

The report on air brake hose was presented by Mr. L. G. Parish (L. S. & M. S.) remarking that it would be unnecessary to read the report as it had been in the hands of everybody. He also spoke of the necessity of the stretching test, saying that at least 50 per cent of the present troubles would be eliminated if proper attention is given this subject.

He also added the following, which the committee prepared since the report had been submitted:

"We would strongly indorse the recommendation of the arbitration committee that on and after July 1, 1906, air brake hose will be considered wrong repairs unless they are made in accordance with M. C. B. specifications and are so labeled. The committee also wish to bring very strongly before the association the necessity of insisting that all hose purchased be fully up to the specifications, which should be considered as minimum specifications, and we would therefore recommend that the label attached to the hose be copyrighted, and in order to prevent violations of the copyright the committee be empowered from time to time to remove new hose from cars and have them tested. The results of the test to be furnished the roads purchasing and applying the hose and also publish in these tests along with their reports of all hose tested. We feel that this committee should also be authorized to prepare specifications especially adapted to manufacture of woven hose."

Mr. A. W. Gibbs (P. R. R.) felt that more attention should be paid to the woven hose. In the wrapped hose considerable friction or adhesion between the successive layers is required to keep them from sliding around. This disappears as the hose gets older. Mr. Gibbs thinks that anything that will do away with the necessity for friction in the way of adhesive material is a step in the right direction. For this reason he thought the committee had not laid enough stress or given a wide enough latitude in the direction of experimenting with woven hose and still be within M. C. B. limits.

It was decided to submit to letter ballot the report of the committee, together with this addition presented at this meeting.

M. C. B. COUPLER TESTS.

The report of the committee on tests of M. C. B. couplers, of which Mr. R. N. Durborow is chairman was presented by Mr. Kleine. The report dealt with the desirability of having one standard coupler to be used on all roads. The committee asked to be given the power to act in conjunction with a special committee (in which representatives from the manufacturers should be included) to decide on a coupler that has all the desirable features now embodied in all the couplers. They also asked to have the present recommended practice for specifications made standard with some slight additions.

The design of "knuckle" which does not pull out when the pin breaks was favorable to all and it was therefore recommended that in purchasing couplers that all concerned will specify that the knuckle is not to pull out when the pin breaks.

A knuckle throwing pin was recommended as of considerable merits, but it was thought not to be advisable to recommend it for use on account of so few couplers being manufactured with this device on.

Mr. R. P. C. Sanderson (S. A. L.) thought that the continuous coupler should not be taken out, as it had some points that were worthy of consideration. He called attention to the discussion of the fastening of the yoke where a pin connection was spoken of. His idea was that the present form was poor, but that it would form a basis for designing a good connection.

An amendment to the report was made omitting the words "Tail end for continuous draft," and the report accepted and submitted to letter ballot.

ARBITRATION COMMITTEE DECISIONS.

Mr. J. J. Hennessey (C. M. & St. P.) read the report, which stated that only 15 cases had come up for arbitration during the past year. It also gave a list of changes recommended by members of the association and railway clubs.

The convention decided to take up for discussion only the rules on which the arbitration committee made a definite recommendation.

Rule 10, pages 4 and 5, was changed as follows:

"Worn Flange: Wheels under cars of less than 80,000 pounds capacity, with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 1 inch thick or less. Wheels under cars of 80,000 pounds capacity or over, with flanges having flat vertical surfaces extending more than 7/8 inch from tread, or flange 1 1-16 inch or less in thickness.

Rule 20, page 6.

This rule was changed so as to show the gauge proposed by the coupler committee.

Rule 21, Page 8.

This rule was amended in the same way as Rule 20.

Rule 34, Page 13.

On and after March 1, 1908, cars offered in interchange must be equipped with M. C. B. standard hose; if not so equipped owners are responsible for application of standard hose.

On and after September 1, 1907, all cars offered in interchange must be equipped with air brakes.

Rule 50, Page 15.

This rule was changed to read, "Damaged dead block, accompanied by damage to end sill."

Rule 51, Page 16.

The words "dead block" were substituted for "buffer block."

Rule 54, Page 16.

By the term "dead block" mentioned in Rules 50 and 51 is meant the block located on center of end sill against which horn of coupler buffs.

"An American continuous draft key shall not enter into a combination of defects denoting unfair usage."

Rule 56, Page 16.

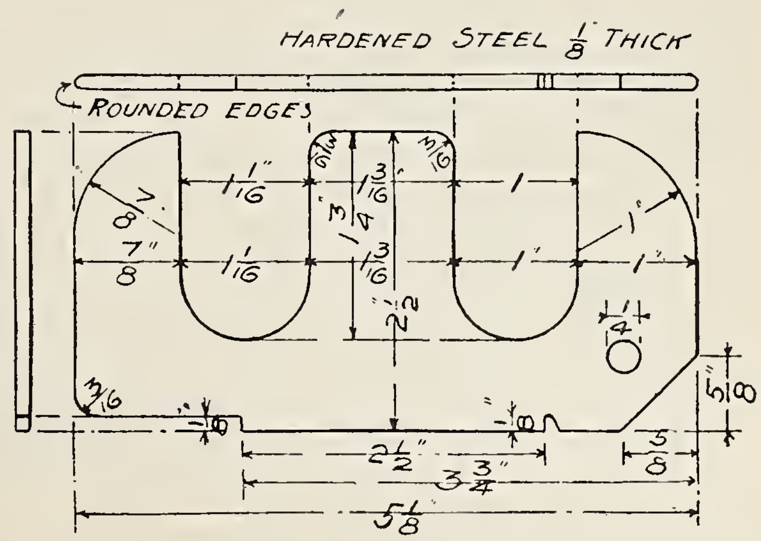
"Repairs to foreign cars shall be promptly made, and the work shall conform in detail to the original construction, and with the quality of material originally used, except as provided for in Rules 60 and 61. Malleable iron, M. C. B. standards, may be substituted for gray iron, M. C. B. standards, but the net cost to car owner in such cases must be no greater than if the original kind and weight of material had been applied. Gray iron, M. C. B. standards, may be substituted in place of malleable, M. C. B. standards, but in such cases the debits and credits must be for what is actually applied and removed. Repair cards and stubs must state kind of material applied and removed."

Rule 58, Page 17.

In making repairs for which the owners are responsible, wheels other than 33 inches may be replaced with 33 inch wheels, if practicable.

Rule 59, Page 17.

Couplers that exceed the distance of 5⅛ inches between point of knuckle and guard arm, measured perpendicularly to guard arm must be repaired.



WORN COUPLER LIMIT AND WHEEL DEFECT GAUGE.

Also that a diagram showing working model of coupler gauge in position should accompany rules.

Rule 69, Page 19.

Air-brake hose applied to foreign cars after July 1, 1906, shall be considered wrong repairs unless they are made in accordance with the M. C. B. specifications and are so labeled.

Rule 75, Page 23.

The cards and stubs must state whether solid or filled journal bearings are applied; also length of bearing. In the case of couplers applied and removed they shall state the make and kind of material in the couplers and the size of shank. In the case of knuckles, they must state whether open or closed knuckles are removed and applied. In the case of brake shoes removed and applied they shall state the kind of shoe.

Rule 92.

The following changes and additions were made:

Brake shoe, reinforced back, applied, no credit for scrap	.40	cents
Coupler, M. C. B., complete, new, malleable iron, 5 by 5 shank	$7.25	——
Coupler, M. C. B., complete, new, steel, 5 by 5 shank	8.25	——
Coupler, M. C. B., complete, new, malleable iron, 5 by 7 shank	8.00	——
Coupler, M. C. B., complete, new steel, 5 by 7 shank	9.00	——
Coupler, body, one, new, malleable iron, 5 by 5 shank	5.25	$ .90
Coupler, body, one, new, steel, 5 by 5 shank	6.25	1.05
Coupler, body, one, new, malleable iron, 5 by 7 shank	6.00	1.00
Coupler, body, one, new, steel, 5 by 7 shank	7.00	[illegible]
Coupler knuckle, one, new, open	1.70	[illegible]

Coupler knuckle, one, new, solid		1.85		.45
Coupler knuckle pin, one, new		.25		.05

Rule 97, Page 35.

The word "offices" was changed to "companies."

Rule 103, Page 36.

The word "net" was inserted before the prices charged for altering the height of cars and applying grabirons.

Rule 104.

This rule was changed as follows:

Brake beams and connections, page 37, add:

Brake beam, wooden truss, repairing	1	$0.20	1	$0.20
Brake hanger, repaired and replaced	1	$0.20	1	$0.20

Center pin and connections, page 37.

Omit the eighteenth, nineteenth and twentieth items on page 37, and ninth and tenth items on page 39, and insert after the seventeenth item on page 37 the following:

Center pin head applied, empty car	½	.10	½	.10
Center pin head applied, loaded car	2	.40	2	.40
Center pin head applied, empty car, and putting same end on center	1½	.30	1½	.30
Center pin head applied, loaded car, and putting same end on center	4	.80	4	.80
Center pin key applied, empty car, including placing same end on center, if necessary	1½	.30	1½	.30
Center pin key applied, loaded car, including placing same end on center, if necessary	2½	.50	2½	.50

Center plates, page 37, omit the item "center plate, one, replacing, two hours." Change next item to read:

Center plates, one or two, at same end, replacing	3	.60	3	.50

Coupler stops, page 38, omit the first item "coupler stops, one or two, at same end of car, replaced, two hours," as it is referred to in the second and third items.

Journal boxes, page 39, add the following after sixth item:

Journal box, one or two, replaced on same axle, solid pedestal truck	4	.80	4	.80
Journal box, three or four, replaced, same truck, solid pedestal truck	5	1.00	5	1.00
Journal box bolt, one or two, replaced, same box	1	.20	1	.20

Siding, page 40, add:

Where nails are set, and holes puttied.				.12

Truck springs, page 41, change item to read:

Truck spring, one or all, in same truck, replacing	2	.40	2	.40

Weighing and restenciling cars, page 41, change price to 1¼ hours, 25 cents.

Buffer blocks, page 37, change:

Dead block, wooden, replacing at one end of car	3	.60	3	.60

Rule 107, Page 42.

No additional labor to be charged for applying key center pin or friction rollers, or for putting car on center, when center-plate bolts or center plates are renewed at same end of car.

Rule 110, Page 43.

Angle cock grinding in, 25 cents, cleaning, oiling, testing and stenciling cylinders, page 44, increased to 30 cents.

"Cleaning, testing and stenciling," under the head of details, is increased to 23 cents.

Triple valve, removed, cleaned, oiled, tested and stenciled (page 47) is increased from 24 to 36 cents, the item of cleaning, testing and stenciling is increased from 6 to 18 cents.

Rule 111, Page 48.

Box car, wooden body, metal underframe, eight-wheel, 50-ton capacity, 38 feet 6 inches long or over, over end sills $750.

Box car, wooden body, metal underframe, eight-wheel, less than 50 tons capacity, 36 feet long or over, $675.

Rule 132, Page 59.

It was decided not to change this rule relieving roads from payment of foreign cars destroyed in floods, etc.

Under the latter rule it was decided by the convention that any road signing or having their representatives sign the M. C. B. rules they should be held responsible and abide by the rules of the arbitration committee. This committee was fully sustained in their decision that the companies should pay for the cars.

PASSENGER CAR RULES.

The report of the committee on passenger car rules were submitted to letter ballot the companies being governed by the rules now in existence for this year. Rule 6 was amended to read, "Cars must be thoroughly oiled at specified or agreed terminals."

TRUCK ARCH BARS.

The report of the committee was accepted and the recommendations submitted to letter ballot.

SAFETY APPLIANCES.

Mr. D. F. Crawford read the report of the committee, which had not been printed previously. The report was accepted and referred to the committee on standards for next year.

The report of the committee was on the design and location of ladder and location of hand holds on roof. The committee was of the opinion that cars with projecting end sills should have a ladder at each end of the car, the sides of which are to be constructed of hard woods and the steps of either wood or iron.

For cars not having projetcing end sills, they recommended ladders located in accordance with the present M. C. B. standard.

In the matter of roof hand hold the committee recommended that it be bolted on in place of the present practice of lag screws.

STEAM CONNECTIONS.

The report of the committee on steam connections was adopted.

TANK CARS.

Mr. A. W. Gibbs (P. R. R.) opened the topical discussion by saying that the committee had made no progress. Mr. Gibbs recommended that the association take no action on the subject at this time, as the American Railway Association had already fixed dates for certain work. He thought it unjust to have a special circular requiring axles differing in size applying to any one class of equipment.

Since the last meeting of the committee there have been several cases of fire on cars equipped with safety valves. The valves performed their functions and discharged the contents of the car with safety and without accident to any person. So far all the cases which have been reported show that the action in regard to safety valves was a wise one.

REPAIRS ON STEEL CARS.

Mr. T. H. Russum presented the report of the committee which was referred to letter ballot for recommended practice. The recommendations were that center sill splices should be located not less than 8 inches from either side of the body bolster and should consist of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end, but not exceeding 24 inches, and not less than same thickness of web plate.

STENCILING CARS.

Mr. H. M. Carson (P. R. R.) presented the report of the committee, adding that the report was practically the report of the Master Painters' Association, which was that a Roman letter should be adopted and of these, heights for the various letters. The recommendations were in detail as follows:

First—It is recommended that Roman letters and figures of the designs shown be adopted for uniform stenciling of freight cars.

Second—It is recommended that the sizes of these letters and figures shall be confined to the following heights: 1 inch, 2 inches, 3 inches, 4 inches, 7 inches and 9 inches.

Third—It is recommended that 7-inch or 9-inch letters or figures be adopted for the initials or name and numbers for the sides of cars and 4-inch letters or figures for the same markings on the doors and ends.

Fourth—It is recommended that for other car body markings on sides and ends, such as capacity, couplers, brake beams, class of car, date built, outside dimensions, inside dimensions and markings inside of car, 2-inch or 3-inch letters and figures be used, with the following exceptions:

1. All weight marks should be 3-inch or 4-inch letters or figures.

2. Trust marks, patent marks or other private marks should be 1-inch letters and figures.

Fifth—It is recommended that all marks on trucks should be confined to 1-inch and 2-inch letters or figures.

Sixth—It is recommended that stenciling on airbrake cylinders or reservoirs should be 1-inch letters or figures.

HEIGHT OF DRAWBAR ON PASSENGER EQUIPMENT.

The topical discussion on the above subject was opened by Mr. T. H. Curtis (L. & N.) with the remark that at present there was no standard height except that of freight cars, which allowed 1½ inches above or below 33 inches. This gave an extreme variation of 3 inches, which is too much for passenger cars when passengers pass from one car to the other.

Mr. W. E. Fowler (C. P. R.) stated that the wear due to unequal height was considerable and was in hopes that some common standard could be adopted.

Mr. Hennessey (C., M. & St. P.) thought that there would be considerable trouble in maintaining passenger cars within a given limit, as the compression of the springs was considerable and varied with the load. He was in hopes that the solid knuckle would eliminate the wear difficulty encountered.

After considerable discussion in which it was brought out that 50 inches was a good height for platforms it was decided to refer the subject to a special committee.

MALLEABLE IRON FOR WEARING SURFACES.

The topical discussion on the subject, "Is it advisable to use malleable iron for wearing surfaces?" was opened by Mr. Foque of the Soo Line.

Mr. Foque was of the opinion that as a general rule malleable iron is not fitted for wearing surfaces on account of the softness of the metal.

For parts subjected to very little wear, such as center plates, side bearings or draft gear, it proves satisfactory if properly designed.

LOADING LONG MATERIALS.

This report was taken up again, as there had been no discussion as it was presented the first time. This was due to the fact that there was a minor report presented with the other report. The two factions got together and prepared a report that all signed.

The rules as revised were then read by Mr. Kearney (N. & W.) after which they were referred to letter ballot for adoption.

COUPLING CHAINS.

Mr. Sanderson presented the report of the committee which recommended a ⅞ inch and 1 inch chains for check chains on double loads, etc.

The recommendation was submitted to letter ballot. The committee was continued to investigate safety chains for next year's convention.

DRAFT GEAR.

The committee recommended that a side clearance of 2½ inches instead of 1 inch as shown on sheet "B." The report was referred to letter ballot and the committee continued with the understanding that they confer with the coupler committee.

CAST IRON WHEELS.

Mr. Wm. Garstang (C., C., C. & St. L.) presented the report of the committee which presented principally the manufacturers' side of the question. It was decided to appoint a standing committee on wheels who should take up the question of cast iron wheels and recommend standards.

Mr. Garstang thought that ⅛ inch could be added to the back side of the flanges with perfect safety. After considerale argument it was decided to have the committee confer with a committee of the American Railway Association.

DOORS.

The report of the committee stated that the members did not show enough interest in the design of a flush door to make any recommendations in that line.

CAST IRON WHEEL FLANGE BREAKAGE.

Mr. R. L. Ettinger opened the topical discussion on the question "How does the M. C. B. cast iron car wheel show up in service as regards the breakage of flanges?" Mr. Ettinger stated that of all the information he could obtain on the results of wheels in service, that the wheel in accordance with the designs adopted last year was proving satisfactory.

OFFICERS ELECTED FOR THE ENSUING YEAR.

President, Joseph E. Buker (Ill. Cent.).
First Vice-President, W. E. Fowler (C. P. R.).
Second Vice-President, G. N. Dow (L. S. & M. S.).
Third Vice-President, R. F. McKenna (D., L. & W.).
Treasurer, John Kirby (L. S. & M. S.),
Executive Committee, H. M. Carson (P. R. R.), G. W. Wildin (Erie), T. H. Curtis (L. & N.).

Burning of Low Grade Coal

THE problem of burning coal of a high sparking character has been one that has received the attention of motive power officers having power running in districts remote from coal fields producing coal of a reasonable calorific value, or about 14,000 thermal units. To burn coals like the western light bituminous and lignites, each having about the same percentage of fixed carbon, and a similar thermal efficiency, experiments to this end have been prosecuted to such purpose as to make possible and profitable the use of these lower grades of fuel. To do this with safety from fire, and at the same time enable the engine to make steam under the severe conditions of the tonnage system of freight haulage has been a work of no mean magnitude, but it has been accomplished on the Burlington system and other western roads, and that without the use of the cone and netting in the stack, so long found a necessity with this class of fuel.

Like many other radical changes wrought in the efficiency of locomotive performance, this one was more the result of the perfection of a detail foreign to the actual seat of operations, than of the drafting appliances in the front end, that is, the success of the whole scheme of drafting hinged on the character of the boiler tubes, the stack being of the straight open type without the usual obstructions to break up and kill live cinders passing to the atmosphere.

In the solution of this question, the vital point aimed at was the retention of the gases and sparks in the tubes a sufficient length of time to make both give up their heat to the surrounding water, and in doing this to cause the cinders to pass out shorn of igniting power. This was found to be accomplished by the use of tubes of a spiral form, the helices causing the gases to follow their corrugated outline and thus touch every portion of the tubes' interior on their passage from the firebox to the atmosphere. The effect on the fuel bills of the roads using these tubes is said to be most marked, and if the reports concerning their performance is half true there will be unusual activity in getting to market the deposits from the immense lignite beds heretofore left in their pristine virginity, for want of means to utilize them.

At the Manhattan Beach Conventions

THE year 1905 will go on record in the archives of the supply fraternity as one replete with success in two great exhibits of railway appliances exclusively—one at Washington, and one at Manhattan Beach, both of which stand unrivalled in point of completeness and excellence. The exhibits at the conventions were an abridged and condensed showing of those at Washington, but were the largest in the history of the M. M. and M. C. B. associations. The arrangements for showing the various appliances were ideal, the smaller exhibits having the piazza of the Oriental hotel, while the larger and heavier details were assigned to ample space immediately north of the lawn, the latter part of the exhibits being shown in the same pavilions used at the International Railway Congress. Mention of these in connection with the illustrations will make clear the pains taken to give an exhibition of railway appliances worthy of the occasion.

The Ashton Valve Company, Boston, Mass., had muffler pops, blow-off valves, open pops, steam gauges with single and double springs, and chime whistles, constituting a fine show in that line of specialties.

The Acme White Lead & Color Works, Detroit, Mich., made their usual fine show, with artistic samples of panels enclosing their space, together with car paints, enamels and varnishes, also the rust preventive "Pandect," a compound for preventing deterioration of metal from the action of gas, acid or alkali.

The American Balance Valve Company, Jersey Store, Pa., had models of the J. T. Wilson high pressure slide valve, be-

MR. WM. MCINTOSH.

THE "SCORE GIRLS" EAST AND WEST.

MR. W. GARSTANG, MR. J. W. MARDEN, MR. F. W. FRAZIER, MR. C. A. SHROYER, MR. J. J. HENNESSEY, MR. W. H. LEWIS, MR. W. P. APPLEYARD, MR. GEO. W. WEST AND MR. J. H. SETCHEL, ALL PAST PRESIDENTS.

MR. WM. WHITE, OF THE ERIE HEATING COMPANY.

Mr. W. C. Arp, Mr. J. E. Keegan, Mr. S. C. Allen and Mr. J. J. Conolly.

Mr. J. Parker Gowing and Mr. F. H. Clark.

sides piston valves of both inside and outside admission, and a semi-plug piston valve, all of which had seen service, the plug valve having seen nearly three years of work and showed no sign of wear.

The American Brake Shoe & Foundry Company, Mahwah, N. J., modern steel back brake shoes and steel castings, representing the newest and best practice in steel brake shoes and locomotive and car steel castings.

The American Steam Gage & Valve Manufacturing Company, Boston, Mass., had steam gages, air gages, muffled and open pop valves, also the Thompson improved indicator with the new detent motion for high speed indicating of locomotive steam distributiona— device that is an absolute necessity for accurate work in indicator practice.

The Anglo-American Varnish Company, Newark, N. J., had their usual complete display of varnish by samples, which caused much favorable comment.

The Baker Car Heating Company, New York, exploited their newest heater, which is made of riveted steel plates. It is one of the latest ideas for safe and efficient car heating, and commanded considerable attention.

The Baldwin Locomotive Works, Philadelphia, Pa., had an exhibit of their steel wheel as it appeared during the various stages of its manufacture, in section and the solid complete

Mr. R. D. Smith, Mr. J. F. Dunn, Mr. Paul Dickinson, Mr. F. R. Schultz, Mr. and Mrs. C. R. Phillips, Mrs. Wenzel and Others.

Mr. H. A. Nealley and the Only and Original "Sam" Brown, of Boston.

Mr. Jas. Macbeth, of the New York Central, and the Hon. J. T. Chamberlain, of the B. & M.

Mr. Tom R. Wyles, Mr. Geo. L. Harvey and Mr. J. T. Dinkgrave.

wheel. They also had a four-cylinder balanced compound locomotive on the exhibit track, this engine being distinguished by inside main rods which spanned the forward axle—a design never before applied to a locomotive.

The Bettendorf Axle Company, Davenport, Ia., showed the Bettendorf products very completely, among which were their freight trucks of thirty and forty tons capacity. Passenger and freight engine trucks of heavy capacity, I-beam trucks and body bolsters, I-beam truck frames, truck frames for removable journal boxes, riveted arch bar truck frame, and cast steel ends for car sills. Advanced practice was here indicated in steel car and locomotive truck details.

The L. J. Bordo Company, Philadelphia, Pa., had their locomotive and stationary blow-off valves, hydraulic valves, and swing joints as applied between locomotives and tenders. In these lines the Bordo company had some new things that appealed strongly to the locomotive men as good things.

The S. F. Bowser Company, Fort Wayne, Ind., illustrated their oil house equipments for railway shops, factories, shop tanks, cabinets and underground gasoline storage, by full size and miniature models. By this system of handling oils there is no waste or drippings whatever, and the measurement is invariably correct by mechanical means, making it impossible to take more or less.

The Buda Foundry & Manufacturing Company, Chicago, Ill., showed their car replacers, car and locomotive jacks, antifriction bronzes and metals, also their general line of track tools, in an interesting exhibit.

Sunday Morning on the Front Porch—The Franklin Railway Supply Family.

Mr. John D. Hurley, Independent Pneumatic Tool Company.

WATCHING THE BALL GAME.

MR. GEO. H. SARGENT AND MR. E. L. ADREON, JR.

The Chicago Pneumatic Tool Company, Chicago, Ill., was in evidence with their specialties operated by compressed air, among which were the Keller riveters, the Boyer and Chicago drills, the Little Giant motors. All of these tools were piped up to do business and were in operation to demonstrate what they could do. Besides these well-known tools, there were the paint sprayer, and pneumatic geared hoist operated by air.

The Chicago Railway Equipment Company, Chicago, Ill., in their very complete showing of car specialties, had the "Monitor" and other types of car body and truck bolsters, roller side bearings, slack adjusters, and brake beams for all classes of service.

Carlines of pressed steel was a special car detail exhibited by the Cleveland Car Specialty Company, Cleveland, O. The carline of pressed steel presents one of the openings for reducing non-paying load in car equipment, that is being taken advantage of by the best designers.

The Cleveland City Forge & Iron Company, Cleveland, O., had their up-to-date car details on exhibit, in the shape of drawbar yokes, turnbuckles and car forgings, representing some of the most important details in car construction.

Cling Surface is the name of a belt dressing made by the Cling Surface Company, Buffalo, N. Y. Its name well indicates its function, which is to cause a belt to hug a pulley

MR. G. W. GREENWOOD.

MR. J. T. BROWN, MR. GEO. N. REILLY, MR. W. C. JOHNSTON AND MR. F. R. MCFETTERS.

"10-57."

Mr. W. P. Appleyard and Mr. J. E. Keegan.

without any apparent tensile stress. The pull of a treated belt was shown in comparison with the ordinary untreated belt, by means of a small weighing scale. The ordinary belt was shown to nearly reach the point of rupture when giving the same maximum pull registered by the treated belt running loose.

The Commercial Acetylene Gas Company, New York, exemplified their method of car lighting by acetylene gas and showed safety storage system of acetylene lighting. This system is applicable to steam and sailing vessels, buoys and signal lights, as well as to locomotive headlights and cars.

The Consolidated Railway Electric Lighting & Equipment Company, New York, presented their system of electric lighting for cars by driving a dynamo from the car axle. The voltage and current of this system is constant at the lamps for all speeds of train, and this interesting feature was nicely demonstrated for visitors.

The Dearborn Drug & Chemical Works, Chicago and New York, analytical chemists and chemical engineers, made their first appearance at the M. M. and M. C. B. conventions. This firm claims the largest and most complete facilities for general analytical work in feed water treatment and scale resolvents, at their Dearborn laboratories.

Davis Expansion Boring Tool Company, of St. Louis, Mo., was represented this year by Mr. Mord Roberts, who has joined the ranks of the railway supply fraternities. The company exhibited their boring tools for car wheels.

The Detroit Graphite Manufacturing Company, Detroit, Mich., exhibited a very complete line of paints for steel cars, for which well founded claims are made of preservative qualities against the action of corrosives harmful to steel construction. In addition to this was samples of locomotive blacks and paints for canvas roofs.

Paul Dickinson, Chicago, Ill., exhibited his cast iron adjustable smoke jacks for roundhouses, also his vitribestos stacks for the same purpose, as well as cast iron ventilators and chimneys. These details have been designed to fit any possible demand for the removal of smoke and gases from en-

Mr. S. J. Bowling and Mr. G. W. Wilden.

Mr. H. S. Demarest.

Mr. W. M. Simpson and Mr. Geo. L. Bourne.

Messrs. Burgert, Mellin, Conolly, Reiss and Dowdel.

gine houses and shops, devoting much thought to a subject that has heretofore been left to languish for want of experiment on correct lines.

Detroit Lubricator Company, of Detroit, Mich., showed new types of locomotive lubricators, three, four and five feeds.

Dixon's graphite lubricants and silica-graphite paints were presented by the Dixon Crucible Company, Jersey City, N. J., and their merits were carefully and interestingly exploited by a corps of experts who left all callers convinced that the Dixon products were par excellence.

The Draper Manufacturing Company, Port Huron, Mich., had a diversity of exhibits, among which were the McGrath pneumatic flue welder, the McGrath turntable motor, the Draper valve facing tools and ball check valves. All of these tools were of a high order in their special domain, and gave evidence of the touch of a designer.

The Falls Hollow Staybolt Company, Cuyahoga Falls, O., had hollow bars of their staybolt iron in many diameters and lengths. Some of these bars were threaded as for use in a firebox, and were bent over cold, to an angle of 180 degrees, without a sign of failure. Other specimens of this iron were nicked and broken in order to show the fibrous structure of the material. Many samples of this iron were shown, from the raw material to the finished bar ready for use, making an interesting exhibit of this well-known staybolt iron.

The Farlow Draft Gear Company, Baltimore, Md., exhibited their draft gears as applied to cast steel, rolled steel and wooden draft sills. The twin spring design as applied to fifty ton capacity steel hopper coal cars, was an exceptionally strong contruction and well designed to stand the hard usage of the coal trade. The Farlow gear attachments combined with the Westinghouse friction draft gear, and applied to steel channel draft sills, was a pretty construction, revealing in every line the work of the engineer familiar with draw-gear requirements.

Mr. J. W. Motherwell and Mr. Fred A. Casey, of the Ashton Valve Company.

Mr. W. J. Robider, Mr. G. C. Murray and Mr. Belden D. Jones.

Mr. M. A. Garrett and Mr. A. L. Guilford.

Mr. E. M. Grove, Mr. Chas. Waughop and Mr. S. C. Mason.

One of the largest exhibits, and also comprehensive ones in its variety of locomotive and car details, was that of the Franklin Railway Supply Company, Franklin, Pa. Here was seen the Franklin driving box lubricator; the Franklin pneumatic fire-door opener with both swing and sliding action; the Franklin car and tender journal box with a boltless-never-losing lid; the Franklin steam chest plug; the McLaughlin flexible metal conduit for car heating, and lock nut, and the Worthington couplers, automatic and emergency. This exhibit was worked overtime demonstrating the perfect operation of the specialties shown.

Flexible staybolts were shown by the Flannery Bolt Company, Pittsburg, Pa., in an exhibit most attractively arranged to bring out the method of construction and application of these bolts, all in full sized detail, and also in a section of firebox sheets showing bolts as in service. Bolts cut to show in section, were self-explanatory of the flexible principle involved by the ball-joint, by which all transverse stresses in the bolt are eliminated, leaving it to cope simply with tensile stress. This exhibit was an instructive one and well calculated to interest those having to do with firebox maintenance.

Car curtains were shown in practically perfect development in the Keeler eccentric curtain which was exhibited by the Garford Company, Elyria, O. This curtain is absolutely self-aligning and self-adjusting, and slides in either direction with certainty and accuracy. The Keeler pinch handle curtain was also shown in this exhibit, both of them having the recommendation of always rolling up smoothly—and always being fool proof.

The Garlock Packing Company, Palmyra, N. Y., had an exhibit of their metallic packings for piston rods and valve stems, that attracted attention because of the mechanical appearance of their design and construction. Garlock packing for throttle and air-pumps for which this company has made a name, also their air brake hose, steam hose, water hose and fire hose, asbestos gaskets, brass wire sheet packing,

Mr. Henry Roever.

Messrs. Clark, Gowing, Gardner, Smith and Thurnauer.

Chicago Pneumatic Tool Co., Mr. W. O. Duntly, Mr. W. P. Pressigner in the Group.

packing for pump valves, compressor packing and injector packing, comprised a part of this exhibit, and it is only simple justice to say that the conventions never had a show in this line equal the Garlock.

The General Electric Co., Schenectady, N. Y., had an exhibit comprising the Curtis steam turbine, a compressor for combination, automatic and straight air brake, automatic electric signals, a mercury arc light rectifier and numerous details of the Curtis turbine, among which was the bucket wheel from a 500 k. w. turbine.

The Gold Car Heating & Lighting Co., N. Y., presented a complete and instructive exhibit of their heating systems for passenger trains, by steam, hot water and electricity. All these systems were in practical operation, showing their improved regulating methods for preserving a constant temperature in the car to meet the varying outside temperatures. Their train lighting system by storage battery was also an important feature of this exhibit.

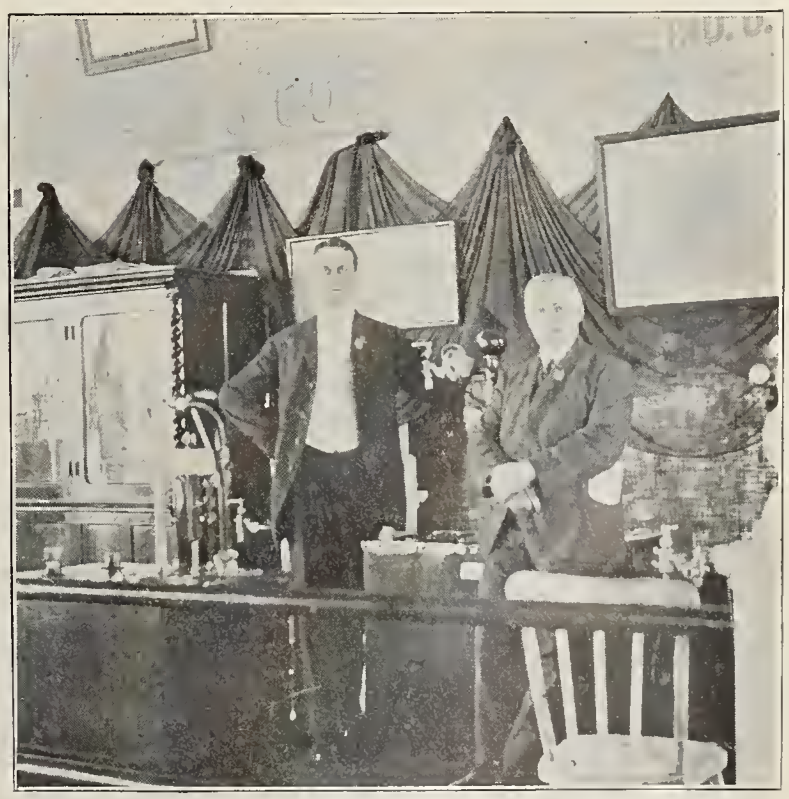
Mr. W. G. Menzel, of the Wisconsin Central.

Mr. G. N. Dow, Mr. C. J. Donahue, Mr. W. L. Miller, Mr. P. R. Diamond and Mr. L. E. Butler.

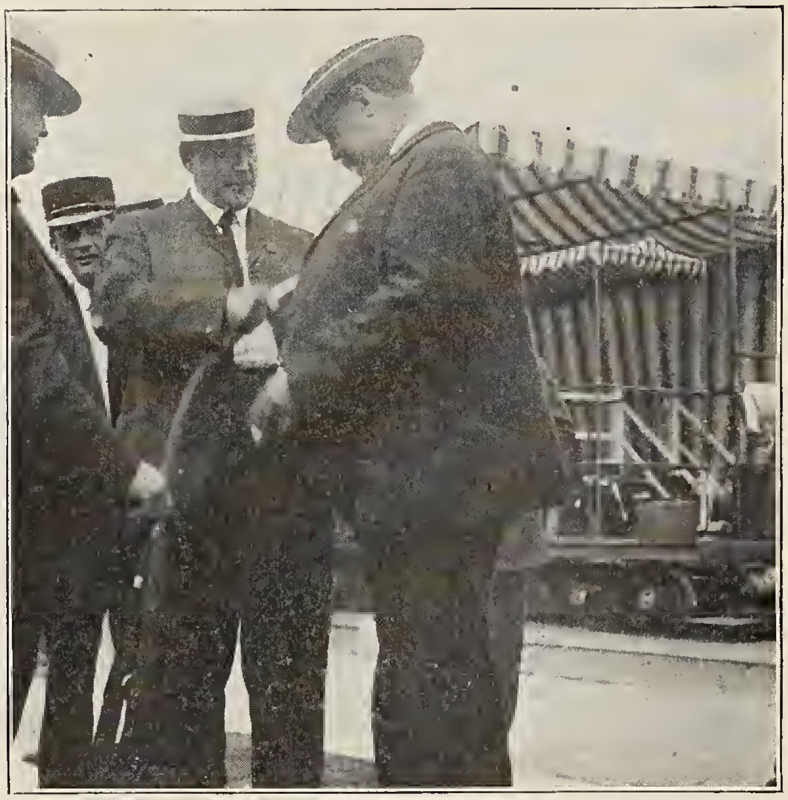
The Gould Coupler Co., N. Y., had an extensive showing of the numerous railway details they control. Among these were their electric car lighting system; the application of the Gould coupler to foreign practice; the Gould Z-beam steel platform for passenger cars; their friction buffer draft gear; steel bolsters for cars; steel draft arms and friction daft gear, besides tandem draft gear, as applied to either steel or wooden sills, and spring buffers and tender and pilot couplers. This was a large exhibit and skillfully arranged to bring out its most salient points.

Greene, Tweed & Co., of New York City, represented by Mr. H. S. Demarest, showed the Palmetto packing and the Favorite reversible ratchet wrench.

The large blow-off valve, so long the familiar trade-mark of the Homestead Valve Mfg. Co., of Pittsburg, Pa., occupied a prominent place as usual. It called attention to the Homestead blow-off valves, straightway valves and three-way and



Mr. E M. Savercool and Mr. Chas. A. Dunkelberg, of S. F. Bowser & Co.



Mr. R. C. Hallet "at work" With the Vacuum Cleaner.

Mr. F. W. Sargent and Mr. E. Sidney Lewis.

four-way valves made by this company, as well as the locking cock, all of which were shown to advantage, either in section or in dismantled parts. In addition to the regular show of valves which has made the "Homestead" famous, this company also had their new rolled steel railroad tie exhibited in full size. This tie has a merit of lightness combined with strength, and being of a simple rolled section is always available. The rail is secured to the tie by means of a casting, through which two bolts pass, holding the rail to gage. A small clip on the outer face of the casting drops by gravity between the nuts, forming a secure nut lock.

The Independent Pneumatic Tool Co., Chicago, Ill., exhibited their line of "Thor" pneumatic tools, embracing many new applications of compressed air to shop operations. The reversible and non-reversible drills, and the reaming and tapping machines were tools of special merit, while the air turbine driving cut-off saw was an adaptation of air power in a direction sure of recognition by wood workers. The hammers, riveters and caulking tools were all original in design and superior in point of constructive details.

In brass and iron valves the Jenkins Bros., New York, had one of their characteristic complete collections of valves for every class of steam, water and hydraulic service, besides their sheet packings, gasket tubing and pump valves.

Car doors for freight service were shown in model by the Jones Car Door Co., Chicago, Ill., in the Smith, Jones and Brown doors. All of these doors were quarter size and worked as perfectly as the full sized doors which are so extensively used. They comprised doors for stock, box and refrigerator service. The grain door shown was conceded by car men to have more good points than the average door for that purpose, being easy to operate, always sure when in place, and impossible to use for fire wood by the "hobo" or farmer in sparsely wooded districts.

The bolt-cutting and nut-tapping machines of the Landis Machine Co., Waynesboro, Pa., were the recipients of many

Mr. Philip J. Mitchell, of Philip Justice & Co.

In the Gould Co. Exhibit, Dr. Gould, Mr. Huntley and Mr. McKeen.

Oliver Machinery Co.

The Draper Mfg. Co.

compliments. These machines embodied the most advanced practice in screw-cutting work by dies, the mechanism of which was responsible for the accuracy of the work exhibited which has been pronounced equal to the best lathe work.

The Landis Tool Co., of Waynesboro, Pa., showed some grinding machines and their products in refined grinding on work requiring absolute truth, on such work as crank pins, close fitting of cylindrical valves, etc. There were a No. 16 crank grinder and a No. 3 universal grinder in this exhibit, both of which tools were fine samples of their kind.

Mason locomotive reducing valves, steam pump and damper regulatofs, and regulators for water and air, were shown in great variety and completeness by the Mason Regulator Co., Boston, Mass.

The McConway & Torley Co., Pittsburg, Pa., had on exhibit the Janney coupler, model of 1905; the Pitt freight coupler; the Kelso tender and pilot couplers; the Janney passenger coupler; the Buhoup three-stem coupler, also a model of the latter showing its operation on curves, and the Pitt coupler electrically operated.

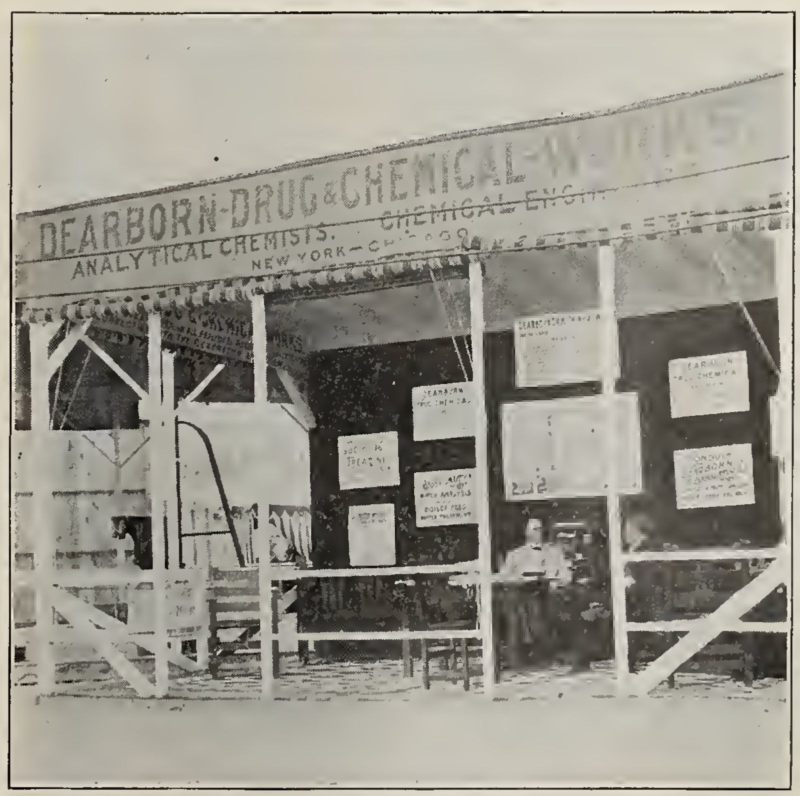
McCord journal boxes, draft gears and spring dompeners, and the McKim gasket and Gibralter bumping post, were well exploited by McCord & Co., Chicago, Ill.

The Nathan Mfg. Co., New York, were to the fore with a device that promises to be an important factor for lubrication in a field now in its infancy; namely, for use with superheated steam. For this purpose they exhibited the Freedman force feed lubricating pump for locomotive valves and cylinders.

Radial draft gear demonstrations were made with half size cars operated by compressed air by the National Malleable Castings Co., Cleveland, O., showing the operation of their radial gears.

Corrugated boiler tubes were exhibited by the New Jersey Tube Co., Newark, N. J. These tubes are spirally corrugated and produce a swirl in the gases passing through them that

Pyle-National Electric Headlight Exhibit.



Dearborn Drug & Chemical Works.

COMMERCIAL ACETYLENE CO. EXHIBIT.

THE MASON REGULATOR CO.

insures giving up of a maximum amount of heat in their passage to the stock.

Electric transfer tables and turntables, also drawbridge machinery, was exhibited by means of illuminated transparencies and photographs by Geo. P. Nichols & Bro., Chicago, Ill.

An exhibition that attracted the attention of the mechanic interested in the today process of making fits in metal by the grinding machine was that given by the Norton Grinding Co., Worcester, Mass. The essence of refinement seems the most fitting term to apply to the system worked out by this company for producing accurate cylindrical work. The trained cunning of the most skilled artisan in working metal could not produce anything more beautiful in fit or finish than the piston rod in this exhibit, having a ring that would "freeze" when at a lower temperature than when ground to fit the rod.

The Oliver Machinery Co., Grand Rapids, Mich., a house noted for its high class woodworking tools, had some fine samples of their product on exhibit. Among these were wood trimmers, band saws, face and gap lathes, saw benches and swing saws and disk sanders. On the universal bench saws there was a refinement in the shape of a micrometer adjustment to the fence, and a tilting table that makes that tool one of the most valuable adjuncts to the woodworker. This firm is one of the pioneers in making woodworking machinery instruments of precision, and have brought their specialties to a high plane of excellence.

Springs for locomotives and cars were in the exhibit of the Pittsburg Spring & Steel Co., Pittsburg, Pa. Locomotive driving springs, engine truck and tender truck springs, passenger and freight truck elliptic springs, draft springs, equalizing springs, pop valve and many other springs comprised this show of steel springs.

MR. HARRY A. PIKE, MR. H. B. HUNT, MR. THEO. H. CURTIS AND MR. L. R. POMEROY.

MR. JAMES CLOSE.

Mr. Ralph B. Phillips.

Mr. J. E. Frantz and J. G. Benedict.

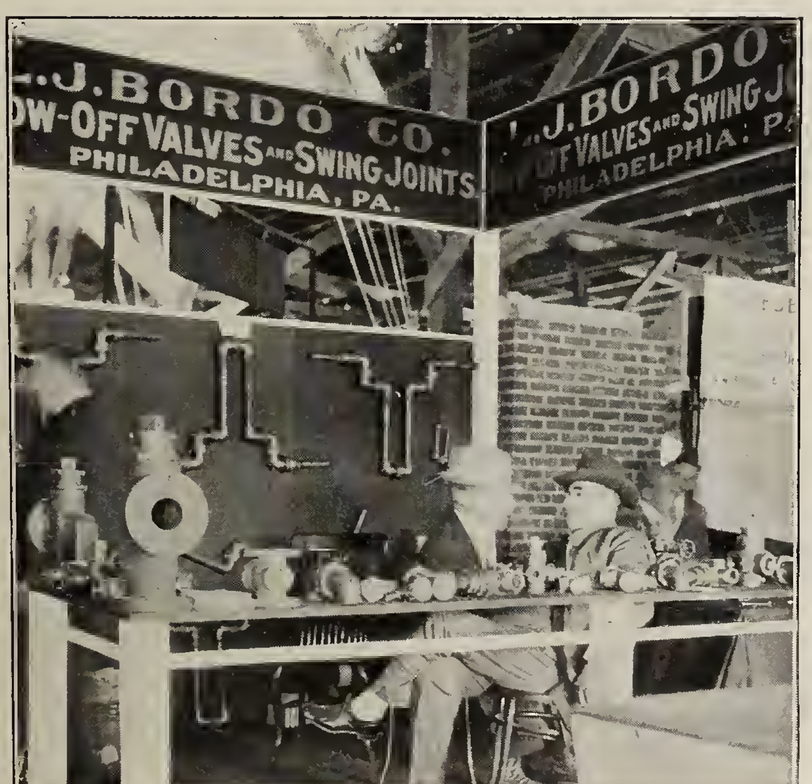
The Pyle-National Electric Headlight Co., Chicago, Ill., had their electric headlight for locomotives, the turbine engine and generator and complete outfit for road service in operation.

The Safety Car Heating & Lighting Co., New York, were, as usual, in the lobby of the hotel headquarters with their exhibits of lighting and steam heating. On this occasion they showed the new incandescent mantle lamp for car lighting, which was also installed in a coach on the exhibit tracks, where was also to be seen their new ventilator.

The Standard Car Truck Co., Chicago, Ill., had one of the most complete exhibits of the Barber truck ever shown at any convention in the ten years since it has been before those bodies. These trucks were in quarter size models, representing the Barber roller bearing as applied to passenger and freight car trucks and locomotive tender trucks from 25 to 75 tons capacity. In the heavy capacity truck the spring seat is of steel, and bottom of truck columns is double bolted. Three double elliptic springs are used, and cast steel bolster with a 14-inch depressed center plate. In this exhibit was also shown the conical roller bearing center plate, one of the new things brought out by the Standard Truck Co.

The Standard Coupler Co., New York, showed the Standard steel platform in full size with attachments, also the Sessions-Standard friction draft gear. In this exhibit was seen the model testing machine for demonstrating the efficiency of friction gear. By this model it was shown that two ordinary draft springs of 19,000 lbs. capacity each would have their resistance increased to about 140,000 lbs. by introducing friction to absorb the impact. These experiments were of the greatest interest to the observers.

Ball bearing centerplates and side bearings, and the Symington journal box, comprised the exhibit of the T. H. Symington Co., Baltimore, Md. These were shown in full size and gotten up with the view of showing their valuable points to the best advantage. Body and truck bolsters were fitted up to



L. J. Bordo & Co. Exhibit.

Norton Grinding Co. Exhibit, Mr. Geo. C. Montague.

demonstrate the low resistance to curving offered by the ball bearing center plates and side bearings, affording a fine object lesson in that regard.

Templeton, Kenly & Co., Chicago, Ill., had a fine showing of their Simplex car jacks, and other lighting appliances for labor-saving and wrecking purposes, all of which were new and essentially modern.

The Universal Safety Tread Co., Boston, Mass., had a full line of their safety tread as devised for the manifold purposes it is used in. It is applied to locomotive pilots and tenders, and passenger car and street car steps, steamship companionways, churches and public buildings, not only because of its safety, but for its phenomenal wearing qualities.

The Vacuum Cleaner Co., New York, had one of their portable cleaning installations on exhibit, and were constantly engaged in giving demonstrations of the beauties of that system in removing dirt from carpets and draperies, showing its application to car cleaning, also the removal of dust and dirt from hotels, offices, private houses, steamships, etc. A novel use of the cleaner was shown in the thorough manner in which clothes were cleaned of every vestige of dust while on the wearer, as is now done in many barber shops where this system is in use.

The Walworth Mfg. Co., Boston, Mass., showed their locomotive and stationary boiler injectors, die-plates and pipe-cutters, taps, dies and tap and reamer wrenches, also the Miller ratchet die plates, miller ratchet pipe cutters, Walworth pipe vises, Stillson wrenches, Smith friction track drills and sleeve and boiler ratchet drills. This exhibit comprised a simple of practically every tool required for average machine shop practice.

The Washburn Coupler for passenger and freight cars and for locomotive pilots and tenders were shown by the Washburn Company, Minneapolis, Minn., in a collection that comprised their various types having the most improved features of automatic coupler practice. Nothing could have added to the interest of this exhibit in point of thoroughness as every possible question had been anticipated.

The Wells Light Mfg. Co., New York, had their various sizes and types of lighting for interior and outdoor work, demonstrating their value as an illuminant. Besides these they showed their tripod outfit, locomotive tire remover, and standard gas lamp.

The Westinghouse Air Brake Co., Pittsburg, Pa., exhibited the Westinghouse friction draft gear complete and in section, by which its operation was clearly shown, and also had in this connection the machine devised to demonstrate the capacity of the friction draft gear. In the air section of this exhibit was a testing rack fitted with the new engine and tender equipment to represent two locomotives and four cars, all of which were operated as in service. Besides these, there were automatic couplers, a ten-inch freight equipment in section and 9½ and 11 inch and compound air pumps. The working of the Westinghouse air appliances was also explained by means of colored charts devised expressly for educational uses.

The Standard Sectional Automatic Car Journal Lubricator Co., of New York, furnished an object lesson in lubrication that was not lost on those who looked into it. There was nothing to it except an oil tight journal box exactly the same as any other box for the purpose, and having the space formerly utilized for waste filled with oil. A frame carrying disks rested on the bottom of the box, with the disks in contact with the under side of the journal. When the journal was in motion, these disks also revolved and distributed the oil over every part of the bearing. An electric motor drove the axle at any speed desired in the demonstrations made with the device. This method of lubrication was tried out on the Great Northern Ry., showing a remarkable economy in oil as well as brass and journal wear in a run of over 5,000 miles. This equipment has been ordered by the Japanese government for several thousand cars.

Philip S. Justice & Co., Philadelphia, Pa., represented by Mr. Philip J. Mitchell, showed the "Reliance" hydraulic jacks.

Some Conventionalities

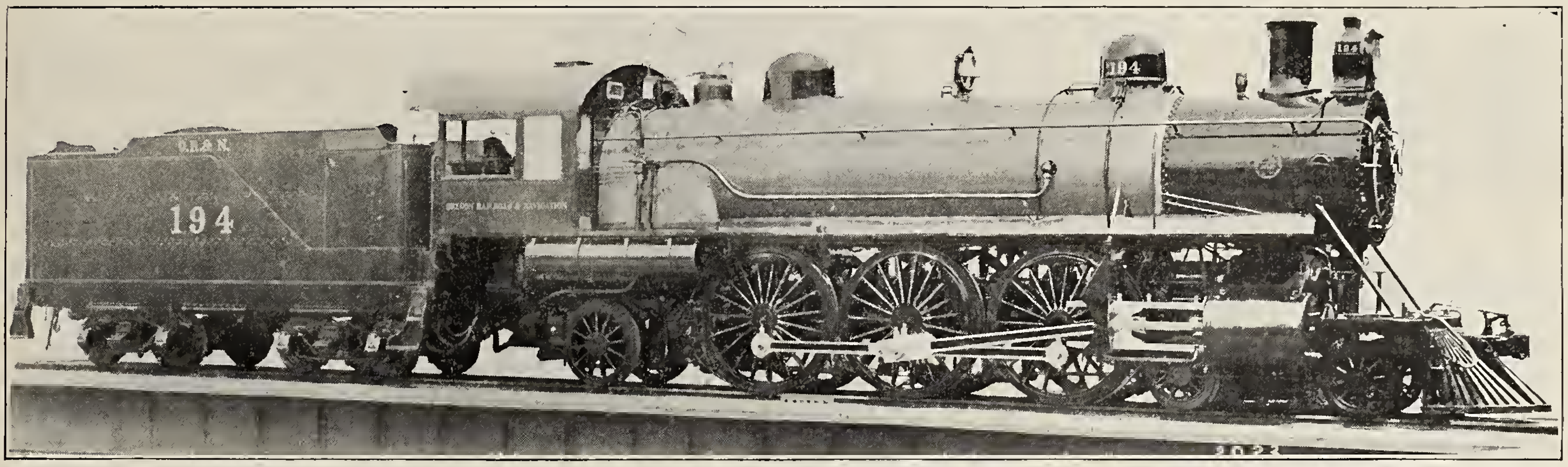
Genial J. C. Barber, president of the Standard Car Truck Company (and may his rotundity never grow less), received the shock of his life while entertaining his estimable wife and some friends in that princely style peculiarly his own, and which has earned for him a fame as broad as this continent. It happened about 11 p. m. on the piazza of the Manhattan Beach hotel (to be exact it was 10:57), when the garcon made a muff of opening some Pommery sec and deluged the ladies with the choice fizz. If there is anything that J. C. can't abide, it is the work of an amateur on "ce vin qui deverse l'esprit et la gaite."

One of the most beautiful exhibitions of devotion was seen at the automobile stand at the entrance to the Oriental grounds. A girl and her escort had returned from a ride, and on alighting, the lady's tan oxfords shipped sand enough to get her over a mountain division on a wet rail. The party were visitors, and not stopping at the house, but sand had to come out, and was all expelled only by the removal of the shoes and hard work on the part of the swain.

Did you see happy John Chamberlain? He was there, of course, but it was said his umbrella was engaged for a parachute act for the season at Coney. The turn done by "Jack" at this convention was just as full of clean fun as any of his previous surprises. That toy straw hat worn under his regulation head gear, would insure an engagement in continuous vaudeville if the wearer ever wants to leave car building for the footlights.

Four-Cylinder Balanced Compound---Oregon Railroad & Navigation Company.

THE latest creation in four-cylinder balance compound engines is that built for the Oregon Railroad & Navigation Company by the Baldwin Locomotive Works, and on exhibit at the Railway Master Mechanics' Convention at Manhattan Beach. This engine has some points of construction differing quite materially from other engines of the same wheel arrangement. While the inside and outside cranks at each side are set at 180 degrees, the cranked axle is at the middle pair of wheels, and the inside main rods span the forward axle to connect with the crossheads of the high pressure cylinders, these crossheads working in four-bar guides, while the low-pressure crossheads work in alligator guides.



FOUR CYLINDER BALANCED COMPOUND—OREGON RAILROAD & NAVIGATION CO.

The construction of the inside main rods is in the form of a yoke with an opening longtiudinally, equal to the stroke plus clearance, and also sufficiently deep for the vibratory action of the rod to clear the axle. These rods are forged out of the solid; the detail of them explains the construction very clearly, and shows the means taken to keep the weight within bounds. The outside main rods are of the usual I-section design, and also couple with middle pair of wheels.

Placing the eccentrics on the rear driving axle has been a feature of some Atlantic design engines, but in that case the rear axle was one of the main driving axles. In this instance both main rods are connected to the central axle, also forcing the location of the eccentrics on the rear axle, making a long valve rod, which is supported in two guides, one of which is at the waist plate and the other at the guide yoke bracket. The object aimed at, however, to produce a four-cylinder balanced compound with six coupled drivers, is attained on lines strictly original, and will be sure to attract the attention of all interested in the development of this type of machine.

The starting power of this engine is 28,250 pounds, which gives an adhesion coefficient of five, a factor that indicates the ability of the engine to exert maximum drawbar pull under all conditions of weather and grade. The liberal water space of five inches at the mud ring, and the bridge of seven-eighths of an inch between flues, betokens care in the matter of circulation. General points of interest will be found in the descriptive data presented below:

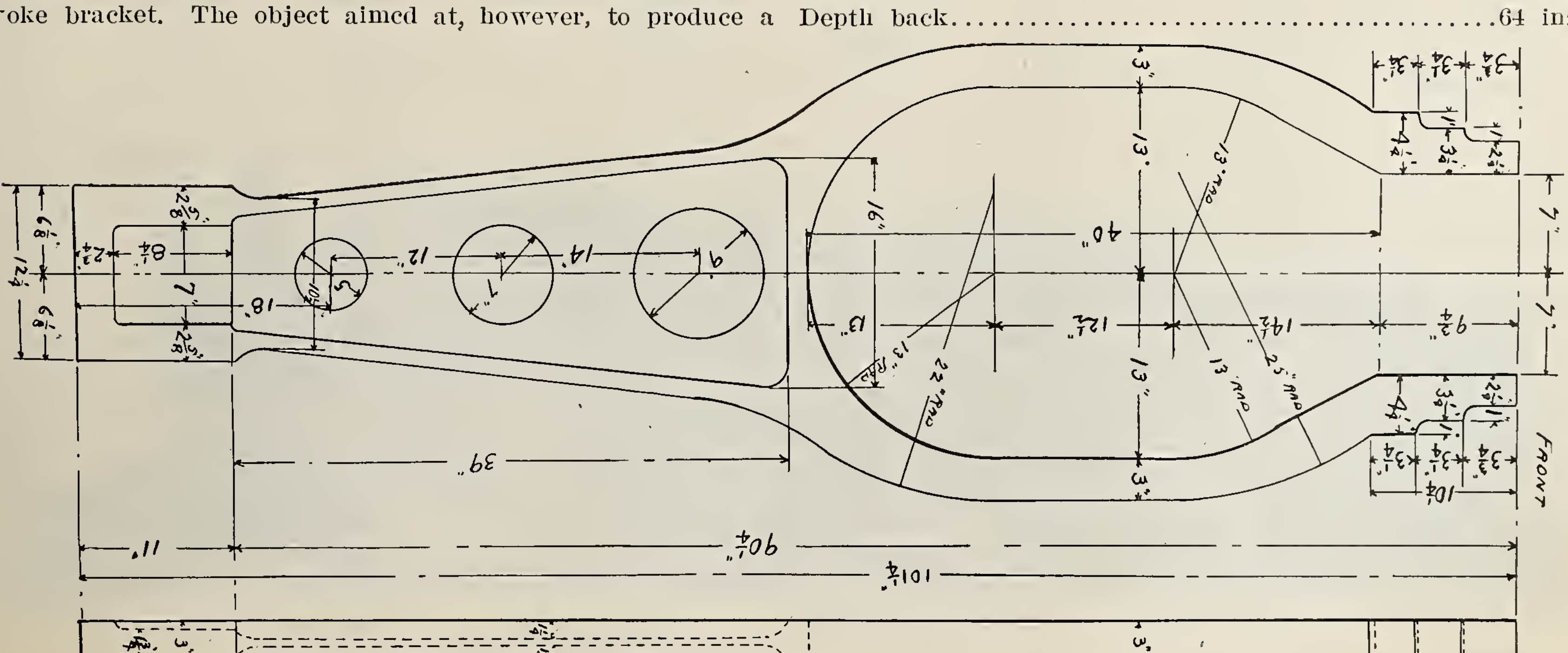
Gauge	4 ft. 8½ ins.
Cylinder	17 and 28x28 ins.
Valve	Balanced Piston

Boiler.

Type	Straight
Material	Steel
Diameter	70 ins.
Thickness of sheets	11-16 ins.
Working pressure	200 lbs.
Fuel	Coal
Staying	Crown Bar

Firebox.

Material	Steel
Length	108 ins.
Width	66 ins.
Depth front	68 ins.
Depth back	64 ins.



DETAIL OF INSIDE ROD—O. R. & N. CO. LOCOMOTIVE.

Thickness of sheets, sides	3/8 in.
Thickness of sheets, back	3/8 in.
Thickness of sheets, crown	3/8 in.
Thickness of sheets, tube	1/2 in.
Water Space.	
Front	5 ins.
Sides	5 ins.
Back	5 ins.
Tubes.	
Material	Steel
Wire gauge	0.125 in. M. M.
Number	245
Diameter	2¼ in.
Length	20 ft.
Heating Surface.	
Firebox	179 sq. ft.
Tubes	2874 sq. ft.
Total	3053 sq. ft.
Grate area	49.5 sq. ft.
Driving Wheels.	
Diameter, outside tire	77 ins.
Diameter, inside tire	70 ins.
Journals, front	11x10 ins.
Journals, back	9x12 ins.
Engine Truck Wheels.	
Front, diameter	33½ ins.
Front journals	6x10 ins.
Back, diameter	45 ins.
Back, journals	8x12 ins.
Wheel Base.	
Driving	13 ft. 4 ins.
Rigid	13 ft. 4 ins.
Total engine	33 ft. 7 ins.
Total engine and tender	64 ft. 1½ ins.
Weight.	
On driving wheels, estimated	143,600 lbs.
On truck, front, estimated	43,400 lbs.
On truck, back, estimated	44,300 lbs.
Total engine, estimated	231,300 lbs.
Total engine and tender, estimated	393,000 lbs.
Tender.	
Wheels, number	8
Wheels, diameter	33½ ins.
Journals	5½x10 ins.
Tank capacity	9000 gals. water
Tank capacity	10 tons coal
Service	Passenger.

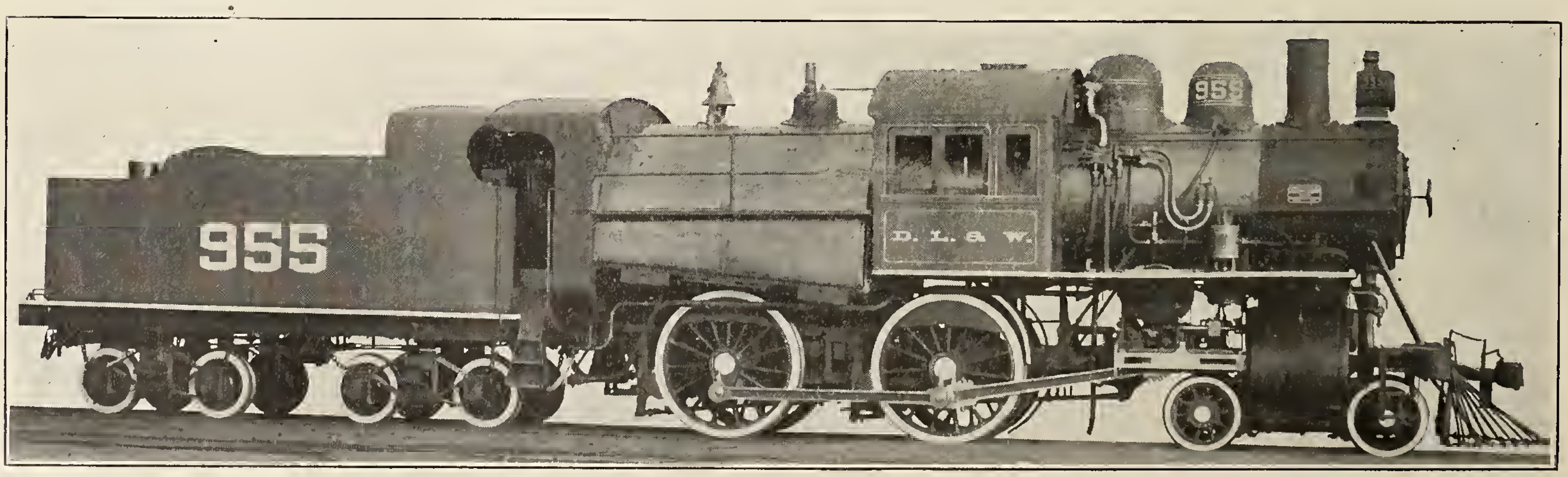
Eight-Wheel Passenger Engine with Superheater, D. L. & W. R. R.

OUR illustration of an eight wheel engine represents an order of two anthracite culm burners built for the Lackawanna road at the Schenectady works of the American Locomotive Company. They are simple engines and of a type that has made a gallant fight to retain its well-earned prestige, against the encroachment of newer designs of machines which the increasing weight and speed of passenger trains made an absolute necessity. The eight-wheel engine has always been a popular one on the Delaware, Lackawanna & Western for their passenger service, and its displacement by the heavier power of other types has been slow in consequence, for certain classes of service. These engines weigh 100,000 and 101,000 lbs., respectively, on drivers, and can exert a starting pull of 23,700 lbs., the coefficient of adhesion being 4.22. This weight on drivers gives a journal load of 25,000 lbs., which while not an excessive weight, makes a heavy machine of the American type, and is some 8,000 lbs. heavier on drivers than the efficient eight wheelers built for this road by the American Locomotive Co. about three years ago.

The Schenectady superheater is applied to only one of these engines, they being duplicates, however, in all other particulars; the interest in superheating having extended to this road, one of these engines has been selected to demonstrate its saving over saturated steam, like conditions and type of machine making a most favorable opportunity to get comparative data. The standards of the road have been closely adhered to in these machines, among which may be

COMPARISON OF D., L. & W. EIGHT-WHEELERS WITH ATLANTIC TYPE ENGINES.

Type and Build.	Road.	When Built.	Cylinders.	Driver, dia.	Weight on Drivers.	Total Weight.	Tractive Power.
Eight-wheel Simple	D. L. & W.	1905	20x26	69	101,000	153,100	23,700
Atlantic Cole Bal. Comp.	N. Y. C.	1904	12½x26x26	79	110,000	200,000	24,000
Atlantic Bald. Bal. Comp.	C., B. & Q.	1904	15 x25x26	78	100,000	192,000	21,400
Atlantic Baldwin Comp.	Sou. Pac.	1903	15 x25x28	79	102,200	200,000	21,700
Atlantic Bald. Simple	C. & A.	1903	20x28	80	103,700	183,800	23,800
Atlantic Am. L. Co. Simple	Penn.	1903	20½x26	80	115,500	182,000	23,800



EIGHT WHEEL PASSENGER ENGINE WITH SUPERHEATER, D. L. & W. R. R.

mentioned the throttle connection through the side of the dome by a bell-crank; the injectors located outside of cab and their symmetrical pipe connections, also the Scotch yoke on the valve stem, and the bracket guide for the end of the valve rods which actuate piston valves.

These engines are, as intimated, heavy ones of their kind, and are powered equal to many of the Atlantic typé engines built within two years past. A few comparative figures are given herewith showing the relative weight and tractive power between the latter machines and these engines. The exhibit is interesting in showing what is possible in reducing total weight when the firebox is placed above drivers, as can be done with anthracite burning engines.

The following descriptive data explains points of interest concerning the eight wheelers in addition to those embodied in the table.

Cylinder, type ......Simple piston, diam. 20 in., stroke 26 in.
Track gauge..........4 ft. 8½ in., tractive power 23,710 lbs.
Wheel base, driving.8 ft. 6 in., rigid 8 ft. 6 in., total 24 ft. 5 in.
Wheel base, total, engine and tender............51 ft. ⅝ in.
First engine, weight in working order..................
......................151,200 lbs., on drivers 100,000 lbs.
Second weight in working order.......................
.....................153,100 lbs., on drivers 101,000 lbs.
First engine weight, in working order, engine and tender.
.... 261,200 lbs.
Second engine, weight, in working order, engine and tender ....263,800 lbs.
Heating surface, tubes ....
...........1st eng. 1,947.89 sq. ft., 2d eng. 1,635.56 sq. ft.
Heating surface, firebox................................
...............1st eng. 190.8 sq. ft., 2d eng. 191.54 sq. ft.
Heating surface, total ....
..........1st eng. 2,138.69 sq. ft., 2d eng. 1,827.10 sq. ft.
Grate area..........1st eng. 87.54 sq. ft., 2d eng. 87.54 sq. ft.
Axles, driving journals.main 9 in. x 13 in., others 9 in. x 13 in.
Axles, engine truck journals......diam. 6½ in., length 12 in.
Axles, tender truck journals...............diam. 5 in. x 9 in.
Boiler, type..........Straight top, O. D. first ring 61 3-16 in.
Boiler, working pressure...185 lbs., fuel, coal, fine anthracite
Firebox, type.Wide Wooten, length 126 3-16 in., width 100 in.
Firebox, thickness of crown...........................
..............⅜ in., tube 9-16 in., sides ⅜ in., back ⅜ in.
Firebox, water space.......front 4 in., sides 4 in., back 4 in.
Crown staying ....Radial
Tubes, material..char. iron
....No. 1st eng. 280, diam 2 in., 2d eng. 152, diam. 3 in.
Tubes, length......1st eng. 13 ft. 4½ in. gauge. 12 BWG.
..................2d eng. 13 ft., gauge 10 and 12 BWG.
Boxes, driving, main......................C. S., others C. S.
Brake, driver..................West.-Amer. high speed,
..........................truck West.-Amer. high speed
Brake, tender....West.-Amer. high speed, air signal West.-J.
Brake, pump................9½ in. RH., reservoir 26½x50 in.
Engine truck...................4-wheel swing center bearing
Exhaust pipe ....double nozzles 3¼, 3⅜, 3½
Grate, style .... Rocking
Piston, rod diam...............3½, piston packing C. I. rings
Smoke stack................diam. 18 in., top above rail 15 ft.
Tender frame...............10 in. steel channels and plates
Tank, style ....U shape
Tank, capacity ....5,000 gallons
Tank, capacity fuel........ ....10 tons
Valves, type......Piston 12 in., travel 5½ in., steam lap 1 in.
Valves, clearance ....1-16 in.
Setting—1-16 in. lead in full gear ford. and shift back up
......ecc. to give ¼ in. lead at 6 in. cut-off ford. motion
Wheels, driv. diam. outside tire..69 in., centers diam. 62 in.
Wheels, driv., material, main..............C. S., others C. S.
Wheels, engine truck, diam..33 in., kind Nat. No. 3 C. I. spoke
Wheels, tender truck, diam..33 in., kind Boies No. 2 W. I. disc

Increased Repair Capacity on the Erie

THE extent to which improvements have been projected looking to increased facilities for handling work on the Erie road, is far-reaching and so thorough as to place the shops on a plane of efficiency well suited to the needs of the road. To accomplish this end, the smaller plants have been looked after and expanded by means of additional repair space and an increased tool installation. These improvements are the result of intelligent study of the conditions governing the question of motive power maintenance by the heads of the departments responsible for the work. The amounts appropriated for tools, and the points to which they are accredited, also the present and proposed capacity of the plants after the improvements now under way are consummated, are given in the statement below:

Improvements in Erie Repair Shops.

Shops.	Cost of Tools.	Capacity Per Month. Old.	New.	General Repairs. Increase.
Hammond...........	$ 5,000			
Huntington.........	46,000	5	10	5
Marion.............	5,500			
Galion..............	34,000	4	9	5
Kent...............	5,500			
Cleveland...........	40,000	5	10	5
Meadville...........	79,679	20	25	5
Salamanca..........	5,500			
Rochester...........	7,260			
Bradford...........	5,500			
Buffalo.............	30,000	1	4	3
Hornellsville........	145,225	10	25	15
Dunmore...........	30,085	4	6	2
Susquehanna.........		23	23	0
Stroudsburg.........	13,400	5	7	2
Port Jervis..........	11,670			
Bergen..............	6,500			
Jersey City.........	.	8	8	0
Total...........	$470,819	85	127	42

The tools contemplated in the above expenditure embrace lathes, planers, boring and turning mills, slotters, shapers, cranes, punches and shears, drill presses, steam hammers, emery grinders, milling machines, tinsmiths' appliances, pneumatic tools, tube welding machines, ball bearing jacks, bolt furnaces, heading and forging machines, bolt cutters, air compressors, shafting, pulleys and hangers, stationary engines and equipment for blacksmith shop. This list of tools comprises the best of improved modern patterns of the respective kinds, designed for the use of high speed tool steels.

By the table it will be seen that the new capacity is equal to a total of 127 engines per month for general repairs, which is an increase of 42 engines more than under the old rating. When the new order is in operation, the shops will be in a position to comfortably handle the road's equipment of 1,130 engines. The policy of the Erie would seem to be to continue their established custom of spreading the work over several points, which is somewhat at variance with the trend of shop practice as developed in the more recent plants, which are designed on lines of such magnitude as to be able to handle all heavy repairs for the system. The fact that in addition to the expenditures noted, there are to be five new engine houses and other new structures built, six 80-foot turntables, besides the installation of the Sturtevant heating system in several of the engine houses, also the fifteen-ton coaling cranes to be located at eight important points on the line, would suggest that the present amplification of the old system was the correct solution, for the conditions existing on the Erie.

Electric Locomotive and Train--On Test Track Near Schenectady, N. Y.

A FEATURE of special interest to the visiting delegates of the International Railway Congress at Schenectady, on May 26, was the trial runs of one of the electric locomotives built for the New York Central, provided for their entertainment by the local reception committee, under the auspices of the American Railway Association, among whom were the following gentlemen: From the American Locomotive Co. A. J. Pitkin, J. E. Sague and Jas. McNaughton. From the New York Central, Geo. H. Daniels. From the General Electric Co., E. W. Rice, Jr., W. B. Potter, G. E. Emmons, A. W. Burchard and G. de B. Greene. This committee was further augmented by other officials from both companies, among whom were, R. J. Gross and J. D. Sawyer of the American Locomotive Co.; W. J. Clark, A. L. Rohrer, W. B. Schlicter and F. H. Gale of the General Electric Co.; also F. A. Currie and F. A. Kingsbury of the New York Central. The train was in charge of F. A. Harrington, Gen. Supt., and through the courtesy of W. J. Wilgus, fifth vice-president, and E. B. Katte, electrical engineer, all of the New York Central, arrangements had been made for a full exhibition of the operation of the electric locomotive.

Arriving at the trial track, the electric locomotive was coupled on to the special train bearing the visitors. Under electric power, the train then made several trips over the six-mile track equipped with the third rail—the scene of the high-speed exploits of these engines—and the delegates were given ample opportunity to note the operation of the electric engine at high speeds. No attempt was made to smash records, but the instruments recorded over sixty miles an hour at different times during the run. The train was then stopped and the delegates given an opportunity to examine the locomotive. All were impressed with the admirable performance of the machine, in point of smooth action and absence of din and jar. Comparison of these features with the steam machine were easy to make, as regular trains were passing while the delegates were noting the performance of the electric engine at over sixty miles an hour.

The party were next taken to the works of the General Electric Co., where the time was spent in visiting the principal departments of the works, the greatest interest being manifested by the visitors in the immense shops in which are manufactured the Curtis steam turbines. After a thorough inspection of the plant, followed by a lunch in the company's restaurant, the delegates boarded their special train. Our half-tone shows a part of the delegates watching the electric engine bringing the train to a stop after one of the fast runs.

Personals

Mr. Gray W. Johnson has been appointed electrical engineer of the Southern, with headquarters at Washington, D. C.

Mr. E. Damson has been appointed master mechanic of the El Paso & Northeastern.

Mr. H. R. Gray has been appointed master mechanic of the St. Louis & San Francisco.

Mr. W. P. Page has been appointed master mechanic of the Pennsylvania Railroad at Camden, N. J., in place of Mr. Rufus Hill, resigned.

Mr. Nick Bowers has been appointed foreman and Mr. John McGowan has been appointed assistant foreman of the shops of the Manistee & Grand Rapids at Filer City, Mich.

Mr. A. M. Phelan has been appointed master mechanic of the Spokane Falls & Northern, with headquarters at Northport, Wash., to succeed Mr. A. Nugent, resigned, effective on June 10.

Mr. George W. Kohler has been appointed road foreman of the locomotive department of the Chicago, Burlington & Quincy at St. Joseph, Mo., in place of Mr. Charles Hoffman, resigned.

Mr. William Birchill has been appointed general foreman of the Detroit, Toledo & Iron at Ironton, Ohio, in place of Mr. C. K. Smith, resigned.

Mr. J. F. Robinson, acting master mechanic of the Seaboard Air Line at Savannah, Ga., has been appointed master mechanic, in charge of the shops at Savannah and Americus, Ga.

Mr. A. L. Moler, late master mechanic of the Chicago, Cincinnati & Louisville, has accepted the position of traveling engineer for the Locomotive Appliance Company of Chicago.

Mr. W. F. Combs has been appointed master mechanic of the Macon, Dublin & Savannah, with headquarters at Macon, Ga., succeeding Mr. F. R. Cooper, resigned.

Mr. J. H. Dacey, division master mechanic of the Chicago, Burlington & Quincy at St. Joseph, Mo., has been appointed division master mechanic of the Wabash at St. Joesph, to succeed Mr. S. W. Mudd, resigned.

Mr. R. W. Burnett, assistant master car builder of the Erie, has been appointed master car builder of that road with headquarters at Meadville, Pa., to succeed Mr. R. Gunn, assigned to other business.

Mr. Charles Hoffman, heretofore road foreman of the locomotive shops of the Chicago, Burlington & Quincy at St. Joseph, Mo., has been appointed master mechanic of the St. Louis-Louisville lines of the Southern at Princeton, Ind.

Mr. R. D. Hawkins, heretofore mechanical engineer of the Great Northern, has been appointed general master mechanic of the Minot, Dakota and Montana divisions and the Montana Central Railway, with headquarters at Minot, N. D.

Mr. Thomas Paxton, heretofore master mechanic of the El

Electric Locomotive and Train on Test Track.

Paso & Southwestern Railroad, has been appointed superintendent of motive power of that road and of the El Paso Northeastern System, effective on May 26. Headquarters, El Paso, Texas.

Mr. A. L. Moler has resigned as master mechanic of the Chicago, Cincinnati & Louisville at Peru, Ind., and Mr. George Dickson, general foreman, is temporarily filling the position of master mechanic.

Mr. W. J. Thomas, who resigned in January, 1904, as master mechanic of the Cleveland, Cincinnati & St. Louis at Wabash, Ind., to become manager of the Sphinx Oil & Gas Company at Wabash, has been appointed master mechanic of the Panama Railroad.

Mr. J. O. Pattee, formerly superintendent of the locomotive and car departments of the Missouri Pacific, died at his home in St. Paul, Minn., on May 25 from the effect of injuries received in a fall.

Mr. George L. Wall has resigned as assistant engineer of motive power of the Pennsylvania Company at Fort Wayne, Ind., to accept the position of mechanical engineer of the Lima Locomotive & Machine Company, at Lima, O., taking effect on July 1.

Mr. A. C. Hinckley, heretofore master mechanic of the Northern and Southern divisions of the Cincinnati, Hamilton & Dayton at Lima, O., has been appointed master mechanic of the entire system, with headquarters at Lima. The position of superintendent of motive power, heretofore held by Mr. Fred Mertsheimer, has been abolished.

Mr. Fred Mertsheimer has resigned as superintendent of motive power of the Cincinnati, Hamilton & Dayton to accept a similar position with the Kansas City Southern. Mr. Mertsheimer succeeds Mr. W. E. Symons, who has been superintendent of machinery of the Kansas City Southern since August 15, 1904, and who was before that date mechanical superintendent of the Gulf, Colorado & Santa Fe. Mr. Mertsheimer was formerly superintendent of motive power and machinery of the Kansas City Southern and was afterward superintendent of motive power and car department of the Denver & Rio Grande until December, 1904, when he resigned to become superintendent of motive power of the Cincinnati, Hamilton & Dayton.

Mr. George Gibbs has been appointed chief engineer of electric traction of the Pennsylvania, New York & Long Island and the Pennsylvania, New Jersey & New York, the subsidiary corporations of the Pennsylvania Railroad, under which the tunnels under New York and the North and East rivers are being built. Mr. Gibbs was formerly for many years mechanical engineer of the Chicago, Milwaukee & St. Paul and left that road in July, 1897, to become consulting engineer for the Baldwin Locomotive Works. He was appointed consulting engineer of the company building the New York subway in December, 1901, and on June 1, 1902, was chosen vice-president of Westinghouse, Church, Kerr & Co.

Water Purification for Locomotives

The report of the committee of the Maintenance of Way Association on water purification as outlined presented three problems:

First.—Water softening methods and plans for various conditions.

Second.—Comparisons of the cost of installing and operating water softening plants; the benefits derived from their use.

Third.—The general conditions under which the installation of water softening plants would produce savings.

Although water softening by American railroads is in its infancy, yet the results obtained fully warrant the efforts that have been made, and the fact that more and more plants are being built every year by American railroads indicates that they realize the possibilities for saving, and they are not neglecting them.

The five American railroads that have gone into the matter most extensively in the West, where the water supplies are much worse than in the East, are the Santa Fe, the Northwestern, the Rock Island, the Southern Pacific and the Union Pacific, and in the East the most prominent roads using purifiers are the Pittsburg & Lake Erie, the B. & O., and the Vandalia.

On the Santa Fe Road the water softening plants are located in western Kansas and Colorado. As a result of a comparison between 1902 and 1904 the locomotive failures from leaks have decreased 74 per cent since the softening plants were installed, and the failures from foaming have not materially increased. The life of flues has been increased, so that a new set of flues lasts from 12 to 15 months; whereas before the water was treated they had to be renewed in from six to eight months. The number of new tubes issued by the Stores Department has decreased nearly 100,000 lineal feet. The cost of boiler repairs has also been reduced. The average cost of chemicals and labor at the Santa Fe plant is 2 per cent per 1,000 gallons of water softened, the cost ranging at different plants from .32 cents to 10.8 cents.

On the Chicago & Northwestern water softening plants are located in Iowa, Minnesota and Illinois. On the lines between the Mississippi and Missouri rivers, 352 miles, they have equipped 17 water softening plants. All locomotives running on this division are supplied with soft water, the other plants having a supply of natural soft water. After a year's service the cost of wages for boiler makers has been reduced 25.8 per cent, and the number of engine failures has dropped to a remarkable degree. The total failures due to leaky tubes, leaky fireboxes and leaky arch tubes, August, 1902, to June, 1903, was 583, and August, 1903, to June, 1904, only 120, showing a reduction of 79 per cent in boiler failures, with a greater mileage of engines. During the period the decrease in the amount of coal consumed per 100 train-miles was 4 per cent. The average cost of chemicals on the Northwestern is 1.8 per cent per 1,000 gallons, the cost ranging from .8 to 3.4 cents.

On the Chicago, Rock Island & Pacific Railway there are 15 water softening plants on the Kansas division, only a few of which have been operating more than six months, and they have not had time to collect statistics and data relating to them.

On the Southern Pacific the water softening plants are located in California. Some of them have been operating since 1896, and they now have ten new plants in course of construction. Their records show that during the last eight years the cost of boiler repairs has been decreased 50 per cent by the use of softened water. The average cost of chemicals was 4.4 cents per thousand gallons, ranging from 1.4 to 7 cents.

On the Union Pacific Railroad the water softening plants are located in Nebraska, Wyoming and Kansas. As a result of their use the average life of a set of tubes in locomotives has been increased from six months before water was softened to two and one-half years after. In freight service the life has been increased from one year before using softened water to two and one-half years with it. The gross tons per pound of coal has been increased 7½ per cent and the cost of repairing of locomotives monthly decreased 34 per cent as a result of the use of water softening plant. The average cost of chemicals on the Union Pacific is 1.3 cents per thousand gallons.

The committee summarizes the benefits from the water softening plant as follows:

Fewer boiler failures due to leaks; longer life of tubes and firebox sheets; reduced cost of labor for repairing and washing boilers; increased locomotive mileage between shoppings; increased ton-mile per pound of coal; decreased number of locomotives in service; shorter time required for locomotives to go over the road; less expense in cost of overtime and delay.

In regard to the necessity for water softening plants caused by the large locomotive, the committee says the large locomotive necessitates larger boilers and fireboxes and the use of an increased amount of water and fuel to furnish steam to operate them. The larger the amount of steam required the more water must be evaporated to produce it. During the generation of steam the solid impurities, such as the different salts of lime, magnesia, etc., that were dissolved in the water remain in the boiler and form scale; the more water evaporated, therefore, the greater the deposit of scale. It is for this reason that the quality of water used in boilers has become so important a question within the last few years. With locomotives hauling maximum tonnage and often 15 to 20 hours on the road the effect of bad water is more apparent, and the necessity of doing something to relieve this trouble becomes imperative. While the use of soda ash in an engine tank was fairly satisfactory for small locomotives doing limited service, with the larger locomotives it is found necessary to resort to some process of treatment by which the incrusting matter can be removed from hard water before it is allowed to enter the boiler. In general it may be said that if the water is corrosive it should be treated to remove the cause of corrosion. If it contains 15 grains per gallon of hardening solid matter in solution it will pay to soften it, no matter what this scale forming material consists of. If the water contains less than 15 grains per gallon of incrustation solids, consisting of sulphate of lime, it will pay to soften it. If it contains 50 grains per gallon of alkali salts and a large quantity of sulphate of lime and magnesia it will not pay to soften it, as the resulting softened water would doubtless cause foaming.

Mr. H. Stillman, engineer of tests of the Southern Pacific, says: "I have long taken the stand that the matter of water treatment can be overdone and that waters for locomotive boiler use cannot be properly treated when the total alkalies naturally contain and resultant exceed 30 grains per gallon. Railroad managers must learn to discriminate between what can be done and what cannot be done in the way of water treatment as well as the other items of their service. Better railroading can be done in the way of getting locomotives over roads with their trains with a hard rather than with a soft water where soluble alkalies are present in excess in either water. There is no reason why we should not do what we can and where we can in the way of chemical treatment of waters for locomotive use."

Dearborn Laboratories

The Dearborn Drug & Chemical Works of New York and Chicago, make a specialty of the treatment of boiler feed waters. This company have for the past 15 years been handling the water proposition in stationary plants for the prevention of scale and other troubles caused by feed waters in boilers, so that Dearborn feed water treatment prepared to suit the case has been universally adopted by the operators of stationary boilers all over the country.

This company have established offices in 20 of our principal cities in the United States, one in Havana and one in Honolulu, H. I.

About two years ago the company established their railroad department. The ability of the Dearborn Company to successfully handle the alkali waters of the West, containing, as they do, large quantities of sodium sulphate, carbonate and chloride, which cause great trouble with locomotives foaming and soon destroy the tubes on account of corrosion, pitting, etc., has been a great relief to railway operators. It is, of course, impossible by any method of precipitation to remove this alkali salts so that they must be treated in the boiler, and the Dearborn Company are making preparations, composed of organic extracts and wood fiber starches, properly proportioned, which when used in small quantities in the locomotive is claimed absolutely to prevent foaming and all corrosive action of these salts, so that engines using such treatment are able to do away with blowing off almost entirely, and the distance made between washouts is doubled and in some cases three or four times the milage can be successfully made without washout than was possible without the use of such treatment, while the life of the boiler tubes is greatly increased.

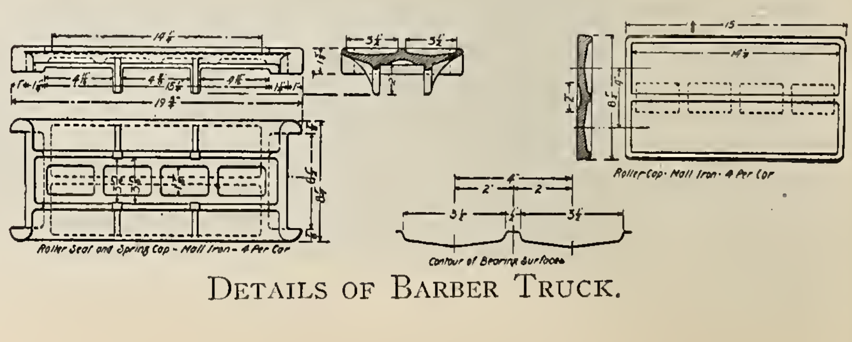
The Dearborn Company have been so successful in handling waters of this class that most of the larger systems west of the Missouri river have adopted the use of the preparations made by this company on their alkali districts, and such preparations also handle and prevent the formation of a limited amout of scale.

The general office and laboratories of the company are located in Chicago. Their equipment for testing work of all kinds is, perhaps, the most complete of any commercial laboratory in this country, and their policy of preparing special preparations to suit the analyses of waters has been the scientific basis upon which their successful results have been attained both on stationary, marine and locomotive work.

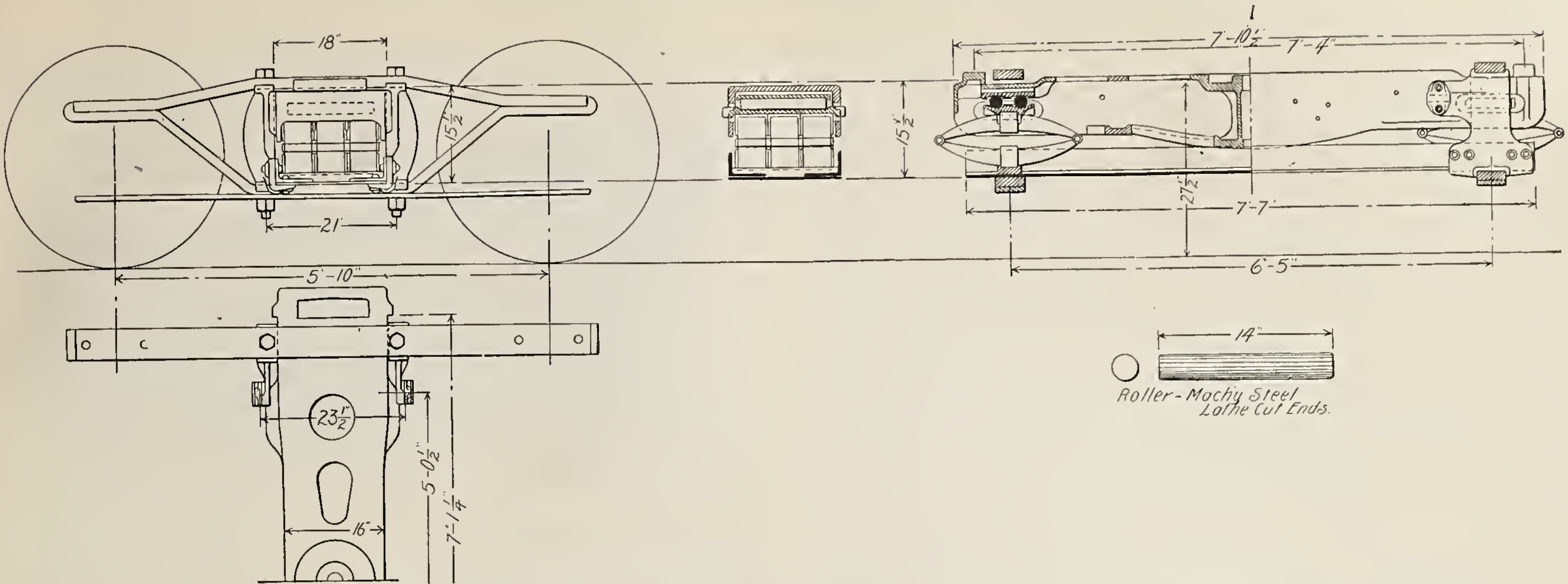
The officers of the company are: Wm. H. Edgar, president; Robert F. Carr, first vice-president and general manager; Wm. B. McVicker, second vice-president and Eastern manager; C. M. Eddy, secretary and treasurer; Robert W. Francis, directing engineer; Wm. A. Converse, directing chemist.

The Barber Roller Bearing Truck, 150,000 lbs. Capacity

Latest development of the Barber roller bearing truck for the increased weight of tenders and cars has resulted in the production of a truck that has proved equal to all requirements of the heaviest service. Our illustration of the new 150,000 lb. truck designed for C., B. & Q. tenders is a construction that embodies many points of excellence, including the Barber roller bearing, the latter principle being elaborated and improved. The malleable iron truck columns are designed with the view of furnishing the necessary rigidity at the arch, and this is accomplished by a distribution of material that gives the greatest strength with the minimum of weight. The lower flanges of these columns are widened so as to receive two rivets through the flanges of the spring plank angles—a construction that makes for safety against lateral stresses. The upper ends of the columns have an inside extension forming a bearing for the brake hangers. The width between columns is 18 inches, which lets in the triple elliptic springs and allows the use of 14 inch rollers. Cast steel bolsters are used in this truck, having a depression to receive the upper center plate. The spring plank—a misnomer now, by the way, since wood is no longer used, is formed by riveting a arch bars are 1¾ x 5 inch by ½ in steel angles. The top arch bars are 1¾ x 5 inch, bottom ½ x 5 inches and the tie strap is ⅞ x 5 inches. The dimensions of these members have proven the wisdom of their choice since they stand up to their work and maintain the initial rigidity of the truck.



DETAILS OF BARBER TRUCK.



The Barber Roller Bearing Truck, 150,000 Lbs. Capacity.

The journals are 5½ x 10 inches. The details of roller seats and spring caps, which are of malleable iron, shows the construction of the roller bearings, each pair of which have two machinery steel rollers, 2 inches in diameter by 14 inches long, with ends faced true. The seats and caps which bear on these rollers are made smooth and true, and the contour of the bearing surfaces is seen to be two inclined planes tangent to a curve of 1½ inches radius. This construction effectually prevents the formation of flat spots on the roller, since its central position is not a plane but a curve whose radius is slightly greater than that of the roller, thus forming a bearing of about ⅜ inch wide, instead of a point. This construction has been found practically perfect in making the truck sensitive on entering curves and taking tangents, and is therefore the culmination of the principle that the inventor has aimed at for the prevention of flange wear.

Duff Roller Bearing Screw Jacks

The Duff Manufacturing Company, Pittsburg, Pa., have placed on the market a new and complete line of roller bearing screw jacks offering twenty-five or more different sizes and have other sizes and designs in course of construction. These jacks have been constructed after a long period of careful designing and have been put to abnormal tests in order to prove their superiority over any style of jack ever placed on the market for heavy work. These tests have demonstrated that this new type of jack will involve a large saving in operating expenses and in time and labor as well, and it further developed that heavier loads could be lifted easier and with less wear than with any other jack of the anti-friction bearing type. It was demonstrated that the same load could be raised about 15 per cent easier with this jack than with other anti-friction screw jacks.

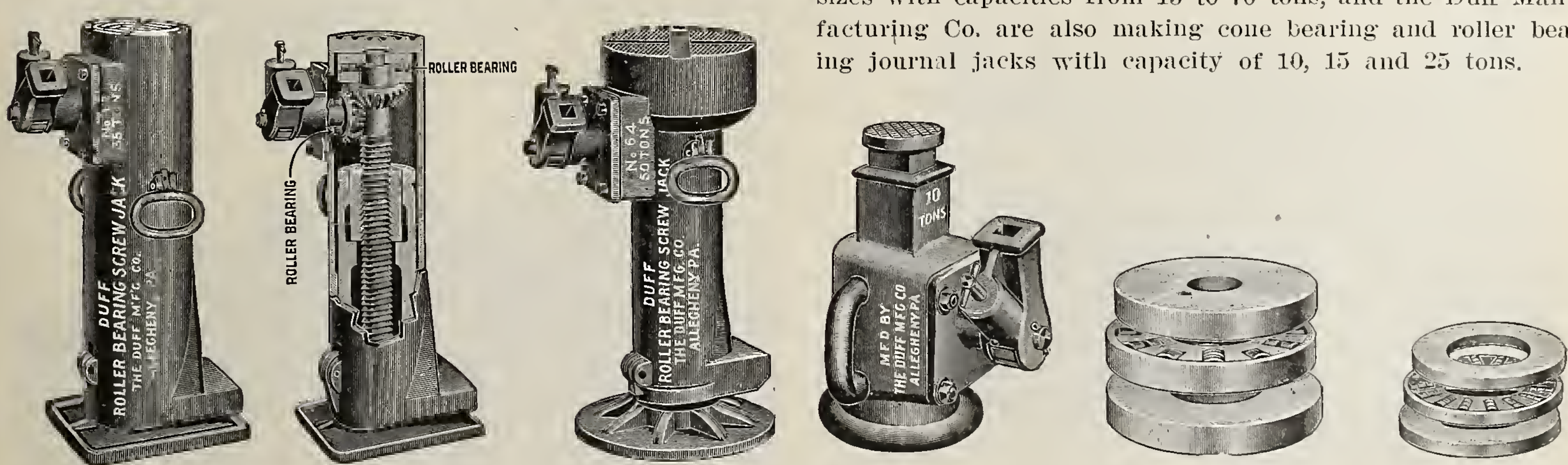
The design and construction are important features and it will be seen from the sectional cut herewith reproduced that it contains two roller bearings—one large or main bearing at the head, and another to take the thrust on the bevel pinion. This additional bearing is a valuable feature and is found only in the "Duff" jacks.

The main feature of any anti-friction jack, however, is the bearing itself. The roller bearing used is a patented bearing of special construction and one that is particularly valuable when applied to lifting jacks. It consists of two hardened ground tool steel plates with a cage between them carrying the hardened ground rolls. A cut of the two bearings employed is shown herewith. This form of bearing is the most durable, most reliable and the most economical that has ever been used in connection with lifting jacks.

It will stand heavier loads, is more simple and will wear better than ball-bearings, or any other form of roller-bearings, and the rolls will not crush or flatten and will not wear grooves in the hardened plates after continuous service, as is often found in anti-friction bearings. When the bearings are removed from the jack frame, they remain intact and do not separate and become hard to handle.

The ratchet is also of special construction and is simpler, more convenient and more reliable than the old style of ratchet, still used on many kinds of screw jacks. With the "Duff" ratchet the jack may be reversed easily and quickly, this operation being so simple that even the most unintelligent operator is able to understand the entire working at a glance.

These jacks cover a wide and an important field in the handling of railway equipment, in bridge work and in the way of wrecking purposes. They are manufactured in all sizes with capacities from 15 to 70 tons, and the Duff Manufacturing Co. are also making cone bearing and roller bearing journal jacks with capacity of 10, 15 and 25 tons.



Duff Roller Bearing and Car Inspector's Jacks.

Some features of these jacks are already patented and the "Duff" Company have other patents applied for, which will cover all features. They have already proven themselves superior to hydraulic or other types of anti-friction screw jacks. They are reliable, always ready for service, much cheaper in first cost and in cost of operation, and will give better and longer service than other jacks for heavy lifting.

The Duff Manufacturing Company have a reputation for their high standard of excellence in materials and workmanship and the "Barrett Jacks," manufactured exclusively by them, have been the world's standard for years for railway track and car work. The high standard of the Barrett jacks will be maintained in their new line of roller bearing screw jacks, which are displacing the unreliable hydraulic and other forms of anti-friction jacks which are expensive to maintain.

The Duff Manufacturing Company are the largest manufacturers of jacks in the world, and their works at Allegheny, Pa., have been greatly enlarged recently to accommodate the increased number of sizes of Barrett jacks and the special department devoted to the manufacture of roller bearing screw jacks. The engineering department is continually experimenting with new ideas and possibilities in the line, as well as improving and constantly adding to their already large line.

Truly, the motto of the Duff Company appears to be fulfilled—"Give me where I may stand and I will move the world." Certainly their product is known and is being used in nearly every corner of the world that boasts of even a semblance of a railroad.

The Falls Hollow Staybolt

At this time when the question of firebox maintenance is one of the live issues with motive power officers, the attention is naturally directed to that phase of the matter in which the item of cost and efficiency is centered, namely, the kind of staybolts used. Great claims are made for elasticity of different brands of staybolt iron, and such claims are no doubt honestly made from the results of a cold test, but such a test is not conclusive when compared to firebox conditions, since it is not a secret that heat impairs the strength of wrought iron; and right here is where comparisons of the hollow bolt with the solid variety is said to make good all claims of superiority of the hollow bolt over the solid bolt, for the fact that it is hollow modifies to a very great extent the elements that work to the destruction of other bolts, by the reduction of temperature due to the constant passage of air to the firebox; this air performing the double function of keeping the bolt below the critical temperature, and also aiding combustion by means of the never failing rush of oxygen through the hole in the bolt.

Another strong point is the unfailing detection of a broken bolt, by leakage into the perforation, giving a warning of staybolt failure that cannot be mistaken. In addition to this important advantage over all other bolts, is that of its ability to more successfully resist the expansive forces of the firebox than the rigid bolt, because of its flexibility. The makers claim for their iron that it is the only elastic staybolt iron in the world.

The Independent Pneumatic Tool Co.

The Independent Pneumatic Tool Company of Chicago, recently acquired the Aurora Automatic Machinery Company, of Aurora, Ill., builders of the Thor piston air drills, pneumatic riveting, chipping, calking, and beading hammers, piston air motor hoist, pneumatic saws and other air appliances. The general offices of the Independent Company are located at the First National Bank Bldg., Chicago, Ill., and the Eastern offices at 170 Broadway, New York city. The officers of same are as follows: Messrs. Jas. B. Brady, president; W. O. Jacquette, first vice-president; John D. Hurley, second vice-president; A. B. Holmes, secretary; C. E. Erikson, treasurer; A. Levedahl, mechanical superintendent. The board of directors consists of the following gentlemen: Messrs. James B. Brady, W. O. Jacquette, John P. Hopkins, John D. Hurley, Simon Florsheim, John M. Glenn, J. J. McCarthy, C. E. Erikson, Louis B. Dailey. Mr. Simon Florsheim is chairman of the board of directors.

Plant of the Independent Pneumatic Tool Co.

The accompanying illustration shows the works of this company at Aurora, Ill. It is equipped with the very latest improved machinery, and at present has a capacity of about 100 pneumatic tools a month.

The makers claim that the Thor pneumatic tools are in use in a large number of plants in all parts of the world, and are giving entire satisfaction.

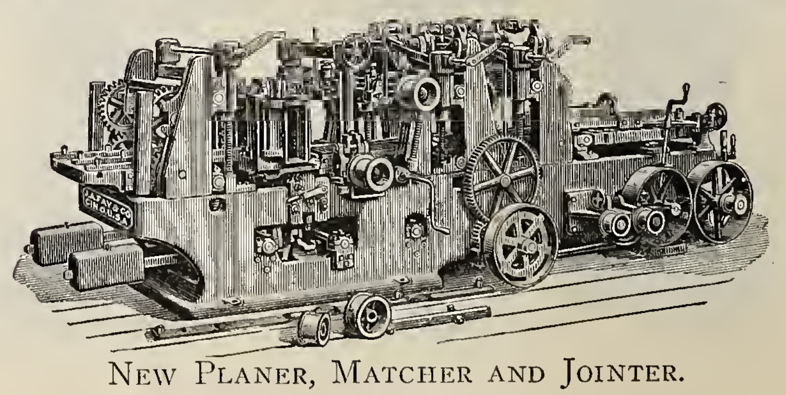
New Planer, Matcher and Jointer

We are pleased to illustrate a new and improved machine lately brought out by a large firm making wood working machinery, and is called a new No. 26, heavy six-roll double-cylinder planer, matcher and jointer, patented January 9th and March 20th, 1900. This is one of the largest and heaviest combined planers and matchers built, and is especially useful for car building and repair shops.

It will plane to 30 inches wide and 14 inches thick, and will work simultaneously three sides of two pieces of material of uneven thickness up to 12 inches wide and 14 inches thick. The frame is massive, perfectly jointed and bolted, to insure rigidity and freedom from vibration. The steel cylinders are slotted on all their faces and have chip breakers for working cross-grained or knotty lumber. The matching works is very substantial and of improved construction, and is fitted with a patent weighted matcher clip for producing an even pressure on the material.

The feed works are very powerful, consisting of six powerfully-driven rolls, easily raised and lowered, and are heavily weighted. The rolls are divided, have accurate adjustments and are always kept in true alignment. The feed is powerful, steady and uniform, and its rate can be furnished as desired.

This machine will be found to possess many other devices



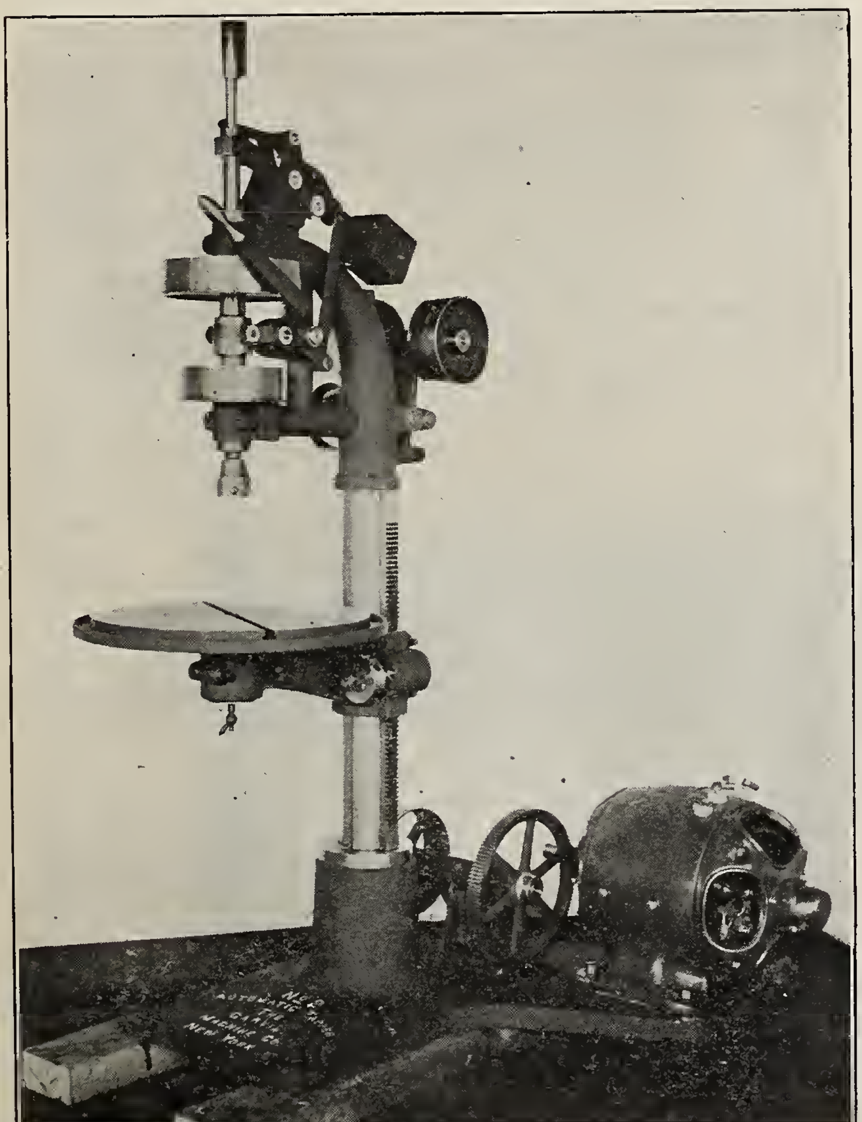
New Planer, Matcher and Jointer.

for facilitating the work and making the several adjustments, and if our readers are interested they can obtain further particulars, cuts and terms from the makers, J. A. Fay & Egan Co., No. 144 to 166 W. Front St., Cincinnati, Ohio, who will also send free those interested, who will write mentioning this paper, their new illustrated catalogue of wood working machinery.

Garvin Automatic Tapper with Electric Drive

ONE of the latest applications of the motor drive to machine tools is shown in our half-tone of the Automatic Tapper built by the Garvin Machine Co., of New York. This machine has a variable speed motor with a speed range of 900 to 18 revolutions per minute, geared down to drive the pully shown at the base of the machine, from which the belt goes to the spindle over idler pulleys. The variable speed of the motor serves the same purpose as a cone pulley, and no change gearing is therefore necessary. One belt is used to drive both forward and reverse pulleys on the spindle, this being accomplished by looping the belt around the idlers.

A bevel friction, which is operated by a toggle, works between the friction pulleys on the spindle. The spindle is operated by the lever at the side. The same movement throws in the friction clutch, and a latch holds it in operating position. As the spindle feeds down, an adjustable collar on the spindle trips the latch, and the friction clutch flies over into the reversing pulley. A feature of more than passing interest in the operation of this reverse is that it is independent of pressure on the lever. The friction can be adjusted very closely to suit the tap used, so that the friction will slip and avoid breaking the tap. No safety device is needed, as the automatic trip is unerring in its operation. The machine is designed so as to be arranged to operate by treadle, or with two heads mounted on one column.



Garvin Automatic Topper With Electric Drive.

Columbia Sander

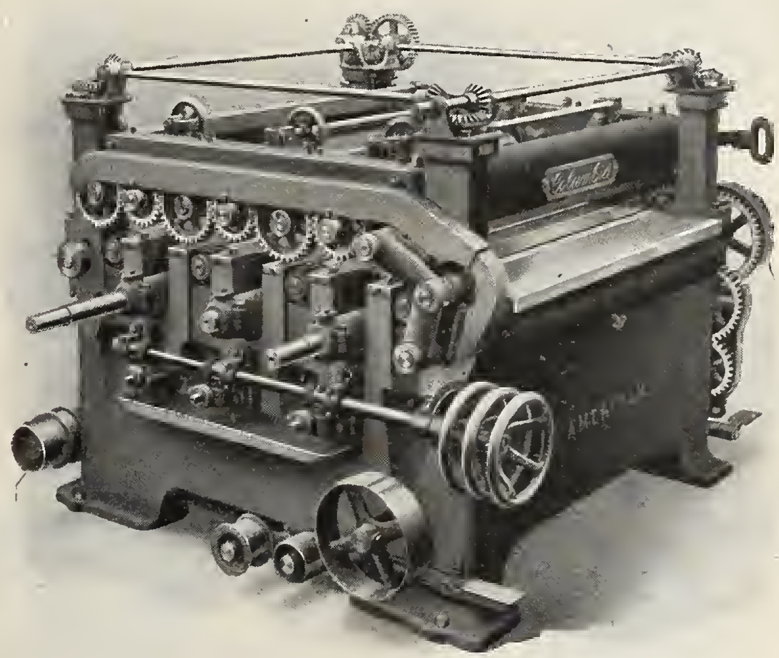
We present to our readers the accompanying views of the Columbia sander and its several important features which have made the machine so great a success.

One of the most important features of the Columbia sander is its patented device for keeping the paper on the drums at an even tension at all times. This mechanism is simple in construction and is absolutely automatic. An examination of the cross section of the machine will show the mechanism of the drums.

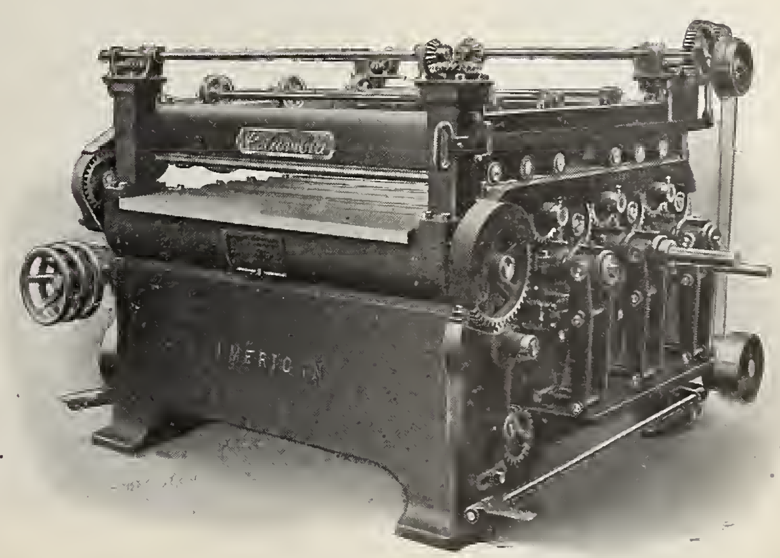
Another feature which will be noticed by examining the cross section cut is the absence of all internal mechanisms. Every attachment, every gear, and, in fact, every part of the machine is on the outside of the frame, within easy access of the operator.

One of the most delicate yet important organs of a sander is its oscillators. On the Columbia it is perfectly central and has a non-cramping arrangement of levers, which makes the lateral movement on a line with the axis of the shaft and follows with perfect freedom the raising and lowering of the cylinders for changing the cut. An examination of the cross sectional view (Fig. 2) of this oscillator shows the self-oiling boxes, the eccentric and strap, the three flexible joints, the collar on the shaft, as well as the outside collar, and a recess in the outside collar for taking up lost motion. The black lines between the collar and boxes represent the babbit washers which prevent any wear on the boxes and which can be easily renewed.

Another important feature is the raising and lowering of



Right Hand View.



Left Hand View.

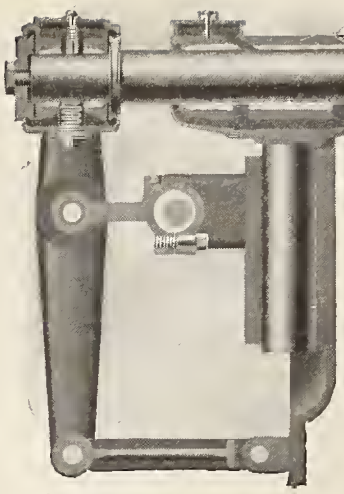


FIG. 2.

FIG. 6.

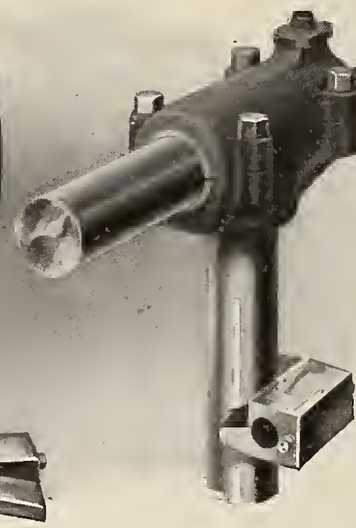


FIG. 7.

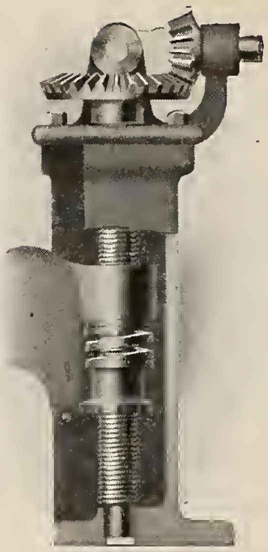


FIG. 8.

the cylinders. On the Columbia this is done by means of a wedge running in a diagonal slot, which holds the cylinders perfectly rigid. For a better conception as to their position in the machine, refer to the cross sectional view. This does away with all raising screws and nuts. Hence there is no lost motion.

Another important feature is the support for the upper feed works, which on the Columbia is accomplished by four large screws which have bearings at both the top and bottom. A second nut and coiled spring is provided to take up backlash in the screws.

Another important feature is the change of feed. The

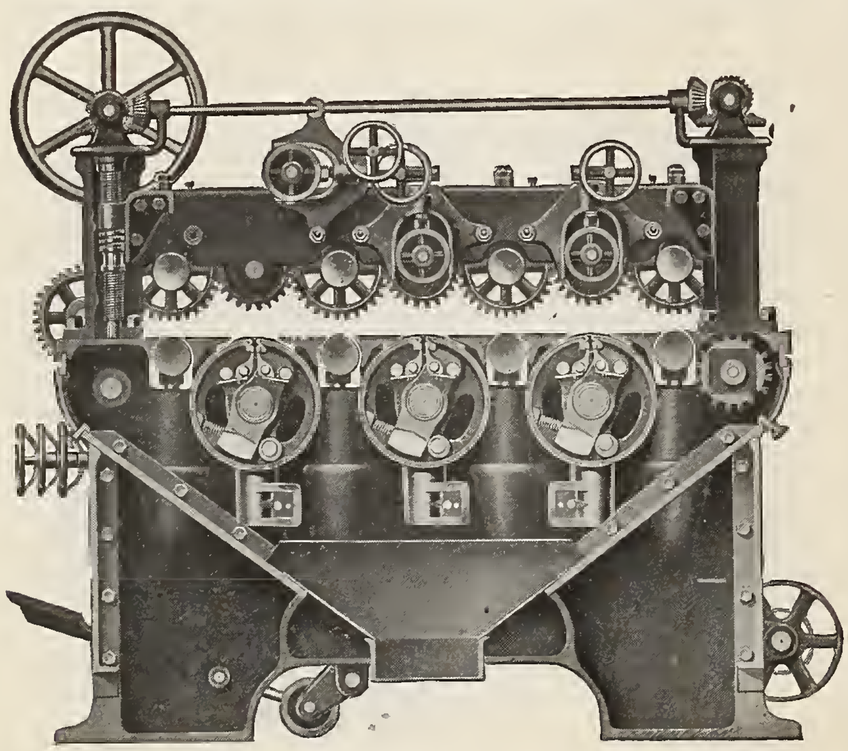


FIG. 11.

Columbia sander is the only one on the market which furnishes more than one rate of feed. This is accomplished by a change in the size of the feed gear. By referring to the right-hand view of the sander, you will notice a small exposed gear immediately above the step. This gear can be almost instantly removed and another one substituted in its place. There are four gears furnished, which allow a change in feed of from 12 to 21 feet per minute.

In addition to these features, the Columbia has also power hoist for raising the upper feed works and an instantaneous feed stop in case of accident.

To any of our readers interested in a sanding machine, we would request them to write the manufacturers and obtain a copy of their booklet, entitled "Success of the Columbia Sander." Address the American Wood Working Machinery Co., 136 Liberty street, New York City; 43-45 South Canal street, Chicago, Ill.; Hennen building, New Orleans, La.

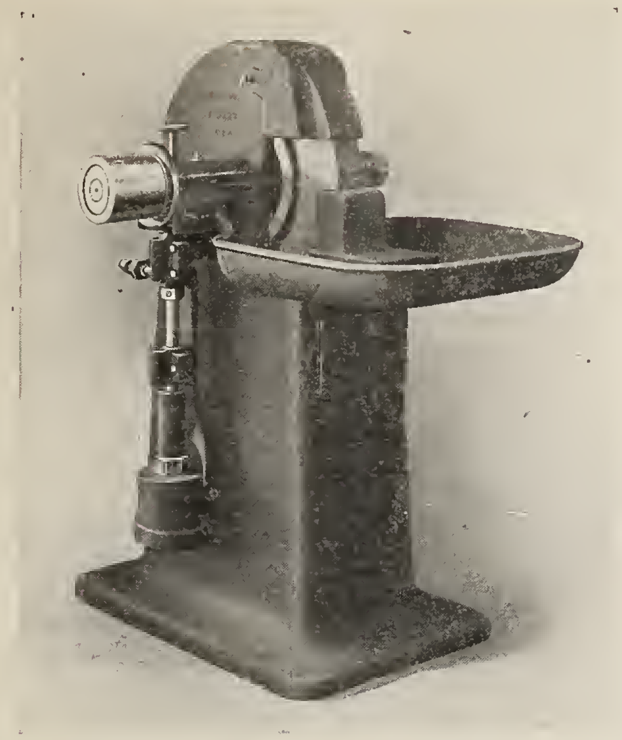
Bard Adjustable Bushing

The Bard adjustable bushing made by the Armstrong Manufacturing Company, of Bridgeport, Conn., has some new features which will recommend it at once to all users of bushings as well as the trade in general. This bushing is fitted with hardened jaws which are moved to and from center by means of a cam plate, and by fastening the plate with the thumb screw, the jaws are firmly held in any desired position. The adjustable jaws make a perfect center for the pipe or rod, fit closely around the same and insure the cutting of a straight thread. When necessary a crooked or drunken thread can be cut with this bushing as easily as with a ring bushing. When once attached to the die stock it can always remain there. It does away with the necessity of carrying a number of loose ring bushings, and saves the time now lost hunting for, and changing, the bushing for each size of pipe. This requires no more winding tin or paper around pipe or rod. This adjustable bushing can be furnished to fit the genuine Armstrong stocks and dies No. 1, No. 2, No. 2½ and No. 3.

A New Water Tool Grinder

The 20-inch water tool grinder illustrated herewith, is a machine that merits the attention of all who are interested in tool grinding, for the reason that it is a development of ideas on tool grinding facilities, by practical men, and therefore embodies in its make-up the points desirable in such a machine. It is heavy, for the purpose of avoiding vibration, has self-oiling bearings, and is clean at all times, being provided with a deep pan which conducts the surplus water back to the tank located in the column of the machine. The water is supplied to the wheel by a vertical centrifugal pump, the amount of water being regulated by the valve shown at the left. The pump is driven by a friction device which is in contact with the driving pulley, and running in self-oiling bearings located above the water line, these bearings being mounted upon a forked frame pivoted at the lower end, the upper end being secured between jaws having a spring by which the friction is forced against the driving pulley.

The centrifugal pump is of such a free fit that it cannot touch the case; the purpose of this construction being to furnish protection from sand or grit. A sleeve cap covers the pump case and prevents leakage, the water line always being below the top of sleeve. A pan is set below the wheel and extends from the front to the back of the column to prevent dirt from settling in the tank. The hood which covers the wheel is brought well forward from the center, and effectually prevents water reaching the main bearings, or flying on the floor. This attention to maintenance of dry surroundings about the machine will commend it to those who like a clean shop as well as an efficient tool. The ma-



A NEW WATER TOOL GRINDER.

chine is designed for a wheel 20 inches in diameter by 2½ inch face, with a 9 inch hole, and is made by J. G. Blount & Co., Everett, Mass., the well-known builders of metal working machinery.

Engine and Car Replacer

While there are a number of replacers on the market, those made by the Buda Foundry & Manufacturing Company of Chicago, and only recently offered to the railroad trade, apparently possess advantages that claim for them unusual recognition. There are several points of superiority that numerous tests to which the Buda replacers have been subjected, seem to have thoroughly demonstrated. One of the important features to which the manufacturers call special attention is the groove that protects the flange by allowing the tread of the wheel to first engage the replacer preparatory to mounting. This construction which makes it possible for the tread, and not the flange of the wheel, to first grip the replacer, is shown in the cut.

The increase in the friction thus secured, over what would be possible if the flange only were presented, is readily apparent, and the great force and shock to the equipment that is ordinarily made necessary is obviated and thus is avoided the injury which so often occurs to the flange, equipment or to the replacer while rerailing a car. Again, there is overcome the tendency to shove the replacers out of position, and also the spinning of wheels in the attempt to secure, on the flange alone, sufficient friction to start the ascent, especially in the case of very heavy equipment such as locomotives.

Another desirable point in the Buda replacer which has been effected, and one which will doubtless meet with considerable favor from the railroads, is the reduction of the pronounced and abrupt arch at the ends. Reference again to the illustration will show how thin the approach has been made, at the same time this method of construction has been accomplished without decreasing the strength required at the points mentioned. This being true, it would seem that a distinct advantage is gained here as elsewhere and the desirable provision for a gradual and easy ascent evidently has been successfully accomplished.

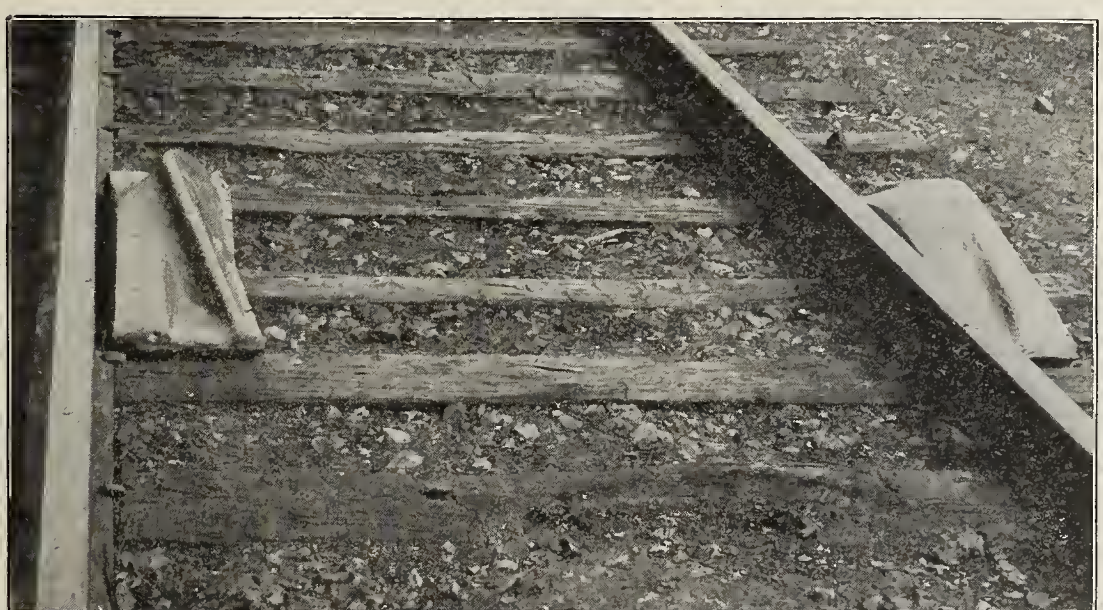
The inner replacer shows for itself more plainly than description how the wheel is forced toward the rail. Repeated experiments have shown that it is not possible for the wheel to travel over the top of the replacer and drop on the opposite side—the deflection has been proved positive and absolutely complete in each instance. During the entire rerailing operation there is no shock whatever and the resultant saving to the equipment, as well as the economy in the time required, leads the manufacturers to feel that they have a replacer which will meet with great success.

The demand for strength has also been met and tests made by the Hunt Bureau of Tests demonstrated that the Buda replacer will sustain a load more than two and one-half times as heavy as any locomotive now in use. This is accomplished by the proper distribution of metal and not by any undue amount. A cut is shown of the under side of a replacer which illustrates its construction. Convenient carrying handles are provided which are shown near the end. Another style has center handles. The replacers come in two sizes, the No. 1, for 60 pound rail, weighing 150 pounds a pair; the No. 2, for 100 pound rail, weighing 200 pounds a pair.

Twenty-Four Inch by Eight-Foot American Lathe

The accompanying illustration shows a 24 inch x 8 foot American lathe with motor drive through an all geared head, as manufactured by the American Tool Works Co., Cincinnati, O. This lathe is also equipped with special multiple tool rest for turning cone pulleys.

The motor is 9 h. p. direct current, variable speed (600 to 1,200 r. p. m.). It is easily started, stopped or reversed by



ENGINE AND CAR REPLACER.

the controller handle conveniently placed at the right end of the carriage. The large number of speeds obtained electrically supplement the fundamental speed changes obtained mechanically through the all geared head. This head is a remarkable, new mechanical speed changing device which provides four spindle speeds, the ratios of which are 32.5 to 1, 10.8 to 1, 4.31 to 1 and 1.44 to 1. On account of the high gear ratio and the wide face driving pulley, the enormous power of this device is evident, the lathe taking without evidence of distress, continuous cuts entirely beyond the pulling power of the ordinary lathe of much greater swing. Each mechanical speed is obtained instantly and easily while the machine is in operation, through the manipulation of the two levers on the front of the head, which in turn operate powerful positive clutches. The construction is simple, powerful and efficient, since only six gears are required in this device. They are coarse pitch, wide face and cut from the solid, and being arranged to run at very low pitch-line velocities, reduce to a minimum the noise incident to all gear drives. They are completely and neatly housed in with means of easy access to all working parts with means for thorough lubrication. There are no slip gears, pull pins, hollow shafts with their attendant weakness, no tumbler gears, no complicated, delicate or frail parts.

All shafts and spindles run in phosfor bronze boxes of liberal dimensions, which are provided with improved and effectual means of lubrication. The necessary adjustment for any desired speed can be determined readily by reference to a simple yet complete index plate on the front of the head.

In addition to the all geared speed changing device this lathe is equipped with the rapid change gear mechanism, providing a wide range of changes for feeding and screw cutting, each change being obtainable while the machine is in operation, without the removal of a single gear.

This lathe, though motor driven, may be arranged for belt drive by simply replacing the gear on the driving shaft with whatever size diameter pulley is desired. The regular carriage equipment consists of compound rest and full swing rest. The lathe is built for heaviest duty, and will utilize the greatest efficiency of the best high speed tool steels.

Award of Medals of Honor

Regulations Governing the Award of Life-Saving Medals Under Public Act Number 98, Approved February 23, 1905.

1. Applications for medals under this act should be addressed to and filed with the Interstate Commerce Commission, at the city of Washington, D. C. Satisfactory evidence of the facts upon which the application is based must be filed in each case. This evidence should be in form of affidavits made by eyewitnesses, of good repute and standing, testifying of their own knowledge. The opinion of witnesses that the person for whom an award is sought acted with extreme daring and endangered his life is not sufficient, but the affidavits must set forth the facts in detail, and show clearly in what manner and to what extent life was endangered and extreme daring exhibited. The railroad upon which the incident occurred, the date, time of day, condition of the weather, the names of all persons present when practicable, and other pertinent circumstances should be stated. The affidavits should be made before an officer duly authorized to administer oaths, and be accompanied by the certificate of some United States official of the district in which the affiants reside, such as a judge or clerk of United States court, district attorney, or postmaster, to the effect that the affiants are reputable and credible persons. If the affidavits are taken before an officer without an official seal, his official character must be certified by the proper officer of a court of record under the seal thereof.

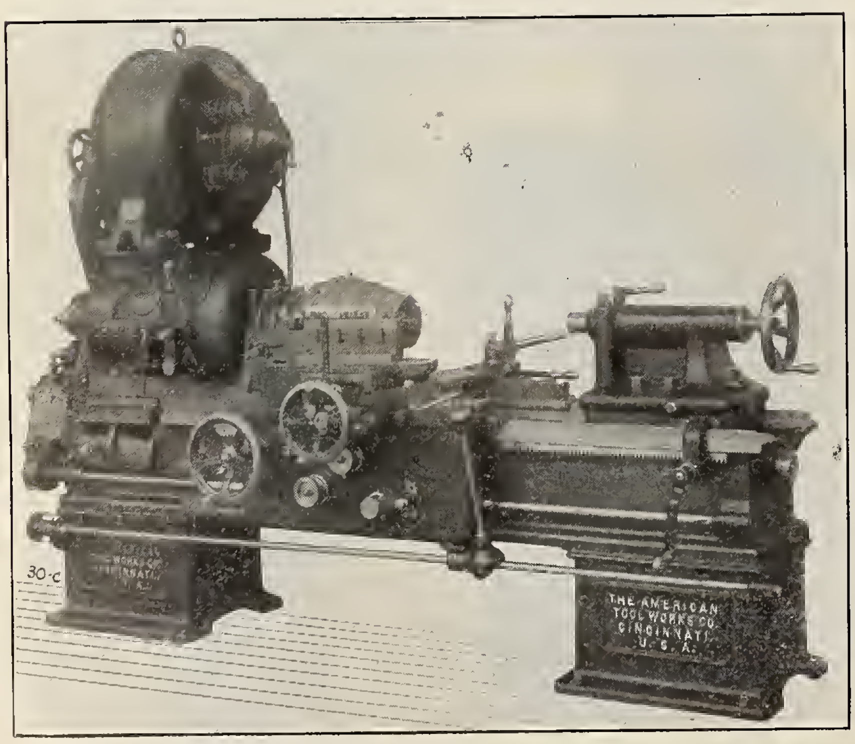
2. Applications for medals, together with all affidavits and other evidence received in connection therewith, shall be referred to a committee of five persons, consisting of the Secretary of the Commission, the chief inspector of safety appliances, two inspectors of safety appliances designated by the Commission, and the clerk of the safety-appliance examining board, who shall act as clerk of the committee. This committee shall carefully consider each application presented, and, after thoroughly weighing the evidence, shall prepare an abstract or brief covering the case, and file the same, together with the committee's recommendation, with the Commission, which brief and recommendation shall be transmitted by the Commission to the President for his approval. The committee may, with the approval of the Commission, direct any inspector of safety appliances in the employ of the Commission to proceed to the locality where the service was performed for which a medal is claimed, and make a personal investigation and report upon the facts of the case, which report shall be filed and made a part of the evidence considered by the committee.

3. Upon final approval of the committee's recommendation by the President the Commission shall take such measures to carry the recommendation into effect as the President may direct.

4. The Commission shall cause designs to be prepared for the medal, rosette, and ribbon provided for by the act, which designs shall be submitted to the President for his approval.

Theodore Roosevelt.

The White House, March 29, 1905.



Twenty-Four Inch by Eight Foot Awerican Lathe.

Notes of the Month

The Ashcroft Manufacturing Company, 87 Liberty St., New York, have just issued a catalogue of the Tabor Indicator. This describes the indicator in detail, bringing out all points that are essential in indicator design.

The Manufacturers' Advertising Bureau, 126 Liberty St., New York, issued the fifth addition of Advertising for Profit. This contains a large number of points of interest to advertisers.

Mr. Harry W. Toothe, manager railway department of the Magnolia Metal Company, New York, who has always been a hard committee worker at the conventions, was entirely free from cares this year, for the first time in fifteen years.

Mr. David Walter Pye, the popular young vice-president of the Safety Car Heating & Lighting Company, New York, was bound by the golden chains of matrimony to Miss Florence Belle Edgett, of Brooklyn, on the evening of June 14.

Mr. W. E. Farrell, for many years manager of the Birdsboro Steel Foundry & Machine Company, announces his having severed his connection with that company, to accept the vice-presidency of M. H. Treadwell & Co., of Myrestown and Lebanon, Pa. Mr. Farrell will be located at Lebanon, having charge of the plant at that place.

On June 25, 1905, the C. R. R. of N. J. opened a new ferry with terminal facilities at foot of West Twenty-third street, New York, in the heart of the shopping district. This line was opened when the Whitehall street ferry was closed, due to the city acquiring the property.

The American Brake Shoe & Foundry Company, 170 Broadway, New York distributed in pamphlet form an article on The Development of the Modern Brake Shoe, by F. W. Sargent, at the Manhattan convention. This has some very valuable information and all that failed to get a copy at the convention should endeavor to do so now.

Mr. Joseph M. Coale, inventor and treasurer of the Coale Muffler & Safety Valve Company, departed this life Friday, June 16, 1905, at Atlantic City, New Jersey, after two days' illness, in the seventy-sixth year of his age. He was connected with the Pennsylvania Railroad Company for more than fifty years.

Mr. Mord Roberts, for many years at the head of the motive power departments of promiment roads, has resigned his office of superintendent of machinery of the Kansas City Southern, and is now general manager of the Davis Expansion Boring Tool Company, St. Louis, where he can give full scope to his inventive afflatus without let or hindrance.

Mr. M. G. Coudon, of H. B. Underwood & Co., Philadelphia, Pa., sails on May 15 for Europe for the purpose of visiting the industrial and railway plants abroad and studying the machine tool question from that standpoint, and with the special object in view of introducing the portable tools of his company.

The Philadelphia & Reading Railway Co. will—in connection with the Central Railroad of New Jersey—operate dining car service between Philadelphia and New York, beginning Monday, June 12th, serving a la carte breakfast on the 7:00 and 8:00 a. m. trains each way; a la carte lunch on the 12:00 and 1:00 p. m. trains each way and table d'hote dinner at one dollar ($1.00) per capita on the 5:00 and 6:00 p. m. trains each way daily except Sunday.

Mr. A. L. Moler has been appointed traveling engineer for the Locomotive Appliance Company of Chicago. Mr. Moler was for some time with the Baldwin Locomotive Works in charge of the erecting department and also as master mechanic on the Cincinnati, Hamilton & Dayton, Queen & Crescent and Chicago & Alton, and superintendent of motive power of the Chicago, Cincinnati & Louisville, and is highly regarded by all who know him.

The Railway Age, while not looking for any floral offerings for its great work at the conventions, is entitled to, and will have, the hearty commendation of the members thereof, and also the devoted contingent of the technical press. A management that shows the masterly enterprise necessary to put out a daily issue at such sessions as the International Railway Congress at Washington, and the annual convocations of the M. M. and M. C. B. Associations has the stuff in it that makes for it a place at the top.

The Birdsboro Steel Foundry & Machine Company, of Birdsboro, Pa., announce their having opened an office at 718 Real Estate Building, Broad and Chestnut streets, Philadelphia, in charge of Mr. J. P. Warfel. Mr. Warfel has represented this company in this section for sometime, and has met with much success. Any inquiries addressed to the Philadelphia house will receive the same prompt attention as though directed to the home office at Birdsboro.

The first specifications for roofing issued by the Isthmian Canal Commission called for 3,000 squares of Paroid, or equal, and the order has been placed for this material. A similar amount of Neponset black building paper and and Neponset insulating paper was specified and ordered. The government has used many carloads of Paroid in the Philippines, Cuba and on work in this country, and the manufacturers, F. W. Bird & Son, East Walpole, Mass., are naturally proud of this latest endorsement of their products by the government.

The Grand Rapids & Indiana Railway, popularly known among those who go into the "Northern Country" as the "Fishing Line," is sending out some very interesting printed matter regarding the various summer resorts to which their line goes in northern Michigan. The little book regarding the Indian play "Hiawatha" is particularly interesting, describing as it does this Ojibway Indian drama which is being played during the summer at Ya-way-ga-mug Lake, near Petoskey, Mich. Any further information regarding rates, and etc., may be had by applying to Mr. C. L. Lockwood, general passenger agent of the road at Grand Rapids, Mich.

Mr. W. A. Stadelman, eastern agent of The Wellman-Seaver-Morgan Company, and who has been in charge of the eastern office at No. 42 Broadway, New York City, has been appointed general sales agent of the same company, with headquarters at Cleveland, O., taking effect July 1. Mr. Fred Stadelman has been appointed assistant manager of the New York office of The Wellman-Seaver-Morgan Company. Mr. Harry V. Croll, M. E., for the past eight years with the E. P. Allis Company, and their successors, Allis-Chalmers Company, of Chicago, has resigned and accepted a position with The Wellman-Seaver-Morgan Company, of Cleveland, O.

An important event in the machinery trade was the incorporation, on May 31, of Manning, Maxwell & Moore, Incorporation, composed of the well-known houses of Manning, Maxwell & Moore and its allied manufacturing companies, The Shaw Electric Crane Co., The Ashcroft Manufacturing Co., The Consolidated Safety Valve Co., The Hayden & Derby Manufacturing Co., The Hancock Inspirator Co., and the United Injector Co. The corporation was formed under the laws of the State of New Jersey, and is established on a basis which is unique among commercial enterprises of its kind, having a paid-up capital of five million dollars. There is but one kind of stock, known as common, non-assessable. The officers of the new concern are: Charles A. Moore, president; John N. Derby, vice-president; Martin Luscomb, vice-president; Stephen B. Aller, vice-president; Colby M. Chester, Jr., treasurer; J. H. Blue, assistant treasurer; Charles Arthur Moore, Jr., secretary, and Merle S. Clayton, assistant secretary. There is to be a board of fifteen directors, among which are some very prominent New York business men. The present directors are: Charles A. Moore, John N. Derby, Charles A. Moore, Jr., Colby M. Chester, Jr., J. Rogers Maxwell, Edmund C. Converse, Martin Luscomb, Stephen B. Aller, Alfred Brotherhood, Robert A. Bole, John G. Emery, Jr., James B. Brady, P. M. Brotherhood and A. J. Babcock. Business will be carried on at the home office of Manning, Maxwell & Moore, at 85, 87 and 89 Liberty street, New York, and through their branch offices in Boston, Philadelphia, Chicago, Cleveland, Pittsburg and St. Louis. The firm of Manning, Maxwell & Moore was established in 1881, composed of Henry S. Manning, Eugene L. Maxwell and Charles A. Moore. Mr. Maxwell died about ten years ago, and Mr. Moore recently purchased Mr. Manning's entire interest in the business. The firm was remarkably successful from its inception, and has grown to be the largest concern of its kind in this country if not in the world, while this combination just effected, with its ramifications and diversity of interests, is absolutely unparalleled in commercial history.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

The Paint-Spraying Issue

At our Advisory Committee meeting in New York, Feb. 28, the editor of these columns, as a member, submitted as a query the following: "How is 'the man behind the (air) gun' getting along?" The other members were afraid it would offend brother Quest, so we dropped it. Now he voluntarily speaks for himself in the following interesting article received May 24 which we hope to insert in the June issue, but if too late it will appear in July.

Editor, Railroad Paint Shop:

Sir:—As one of the fighting under-dogs on the paint-spraying issue in a perfectly legitimate craft scrap, we appreciate the fact that the several publications devoted wholly or partially to the painting trades are disposed to render up both sides of the story with the fair play rule that there shall be no "hitting under the belt" in the piling on. In this particular, was wish to credit the editors of the Railway Master Mechanic for the August, 1894, published free to all symposium article on the then much agitated issue, which we judged as being imparitally fair to both, "for and forninst." We also wish to credite the late April issue of The Paitners' Magazine, where columns devoted to the spicy exploiting of railway paint shop gossip contained two sharply contrasted paragraphs, the first of which being an extract from a late issue of the Railroad Gazette on railway industrial activity, especially referring to the fact that "the paint spraying machine has never been permitted to invade the freight painting de' partment of the Michigan Central Railroad at Detroit, Michigan;" also in same item, announcing the supposed death knell (so to speak) of the paint machine generally, but particularly to be so dead in Detroit territory as to be beyond all recall, quoting as reason therefor, as follows:—"The regular freight car painting is done with long handled brushes from the ground, and so rapidly and economically that there has never been any inducement to attempt spray work, which seems to be becoming a thing of the past." Now, Mr. Editor, in commenting on claims made for the long-handled brush application of paint, we will say that it is just possible we have never met with the expert brush class of labor that could set the pace for high grade paint atomizing machine, which to our personal knowledge and experience, has an average uniform coating capacity of something over 3,000 surface feet an hour in a ten hour run at satisfactory labor rates to all parties concerned.

The second paragraph styled "in sharp contrast to the above," is a rebuttal evidence of a fair-play spirit which we judge should please the painting world's fair-minded readers, in which the editor of those columns embodies the note of a friend of whom it is announced that when on a round of railway shop inspection, the circuit included the McKee's Rocks plant of the Pittsburg & Lake Erie Railroad Company, and is followed up with observation statement that "Brother Quest successfully sprays with a spraying machine all passenger car trucks with color and varnish and varnishes them by same process. Makes a good, clean job. Does the work right in the shop."

Now, Mr. Editor, in our ever friendly continuance and much criticised effort in holding down our title as the so-styled spraying machine crank of our Association, I wish to thank this fair-minded unprejudiced gentleman, whoever he may be. Also to express our regret at not being on the grounds in person in order that we might further demonstrate that we are washing all the goods we are hanging out on the public line in the way of made assertions.

In addition to his passenger car truck observation, we should have been pleased to have shown the gentleman our present atomizing machines at work on the successful blacking off of locomotive running parts, when under repairs in Company's new modernly constructed and maintained machine shops; also where in constant daily use on both in and out-of-door painting of the steel car and other classes of freight equipment where we atomize on a coat of paint to a satisfactory coated finish, with a positive material economy where such work is done under favorable conditions—the required conditions being just as much an essential to the successful working of a machine as it is to have favorable surrounding and skill in working the brush.

We should have been also pleased to further sustain our position, which is to the effect that if the user of a good paint machine is satisfied to have some quality and not all quantity, there will be no need of any after-brushing-down of the so-applied paint, as is the case where the cold unsympathetic brush stickler excels himself in effort to down the machine innovation, which is easily accomplished if an imperfected atomizer is used and worked to full capacity in throwing out clots like shots from a gattling gun, instead of atomizing on the paint which a good machine will do if given fair play supervision and operation.

Thus summed up, we question the advanced opinion that the pneumatic operated paint machine will soon be a thing of the past, we being firm in belief that the machine is here to stay. We are also firm in the conviction that machine painting will be finally endorsed by union labor on class work at satisfactorily arranged advanced prices for the operation of the machine over the brush.

A Visit to the Readville Shops

An invitation was extended to the members of the New England R. R. Club by officials of the New York, New Haven & Hartford R. R. Company to visit their shops at Readville, Mass., and a special train left the South Terminal station, Boston, at 3:15 p. m. May 16, returning from Readville and arriving at the Back Bay station about 6:35 p. m., where the party of nearly two hundred disembarked and walked a short distance to the Westminster Hotel where dinner was served at the expense of the club, after which the cafe was cleared of tables and chairs were rearranged and the regular monthly meeting was held, which was the last of the season, a paper being read upon "The Application of Electricity as a Driving Power for Machinery at Readville Car Shops," by Mr. T. W. Adams, general foreman of these shops.

Probably Mr. C. N. Woodward, division superintendent N. Y., N. H. & H. R. R., who is president of the club, had much to do with these arrangements for the pleasure of its members. This scribe was one of the happy party.

The Readville shops, heretofore described to some extent with general views in these columns, are practically new, having been operated but a year or two. The motive power is electric from a general power plant located 8,500 feet away. This location was for other purposes, such as the operation of suburban trains and other shops and there is said to be practically no loss of power in transmission from this distance. Alternating current is used for all machinery, the transfer table alone being driven by direct current. We will not attempt to enter into any description of this or of the machinery of these shops (see Mr. Adam's paper in May report), but, though of another craft, we were much interested in the performance of a new wheel lathe equipped with an individual motor that, turning two wheels at once, one on either side of the machine, took off chip approaching a half inch in thickness, practically turning the wheel at one operation, save a little smoothing up.

These shops, probably the largest plant in the United States or Canada devoted to car work alone, are now employing about 1,350 men on nine-hour time, two hundred of whom are on freight car repairs. As the New York, New Haven & Hartford's passenger equipment is the second largest in the U. S. and Canada, the Pennsylvania being first, and as they own for the most part and operate their own parlor, sleeping, dining and state room chairs, and as all the company's passenger equipment repairs of a general nature are now done at these shops, this accounts for the large force employed in the busy season now on, and it will readily be seen that it is a big hive of industry in all departments. Mr. Thomas Simpson, who succeeded Mr. John Young as general foreman a year or so ago, has recently been appointed master car builder, an office vacated by Mr. Wm. P. Appleyard a year or more since. He escorted the party over the shops. Mr. Thomas W. Adams, who was in charge of car work at the Norwood shops until that work was removed to Readville, was transferred there as foreman car department, but has lately been made general foreman. He is the eldest son of the late veteran master car builder, Mr. F. D. Adams, so long with the Boston & Albany, another son being foreman of freight car work at the Concord shops of the Boston & Maine.

View of the Readville Shops.

Naturally this scribe left the other visitors in the round of the mechanical departments and hied himself away with some others to devote more time with out associate Samuel Pickford, foreman of the painting department, as of more special interest to us. We found him more than busy with a force of men equal to that of all departments combined in many fair-sized railroad shops—some two hundred men. But he has a variable crew at this time of year, as they come and go on account of greater inducements at house painting when spring opens at Boston and other nearby cities. He is probably using more varnish remover than any other car shop in the country. He uses liquid "Phenoid" altogether and orders five or ten barrels at a time and has used some 60 or 75 barrels in the course of about a year. This speaks well for the way "the New Haven" takes care of the interior of its vast equipment. An old car in the yard near the end of the paint shop is used for a shop for all varnish removing of detachable stuff from the cars, and the car interiors are treated with remover while in the yard so far as possible. This gives better air and greater light. In the car used for a shop is a tank large enough to take in doors which is kept full of the remover, into which all loose stuff is thrown until the varnish is softened through, when is is taken out onto benches provided for the purpose and is thoroughly cleaned. Old cars with grimy oak and mahogany interiors are thus made equal to new in appearance. Most roads can thus make new cars of some of their old ones if they will resurrect their interiors from beneath the grime and varnish of years where they are buried.

We noted an entirely new thing on this visit. It was an electrically illuminated sign across the end of a car at the termination of the slope of the deck roof, reading "Merchants," intended for the rear end of last car of the "Merchants Limited" running between Boston and New York over that road. It is an experiment. The car will need to be turned at end of each trip. In the night at Grand Central station at New York, or the Boston terminal, that ought to cheer the tired business man as does the light in the window of the home to the laboring man. Then, again, if the Boston merchants should happen to get a drop too much over in "Gotham" they could tell which their train is more readily.

In the second story of the paint shop at one end is a designing room where all the stencils are gotten out. Also photographic dark room. We noticed a nice cabinet or closet where they are all arranged, classified and kept—that is a good thing. They are hung on various folders that swing out, like so many doors, which are all suitably lettered at the top so that the hand can be put on to any stencil pattern at once. This is better than shuffling over a drawer full to get what is wanted. Also we noticed a useful way to make stencil ornaments. Silk threads are laid lengthwise over them in shellac to connect all "breaks" and thus an unbroken pattern is stencilled to the work with no connections to be made with a brush.

We think the Readville shops have the best system of lockers and toilet rooms, or lavatories, that we have ever seen, and only wish that the working man could be as well served everywhere. Space at this time forbids further description of these fine shops and our interesting visit to them on this occasion.

Program for the Cleveland Convention

The following program has been prepared for the next convention of the M. C. & L. P. Association, to be held at Cleveland, O., Sept. 12-15th, 1905:

Subject One.

The renovation of coach window shades, particularly those most generally used, such as "Pantasote," etc., with a view to increasing their life.

R. J. Kelly, Long Island R. R., Brooklyn, N. Y.

H. W. Forbes, Erie R. R., N. Paterson, N. J.

W. H. Esterbrook, D., L. & W. R. R., Scranton, Pa.

Subject Two.

Piece Work.—Its advantages and disadvantages from the standpoint of both employer and employee.

W. J. Orr, Erie R. R., Buffalo, N. Y.

H. M. Butts, N. Y. C. & H. R. R. R., W. Albany, N. Y.

B. E. Miller, D., L. & W. R. R., Scranton, Pa.

Subject Three.

The best material and method in the construction of paint shop floors that give best results from the painter's point of view.

J. W. Houser, Cumberland Valley R. R., Chambersburg, Pa.

F. A. Weis, Central Ry. of N. J., Elizabeth, N. J.

J. H. Whittington, Chicago & Alton R. R., Bloomington, Ill.

Subject Four.

Are you burning off your passenger equipment before it is necessary?

Albert V. Locke, Brooklyn Rapid Transit R. R., Brooklyn, N. Y.

A. J. Bishop, Northern Pacific Ry., St. Paul, Minn.

John Stocks, Maine Central R. R., Waterville, Maine.

Paper.—A new method of treating an old cracked car.

W. F. Leach, Minneapolis & St. Louis Ry., Minneapolis, Minn.

Subject Five.

Preservation of steel cars from decay. What new developments has the past year brought out?

T. J. Rodabaugh, P., Ft. W. & C. Ry., Ft. Wayne, Ind.

W. O. Quest, P. & L. E. R. R., McKees Rocks, Pa

J. H. Kahler, Erie R. R., Meadville, Pa.

Subject Six.

Essay: "The Car and Locomotive Painter of Today."

Chris. Clark, N. Y. C. & St. L. Ry., Chicago, Ill.

Subject Seven.

Economy and durability considered, to which extent may enamels, or varnish colors, be employed as a finish for car and locomotive equipment in exterior and interior?

Chas. E. Copp, Boston &Maine R. R., Lawrence, Mass.

E. T. Congdon, Northern Pacific R. R., S. Tacoma, Wash.

E. J. Arlein, Chicago & Northwestern Ry., Chicago, Ill.

Subject Eight.

Are locomotives properly cleaned while in service; if so, by what method and material?

J. B. Shuttleworth, Boston & Albany R. R., Springfield, Mass.

David Murray, Pennsylvania R. R., Pittsburg, Pa.

E. R. Clare, Southern R. R., Birmingham, Ala.

Queries.

1. How do you remove old paint from front ends of repaired locomotives?

2. What oil do you use for rubbing down car interiors when newly varnished?

3. Is not there some other way that can be devised to clean glass in shops than by hand?

4. Is paint removing from car exteriors by chemicals practicable and economical?

5. Does your road use metal train numbers in front of headlights? If so, what color are they painted and why?

6. What is your opinion of painting the exterior of sash body color?

J. F. Lanfersiek, President,
Robert McKeon, Secretary.

Among the Supply Men

C. H. Spotts.

Herewith we have the pleasure of introducing to our readers, such as have not had the pleasure of meeting him, the Manager of the Paint Department of the Jos. Dixon Crucible Co., Mr. Charles H. Spotts. In acknowledging our request for his photo he says: "My picture has never been in print before, nor have I been talked about by editors, but your Advertising Manager, Mr. Myers, has such a winning way about securing contracts, and in fact anything that he wants, that he flattered me into his proposition that the Railway Master Mechanic should have the first 'crack' at me.

Mr. C. H. Spotts.

"You will observe from the photo that I am somewhat of a youngster, having only reached the age of 31 years, and having for a birthplace the picturesquely situated town of Newport, Pa.

"Ten years of my life have been spent telling railroad people of the ability of Dixon's Silica-Graphite Paint to preserve steel work and metal surfaces against that active destroyer, rust. You will understand that my entire age is shorter than that of Dixon's Paint, which now has 42 years to its credit.

"I have great respect for the Master Painters of railroads, as they have a fund of practical paint knowledge that is of decided advantage to the officers in charge of specifications and ordering. These same Master Painters have taught me more about pigments, paints and painting than I have ever learned from books on the chemistry of paints, or from numerous writings on this important subject.

"One of my pleasures is the designing of unique novelties for souvenirs for the railroad conventions (Thanks for samples received.—Editor.), where I have formed many pleasant friendships with railroad people. I am a member of a large number of the railroad associations and social organizations of New York city. As Associate Editor of 'Graphite' (a monthly publication of the Dixon Co.) I design and edit the different paint numbers, and you may care to have this information as to my 'dabbling' in editorial work."

We have extracted the above from Mr. Spotts' letter as forming a more interesting sketch than we can write to accompany his portrait, and trust we may have the pleasure of meeting him at the next convention at Cleveland. He seems to be wrongly named; there are no spots on him; he looks mighty slick. May he live to "knock the spots off" all worse paints than Dixon's.

Death of a Veteran Painter

Glenville, Ohio, May 13, 1905.

Editor Railroad Paint Shop:

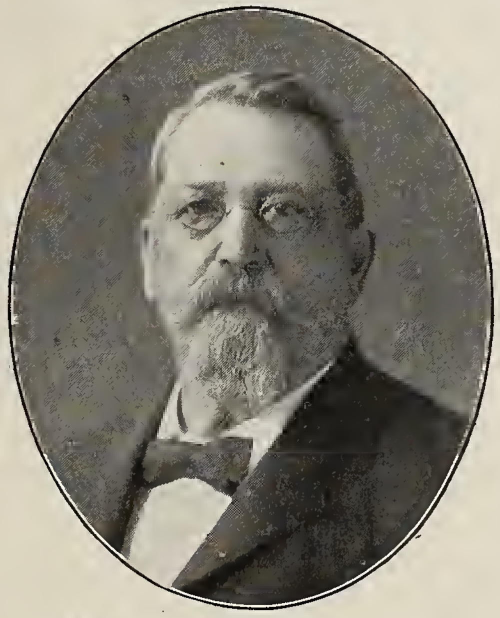
Following is a clipping from a Lima paper announcing the death of H. A. Durnbaugh, who was years ago a member of our association. Although he has not attended the conventions for quite a number of years he is well remembered by the older members of our craft. He was an old Pennsylvania workman, having worked for Charles Mason and Fred. Ball at Altoona. Two of his sons are following the painting business, and are employed at the Collinwood shops of the L. S. & M. S. George is assistant foreman for Robert Shore and John is designer and headlining man and has attended several conventions. I send you a photo under separate cover.

Yours truly,

J. G. Keil.

123 Seabright Ave.

This morning at five minutes of 2 o'clock, Henry A. Durnbaugh, the well-known painter contractor, passed away



Mr. H. A. Durnbaugh.

at his home, 638 south Main street, from an attack of heart trouble.

Deceased had been in poor health for the past year, but was able to be about, and his sudden death was a shock to his many friends.

Mr. Durnbaugh, and family, came to this city in May, 1880, to take charge of the painting department of the Lake Erie & Western shops, under master mechanic, and remained as its foreman for eight years. Since that time he has been engaged as a contractor of painting and decorating.

About eighteen years ago Mr. Durnbaugh was the leader of the Lima City band, and also instructed a band in south Lima. Before coming to this city he was working in the paint department in the Pennsylvania shops at Altoona, Pa.

Deceased was born in Shippensburg, Pa., and was 69 years old the 12th day of last March. He served his country by enlisting in the federal army three different times during the civil war; three months the first, but in what company is not recalled, as the discharge has been burned; the second time he served in Co. K, 201st regiment, Pennsylvania Volunteers, and the last time as captain of the 7th regiment band of Pennsylvania infantry.

Surviving him are: The widow, Mrs. Eliza Durnbaugh; one daughter, Mrs. H. L. Fessenden, of Springfield, O.; five sons—Ralph and Charles, of this city; John and George, of Cleveland; Harry, of Rochester, N. Y.; two brothers, who are in the United States treasury department at Washington, D. C., and three sisters—one in Pennsylvania, one in Illinois, and one in Nebraska.

Sand Blast—B. & M.

Sand Blasting--Boston & Maine Railroad

The accompanying illustration shows a sand blast apparatus in operation on one of the bridges of the Boston & Maine Railroad. The mixed air and sand is delivered through a rubber hose to a nozzle, through which the sand is directed upon the work. A uniform grade of dry sand with sharp cutting edges is used. In this manner an absolutely clean surface for painting is obtained. Immediately following this thorough cleaning, the metal receives a well-applied coat of Dixon's Silica-Graphite Paint, which furnishes excellent protection for many years against corrosion.—(From April Graphite.)

Notes and Comments

We omitted to state in our article in another column about the Readville shops that the paint shop output is two hundred cars per month. The output for April was 202, of which 25 or 30 were heavy repair jobs, burning off, etc.

Wm. M. Skinner has resigned as foreman painter of the Manhattan Division of the Interboro Rapid Transit Company, of New York, we are informed. Mr. Skinner is a member of the M. C. & L. P. A., and was in attendance at the Atlantic City convention last year.

In a late note from Secretary McKeon, dated June 12, he says: "I have received the report of the Hotel Committee today. They have selected the Hollenden Hotel on the American plan at $3.50 per day for rooms without bath. The convention room will be adjoining the dining room."

F. L. Robbins, Mr. Orr's successor at the St. Albans, Vt., shops of the Central Vermont R. R., is in Wilmington, Del., and will be located there for some time, looking after several cars which the American Car & Foundry Co. at that point is building for the Central Vermont.

D. B. Smith, master painter at Plattsmouth, Neb., of the Burlington & Missouri River Railway (the Burlington System), is just out, we learn, after a protracted confinement with inflammatory rheumatism. All striping, we are advised, is being omitted from his road's passenger equipment as fast as the cars pass through the paint shop.

We hear that our associate, W. J. Orr, has had a new scaffolding system installed for him since he went to the Erie's Buffalo shop, and is getting in line for greater conveniences for his men. His assistant foreman, "Matt' Justinger, has resigned, we learn, and no appointment to the vacancy has yet been made.

The Chesapeake & Ohio Ry. is having part of its passenger equipment cars painted Pullman color, window sash included. The remaining part of equipment is still painted orange color glazed with Cadmium yellow, orange shade. Letterboards and corner-posts are red, glazed with lake. My! that showy combination would about awaken the sleepers down this way.

The Northern Pacific, A. J. Bishop, master painter, is likewise enforcing the practical by cutting off all striping from passenger equipment cars. In contrast to this poverty of relief effects the Great Northern, N. B. Watson, master painter, paint their passenger equipment cars dark chrome green, striped in gold, sash painted mahogany. Why, the Chicago & Alton even paint their passenger engines Pullman car color and stripe them to harmonize. It is simply a case of "you pay your monish and has your choice."

It is not creditable to the interest taken in our association by its members to know that Secretary McKeon had to write the second letter to several before he received a reply. This caused considerable delay; hence the full program has not appeared before. He writes that he has not received word from the Hotel Committee as to what arrangements they have made. When they last wrote him they did not agree, one preferring the American plan, one the European, and the third not caring which plan was adopted.

The buffing room in the brass department at the new Argus shops of the Canadian Pacific Railway, Montreal, presents an interesting illustration of recent advance in the removal of dust from buffing and grinding wheels. Here a Sturtevant exhaust fan with a special form of Sturtevant hood enclosing the wheels insures the withdrawal of all of the dust and fine chips. This system maintains a perfectly clear atmosphere within the room, separates the chips from the dust and prevents the discharge to the outer atmosphere of dust laden air with the attendant disagreeable results.

On Monday, May 15, nine and one-half hour time went into effect for ten-hour pay in B. & M. shops. This was a compromise with the labor organizations who, early in the year asked for nine hours. They also granted two hours each Saturday afternoon, the shops closing at 4 or 3:45, according to whether they go to work in the morning at 7 or 6:45. During the months of July and August an entire Saturday holiday is given; but as the shop's forces will be greatly reduced, especially in the car department, this boon will not be enjoyed only by the few lucky ones that remain.

"How to Mix Paints," by C. Godfrey, an expert, price fifty cents, published May 1, 1905, by press of The Western Painter, Chicago, is a very useful book of ten chapters of fifty-three pages with an index. It is in paper covers and illustrated. Chapter I relates to Mixing Paints, Straining Paints, Brushes, Tints and Shades. Chapter II, Reds. Chapter III, Blues. Chapter IV, Yellows. Chapter V, Browns. Chapter VI, Greens, Chapter VII, Greys. Chapter VIII, Colors made from Black Japan. Chapter IX, Displaying Colors. Chapter X, Color Harmony.

One good and sure way to put a railroad's passenger equipment "on the bum," or into a hole from which it can never be extricated without heroic and expensive methods, is to let it go annually by the "slick-and-promise" method. A superficial treatment is given this year and a promise of better things another year, only to be repeated until it goes down, down, down, where it is left to "the other fellow" to remedy, who is likely to come into office at about that time when the real condition of things is discovered by the owners, and then something will have to be done besides the usual rub with "hair oil" and the dusting with whisk broom for the "tip" and the promise.

We learn that John T. McCracken, formerly identified with Jackson & Sharp, Wilmington, Del., as foreman painter at their extensive car and shipbuilding plant, is now traveling in the interests of the Flood & Conklin Company, varnish makers, Newark, N. J. We hope he will do well. John got caught, with others, in an elevator accident at the Rudolf at Atlantic City at our last convention, and we feared the results, and have not heard from him since we left there. This bit of news, if true, gives us the assurance that he has regained his health and strength.

And now has come the summer of our discontent. The paint shops of the B. & M. are practically closed. "Nothing doing." It is the usual thing, but it came earlier this year. Failure to get cars from service made the shop output about fifty cars shy of the two preceding years for the month of May. June 1 there were about 149 cars to do and 115 cars to shop in order to complete the equipment; but as June is a worse month than May to get cars from service it is a foregone conclusion that the equipment will not be completed by well nigh one hundred cars, which would have been easy if they could have been shopped. And the first week in June an edict for the curtailment of the help went forth. It is very disheartening to those who have some pride and the responsibility of keeping the equipment up in shape where it ought to be.

Our readers will note by the full program of the Cleveland convention, now made public in another column, that, following subject No. 4, W. F. Leach, of the Minn. & St. L. Ry., is to furnish a paper entitled "A New Method of Treating an Old Cracked Car," and will have some siding off an old car demonstrating the process in its different stages. It will be remembered that he suggested the title of subject No. 4 as one that he proposed to write an article for these columns under last February; but, notifying him that it would be acceptable, as a member of the Advisory Committee, the editor of these columns wrote him further to the effect that he would bring it up as a convention subject. It was adopted and he was named first to write a paper upon it. It appears now that he preferred to write it under another title. The subject, however, has been taken by three other men. Well, "the more the merrier." "In the multitude of counsellors there is wisdom." We shall now see what can be done with an old cracked car (really an old cracked subject) without burning it off, or burning it up. We have never contended that such a case could not be helped or improved; consumptives, and those afflicted with Bright's disease can be temporarily relieved; but can they be permanently cured is the question? The doctors are always experimenting to see, and we painters should be just as enterprising. Let all prejudice be laid aside and the matter treated with all candor. Things that "cannot be done" are growing less and less in this enlightened age every year.

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO
Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago
TELEPHONE - - MAIN 3185

Eastern Office: Room 714, 132 Nassau Street, New York City.
Telephone: - - 3524 John

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.
Communications on any topic suitable to our columns are solicited.
Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.
In remitting make all checks payable to the Bruce V. Crandall Company.
Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent

Vol. XXIX. CHICAGO, AUGUST, 1905. No. 8.

Contents.

The Piece Work System

THE Erie road, having long contemplated a change in its shop scheme from day work to the piece system, has, on the eve of its inauguration, found a sentiment inimical to the change pervading the ranks, the feeling among the men seeming to be, that the piece work system is conducive to a pace-making gait that gives all the advantage to the road, and all the work to the men. This was practically the same view taken by the operatives of other roads where the piece system has been introduced, it being a peculiar fact that its introduction has been attended in most instances by an opposition that is explainable by the groundless fear that the employer will have the best of it, and use the new scheme as an entering wedge to get future falls out of the employes' wages. Just why this view should obtain is not plain, since the rate of reward is proportional to results, and is adways higher than by the day work system. But to get these results, a tool must be worked more nearly to its capacity than is ever done by the day work system.

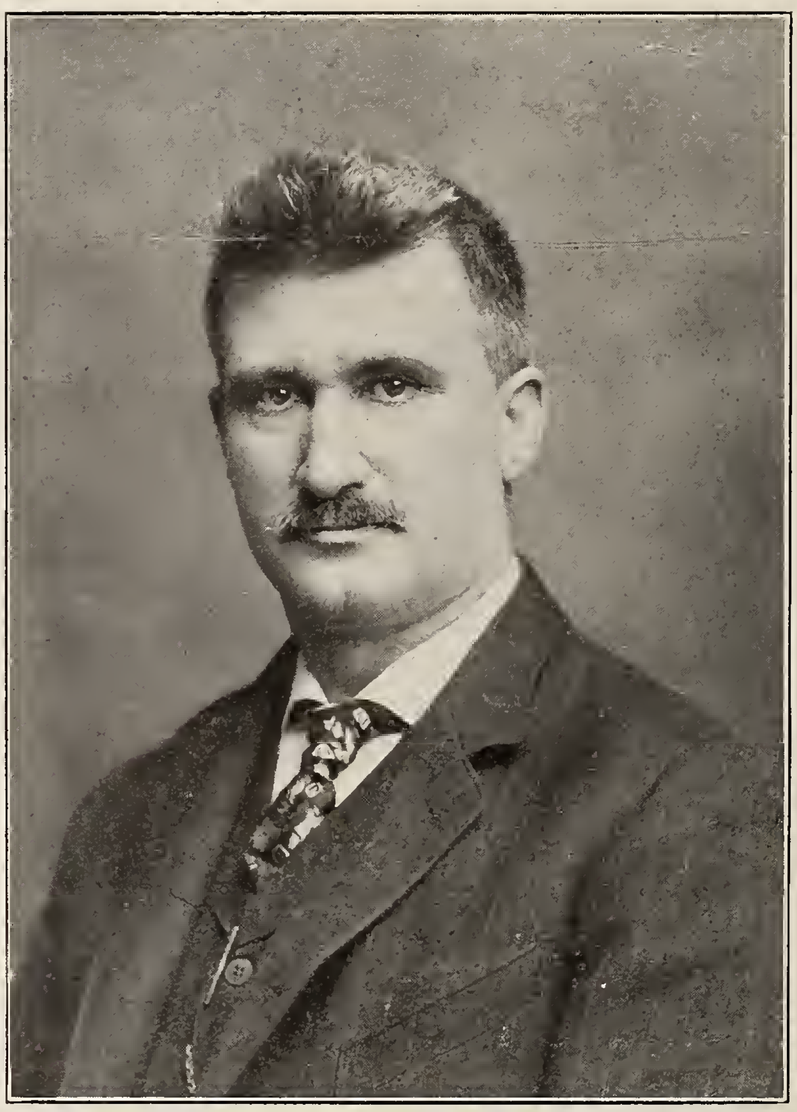
It is true that some men will profit to a greater extent than others, by the piece work system. The fast man will be able to cut rings around his slower confrere, but in that case also both are paid for their ability to do things, which was the status they labored under when working by the day, but for which by the traditions of the craft, no allowance was usually made for superior ability, both being paid at the same rate. The fact that a man has "served his time" is not conclusive evidence of ability or skill. The use he has made of his time when serving it is the crucial test of his producing faculties, and determines his earning power, no matter what the system of turning out work he may be called upon to exercise his particular talents on.

The man who knows his business need have no fear that piece work or any other system will cause him harm; it is the other fellow, unfitted by his defective training to cope with the new situation, that will feel the sting, and it is more than proboble that it is he that insists on the old leveling down and ambition-killing process, rather than the man having the elements of success in his make-up.

The piece work system in railway shops has passed the nursing bottle period, and is in such satisfactory operation as to warrant the prediction that it is to be a permanent fixture in railway shops. The only factor that is likely to militate against its rapid adoption, conceding that prejudice from the rank and file is overcome—as it will be—is the scale of prices named for compensation for the work. If this is fair, and adhered to by the employer, both sides will be the gainer—the men by a higher wage, and the shops by an increased output; and this may be accomplished with tools that are not by any means modern, because an incentive will exist to get out the work. Such tools have been known to actually work wonders when handled under pressure on rush jobs, and when separated from the blighting influence of the day work drag they will go a long way toward solving the problem of output in many shops now suffering from lack of adequate tool equipment. The Erie, however, is to start the piece work system with every facility of the best, and be fully prepared to reap all the advantages going with improved tools and high-speed steels, backed by a rate proposition so fair as to be irresistible. The amount to be spent for new tools at this time will agregate a half million dollars.

Reliable Iron for Car Wheels

THE problem of producing a cast iron car wheel that would be immune against failure, has geen one of as serious import to those in charge of rolling stock as has that of strengthening bridges to carry the ever increasing loads, to the engineering department of railroads, since the increased weight of equipment operates to the same end in each case. While the bridge engineer is able to read his title clear to safety by the aid of steel or stone, the mechanical engineer is confined to the use of cast iron wheels for freight car service, and to the same material also for passenger cars on many railroads, for reasons based on economy, since the all-steel wheel or the steel tired wheel is vastly more expensive in first cost than the cast iron wheel, and on this account is not to be considered as a factor in the solution of the questions bearing on the comparatively recent heavy equipment of fifty tons capacity.



MR. JAMES E. HURLEY,
GENERAL MANAGER, ATCHISON, TOPEKA & SANTA FE.

Mr. Hurley was born at Wapello, Iowa, on June 1st, 1860, and after finishing high school at that place spent three winters at the Normal school in Bloomfield, Iowa, He entered the service of the Santa Fe in 1880 as brakeman and was subsequently until 1882 warehouse man and baggageman. He was then for one year telegraph operator and station clerk at various stations in Kansas and during 1883 was relief agent on the Rio Grande and Mexico Division and chief clerk and cashier at Hutchinson, Kansas. Since then he has held consecutively the following positions: Agent of Florence, Kansas, Chief Clerk to the General Supt., at Topeka, Train Master Eastern Division, Ass't Supt. Missouri Division, Ass't Supt. Chicago Division in charge of transportation at Fort Madison, Iowa, from October 1891 to June, 1894; Supt. New Mexico Division June, 1894, to October, 1894; Supt. Consolidated New Mexico and Rio Grande Division October, 1894, to January, 1901; Acting General Supt. lines west of Albuquerque at Los Angeles, Cal., January to October, 1901. On the latter date he was appointed Gen. Supt. of the Western Grand Division at La Junta, Colorado, and in July, 1902, was made Gen. Supt. of the Eastern Grand Division, which position he held until May 1st, 1905, when he was appointed General Manager.

The cast iron wheel may be said to have been early in the evolutionary state, receiving its first careful attention, however, when the forty-thousand pound car came into existence, and from that time through the fifty, sixty and eighty thousand pound period up to the present heavy cars, it has exacted the best thought of the designer to keep pace with the heavier loads. In that time, the weight of the wheel has increased about one hundred per cent, while its form and diameter has remained unchanged. It is not plain that the cast iron wheel will be readily displaced by any other material, since it lends itself most admirably to the hard conditions of service, because of the density and hardness of the parts subject to wear, and most important consideration of all, it is not costly.

There are so many points to be considered as affecting the life of the cast iron wheel of today, that a comparison with the old conditions can throw no light on the needs of the present, and for that reason the question of durability and safety is one that involves not only an improved design, but also high quality of material, and there is no doubt that the latter is of greater importance than any other phase of the case, more especially in averting the liability of broken flanges, which are believed to fail more often through internal weakness than from causes due to thermal conditions.

Shop tests have closely approached brake shoe results in heating the tread and flanges of wheels, and have given information of value in design, also conveying hints as to the best distribution of metal for the absorption of the heat from the critical points to avoid cracks. These experiments point to a solution of the breakages by means of arranging the metal in such form as will give less rigidity to the plate, both laterally and vertically, making the wheel better able to withstand shocks on curves and switches in its weakened condition due to heating or inherent defects, in order to accomplish the end of a flexible construction, between the axle and rail, the popular form of the double plate must be dispensed with, for that type of construction is the most rigid of all and contains metal where least needed.

The flange is the weakest feature of the wheel and is the only place that has not already been reinforced to provide for the heavy loads; it stands restricted to its present dimensions because of the fact that frog and crossing clearances cannot, or at least will not, be changed at this time. The need of a thicker flange, it is believed, will disappear with the advent of the wheel that has (1) the best of material in it; (2) that material placed so as to combine strength with minimum rigidity; (3) and put up in accordance with the best foundry practice available. Seven hundred pound wheels that come closely to the above requirements are now running under one hundred thousand pound equipment without failure, which is good evidence that the cast iron wheel is safe when correctly designed and properly made of reliable material. It is hardly necessary to say that charcoal iron for car wheels will produce an article less liable to failure than will cheaper iron, and particularly so as charcoal iron manufacturers are making special iron for this purpose.

Sand Houses and Appliances---II

THE general arrangement and equipment of the Chicago, Milwaukee & St. Paul sanding appartus is shown in Fig. 1, 2, 3 and 4. Figure 1 is the plan of the drying room, which has two stoves and a rotary dryer. The sand is shoveled from cars in to the storage bin, from which it is shoveled either into the rotary dryer or sand stoves. The stoves are installed only for emergency uses and at points where power cannot be obtained conveniently. Figure 3 shows the rotary dryer in detail. It consists of a cylinder two feet three and a half inches diameter and seventeen feet five inches long. At each end is a ring with flanges shaped like a car wheel tire. These rings rest on roller bearings, one end being higher than the other. At the lower end is a 5x5 mesh No. 14 wire screen to separate the gravel and sand. The greater part of the cylinder passes through a stove. An electric motor revolves the cylinder which brings all of the sand in contact with the hot metal, drying it as it passes to the lower level. When it gets to the lower end it is perfectly dry and drops through the screen into the sand reservoir below, while the gravel drops out at the end into a box.

From the reservoir the sand is elevated to the tower shown in Fig. 2 by means of air pressure.

The stoves used at some points are shown in Fig. 4. These do not differ much from other stoves for the same kind of service with the exception that the hopper has holes at frequent intervals for loosening sand as it bakes in.

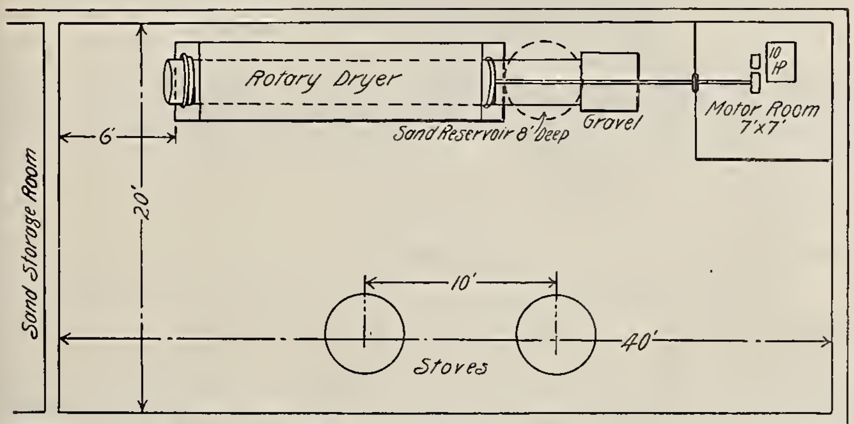


FIG. 1—C. M. & ST. P. RY. PROPOSED ARRANGEMENT IN SAND DRYING ROOM.

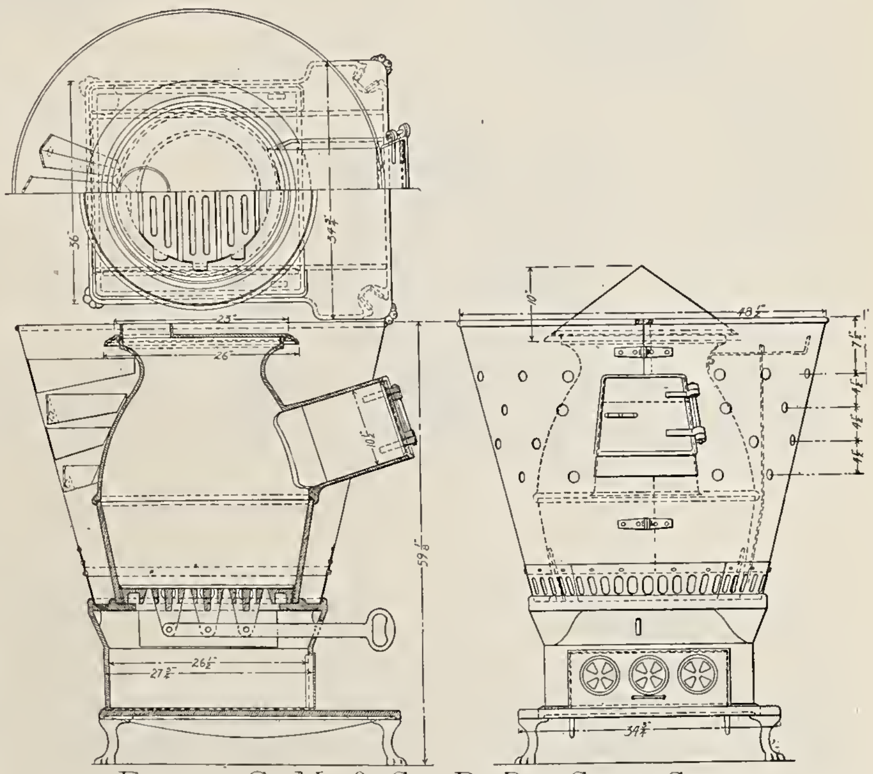


FIG. 4—C. M. & ST. P. RY. SAND STOVE.

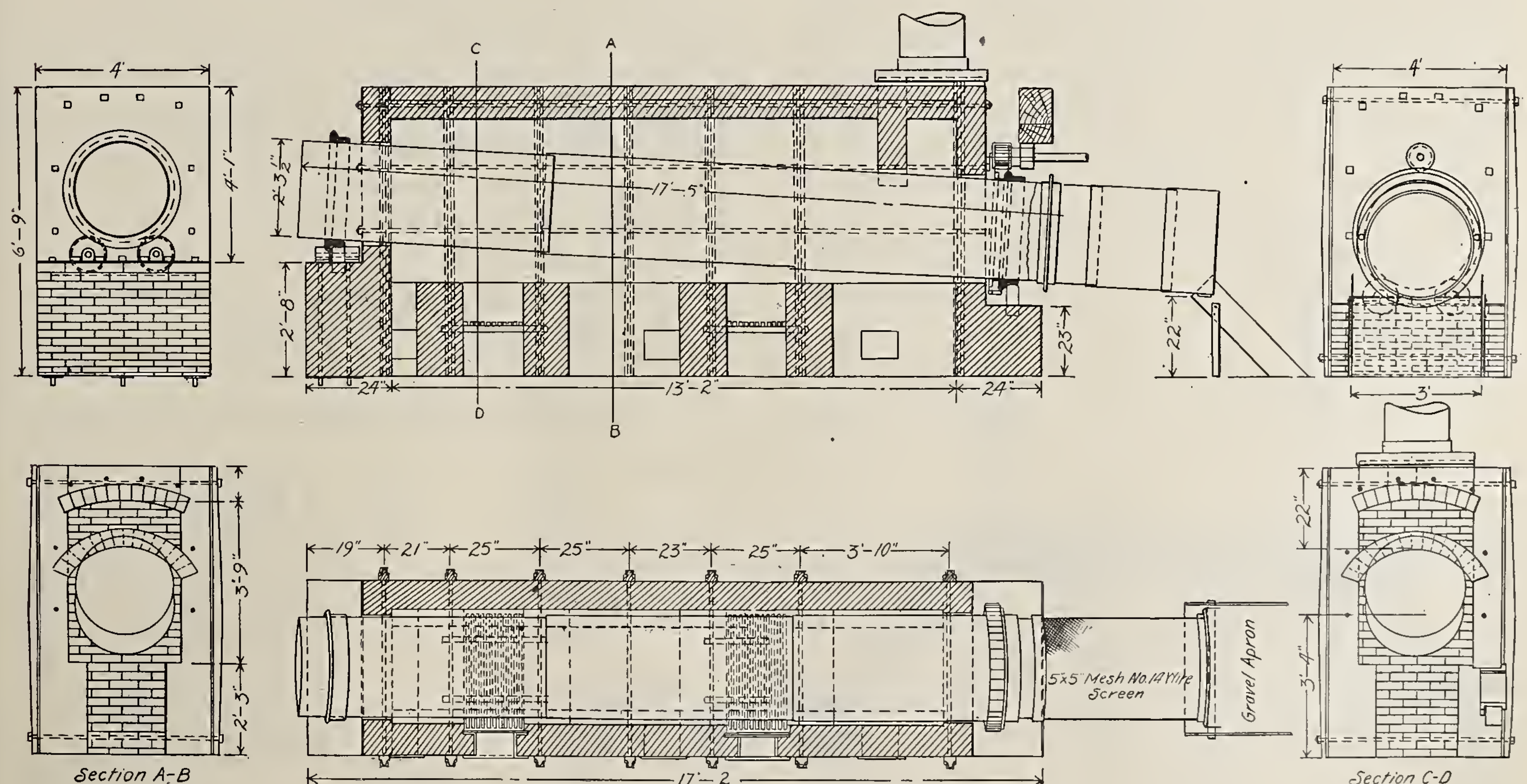


FIG. 3—C. M. & ST. P. RY. ROTARY SAND DRIER.

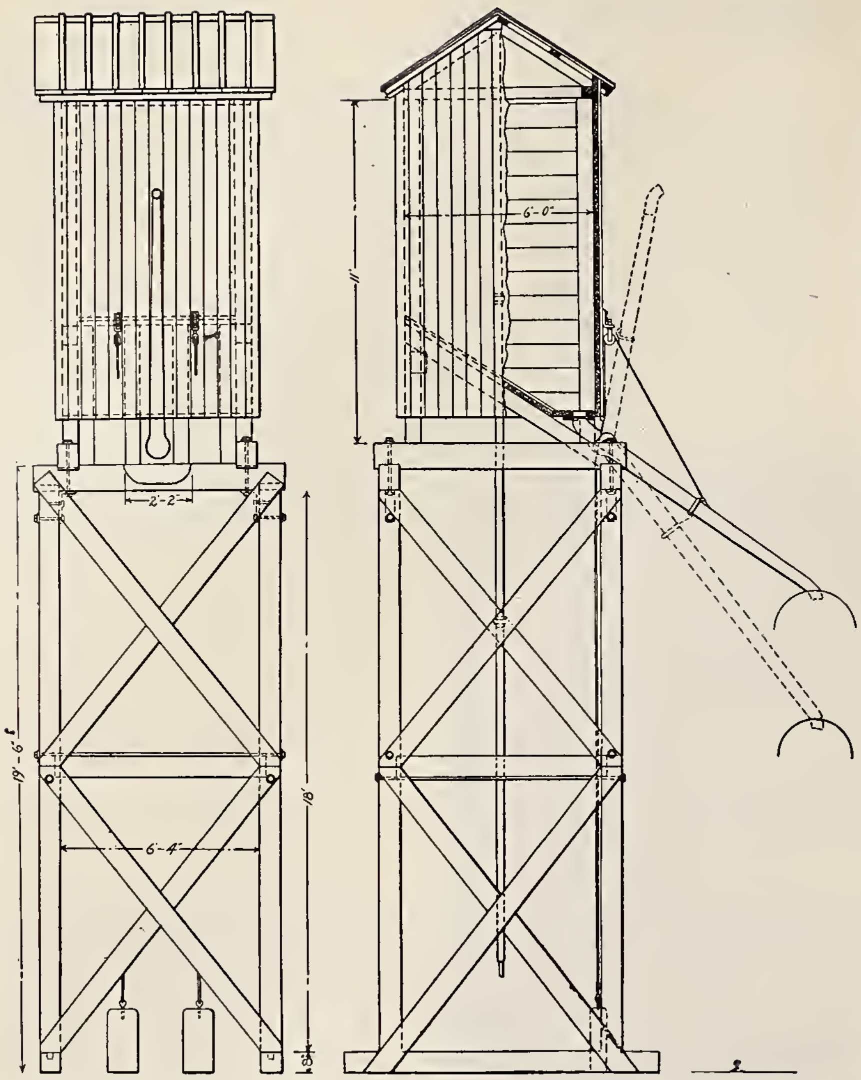


Fig. 2—C. M. &. St. P. Ry. Elevation of Storage Bin.

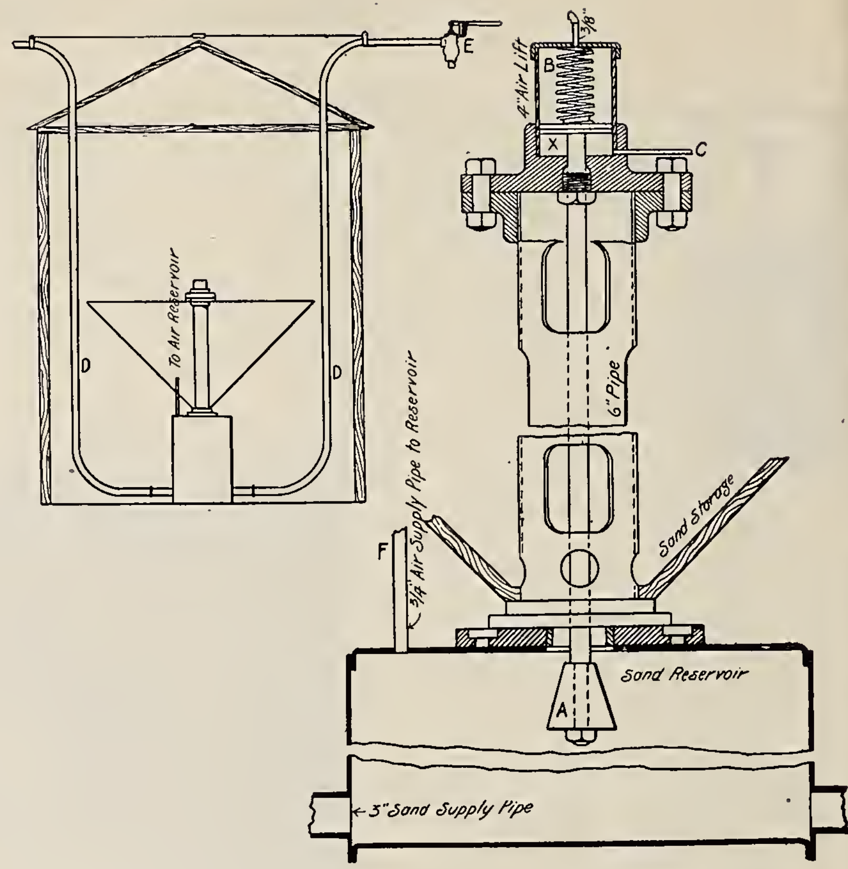


Fig. 6—Vandalia Railroad Automatic Sand Elevator.

We are indebted to Mr. J. F. De Voy, M. E., for the above illustrations and descriptions.

The arrangement of the Vandalia Railroad sanding apparatus is shown in Figs. 5 and 6. Figure 5 gives the side and end elevation. There is a wet sand storage capacity of 3,080 cubic feet which is shoveled from cars through openings in the side. From this it is shoveled into stoves, whose capacity is 220 cubic feet in 24 hours, to dry, after which it is thrown on a screen above the hopper connected with the elevating reservoir. The elevating reservoir is shown in Fig. 6. The valve of this works as follows: The air in the reservoir and cylinder X is exhausted through a three-way cock by means of pipes C and F. This allows the spring B to force down the piston and open valve A, allowing sand to fill the reservoir. The three-way cock then admits air into pipes C and F again, which closes the valve A and puts a pressure in the reservoir. There is no storage tank in connection with the plant, but as sand is needed the valve E is opened which fills the sand box on the locomotive directly.

We are indebted to Mr. W. C. Arp, S. M. P., for the drawings and description.

The method and equipment for handling the sand on the Pittsburg & Lake Erie is shown in Figs. 7, 8 and 9. Figure 7 shows the plan and elevation with all the equipment. The sand is brought into the house on an inclined track, after which it is dumped and shoveled into the wet storage bin, which has a capacity of 55 cars, and is shown in detail in Figs. 8 and 9. From the wet storage bin it is taken in a bucket elevator to the stoves located above a large hopper. As the sand dries it drops into the hopper, is screened and then carried up on the belt carriage by means of another bucket elevator. The belt takes it across several tracks to the storage bin from which the locomotives are sanded. The motor for driving the machinery is located above the stoves.

We are indebted to Mr. L. H. Turner, S. M. P., for the above illustrations and description.

The Minneapolis & St. Louis Railroad Company's sand house is shown in Figs. 10 and 11. Figure 10 gives the

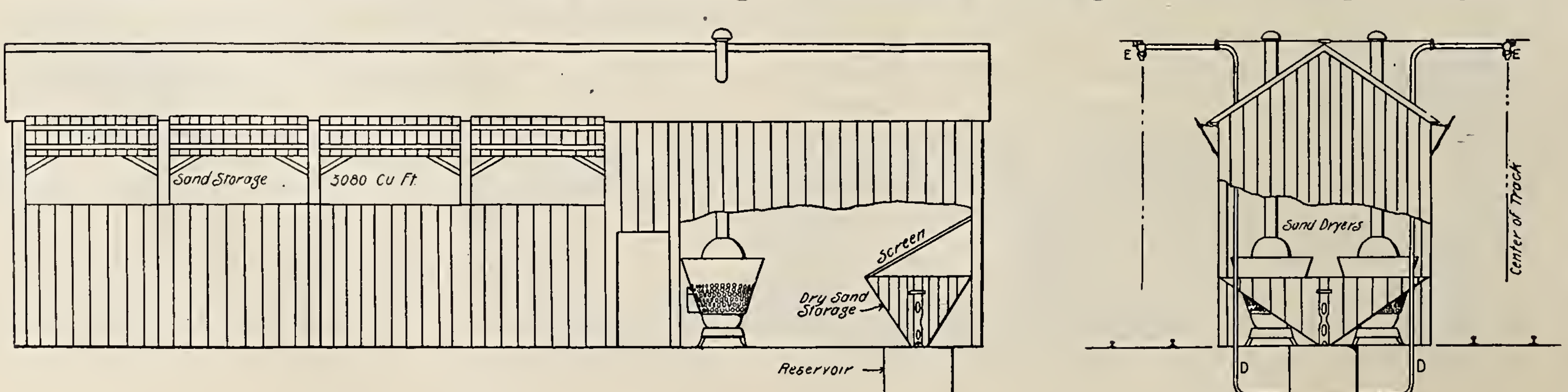


Fig. 5—Vandalia Railroad Sand House at Terre Haute.

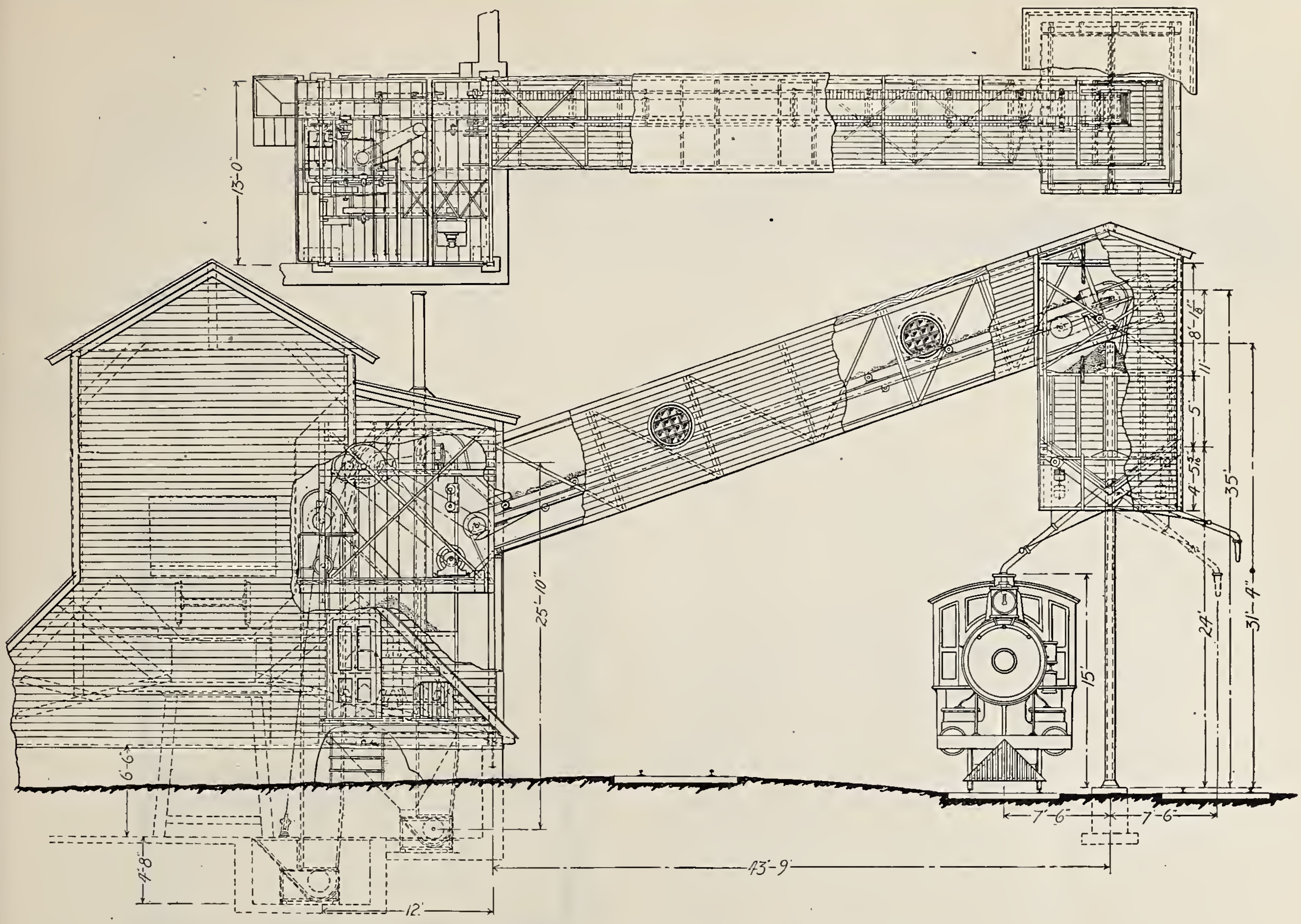


Fig. 7—P. & L. E. Sand House at McKees Rocks.

plan, elevation and a partial section. The house is divided into the wet sand room, operating room and storage shown in Fig. 13. The sand is dumped directly into the stoves, after which it is shoveled into the rotary screen, shown in detail in Fig. 11. This screen is operated by means of an air motor and drops the sand into a hopper above the elevating drum. The sand is then elevated by means of air pressure to the storage tank, from which it is supplied to the locomotive.

We are indebted to Mr. John Tonge for the illustrations and description.

In handling the sand on the Terminal Railroad Association of St. Louis, loaded cars are run up the incline shown in Fig. 13. The sand is dumped directly into the storage bins from the cars as shown in Fig. 12. These bins have a connection above the sand stove, so that it requires no further handling of sand to dry it. After passing through the stoves it is screened and put in the elevating drums, from which it is elevated by air to the dry sand storage bins above.

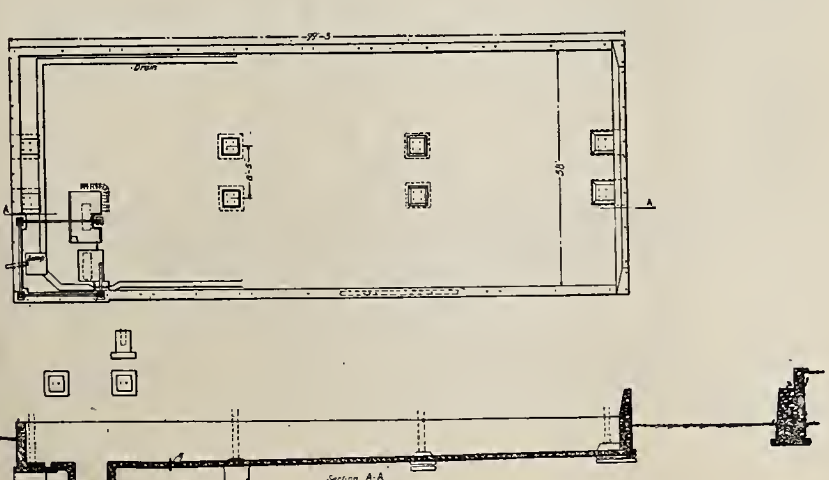


Fig. 8—Foundation Plan P. & L. E. Sand House.

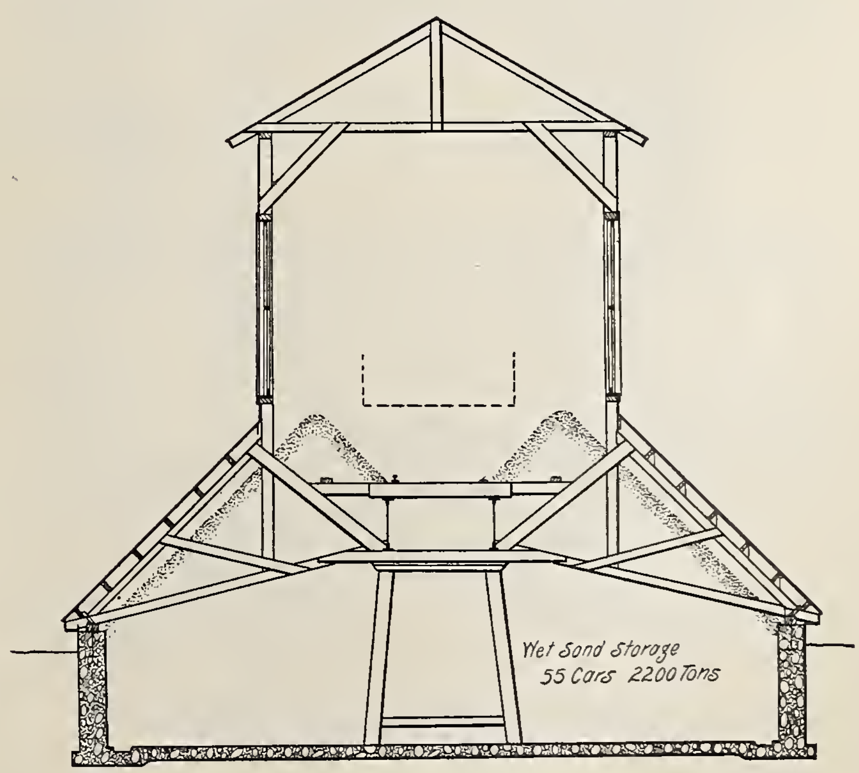


Fig. 9—Cross Section P. & L. E. Sand House.

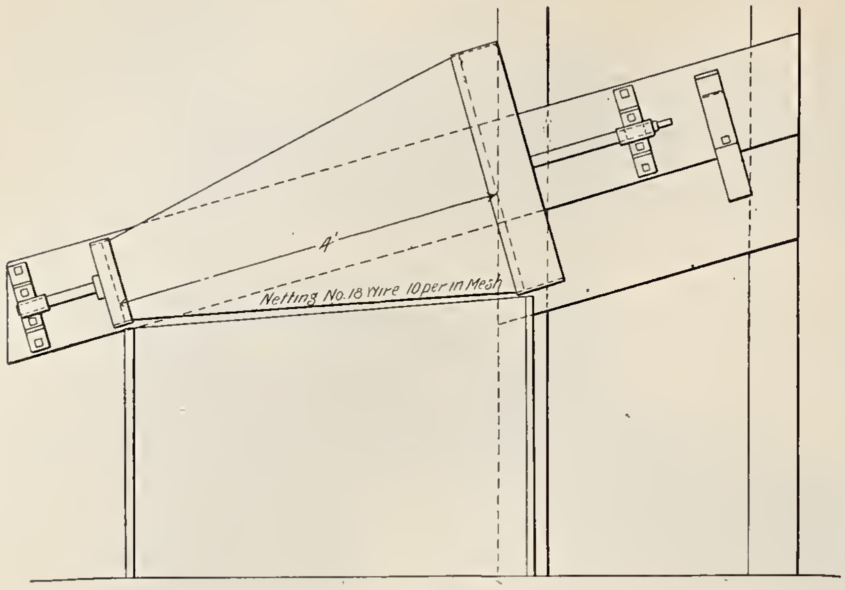


Fig. 11—Rotary Sand Screen M. & St. L. R. R.

We are indebted to Mr. Wm. Bawden for the above illustrations and description.

The standard sand house of the Pennsylvania Lines West is shown in Fig. 14, which is a plan and elevation of the Kinsman street house in Cleveland. In this sand is dried in a stove, after which it is screened and dropped into the elevating drum. Air pressure elevates it from the drum to an auxiliary drum, and from this to the storage bin in the top of the tower. Four-inch pipes lead down from this storage to the said chutes, from which the locomotives are sanded. A detail of the under-cut gate valve is shown in the illustration.

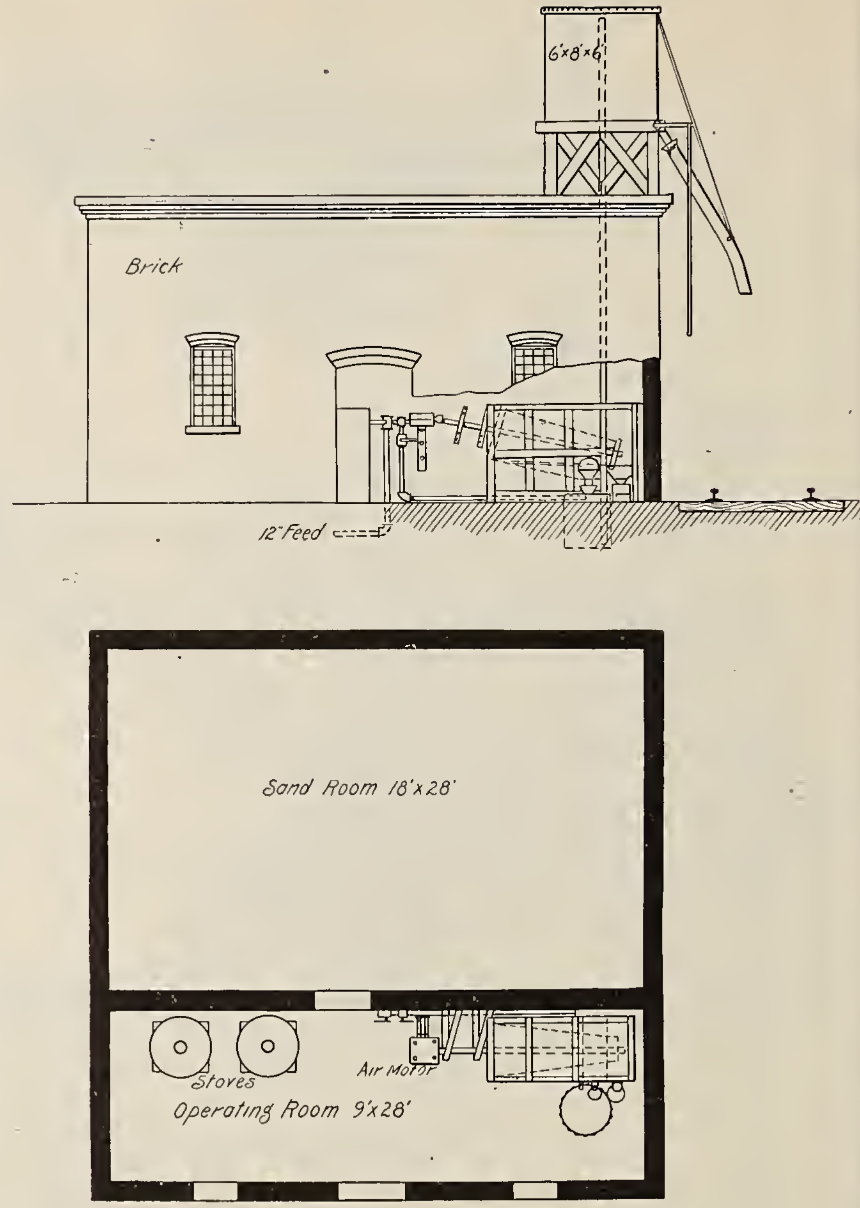
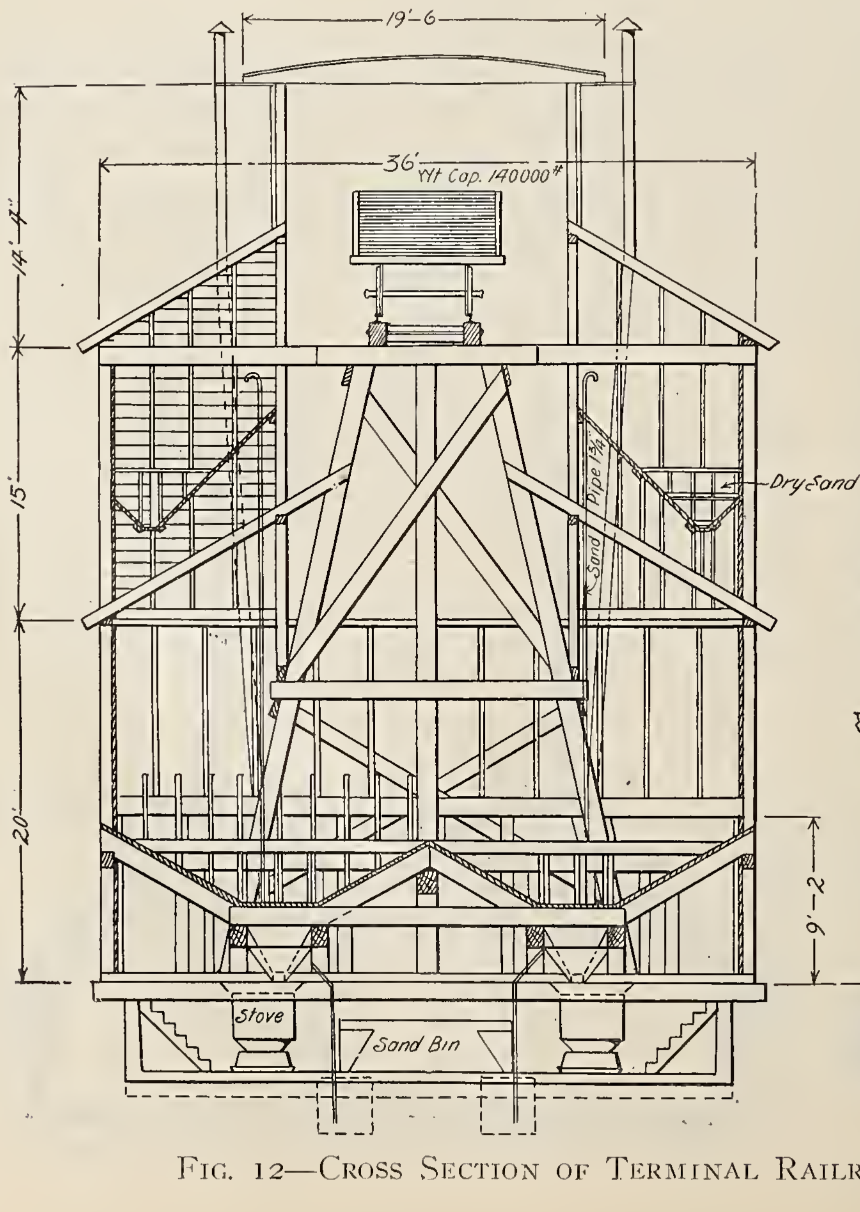


Fig. 10—Plan and Elevation M. & St. L. R. R. Sand House.



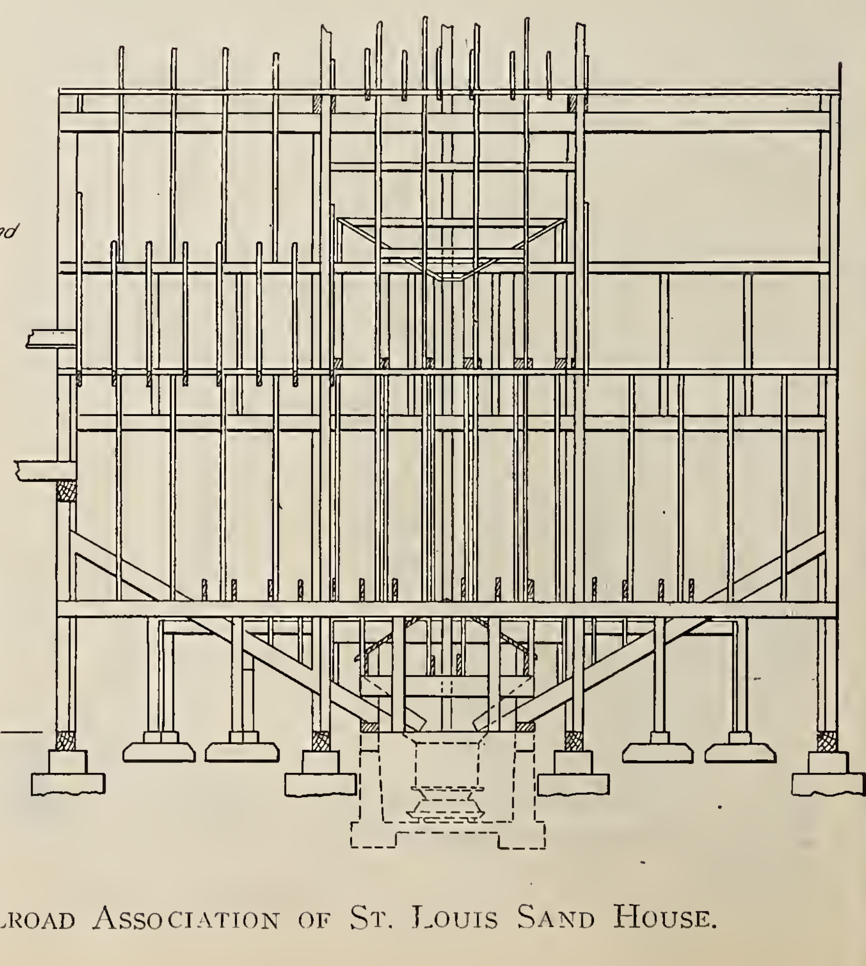


Fig. 12—Cross Section of Terminal Railroad Association of St. Louis Sand House.

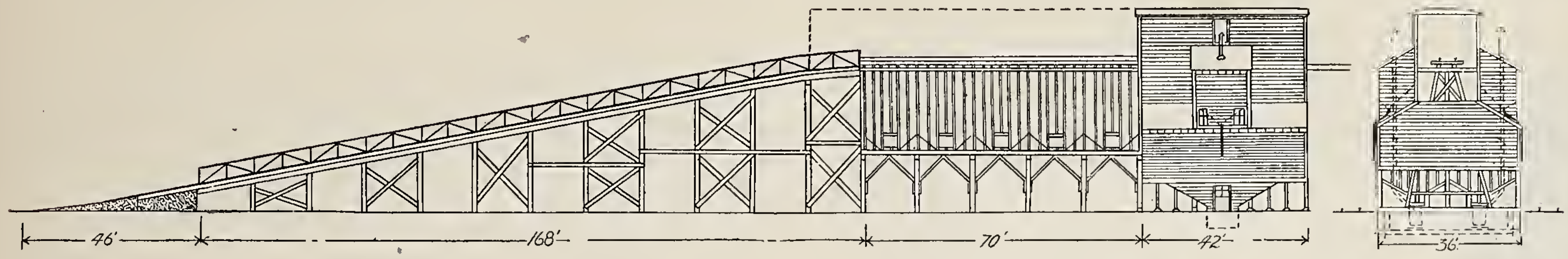


FIG. 13—ELEVATION AND SECTION OF T. R. R. A. OF ST. L. SAND HOUSE.

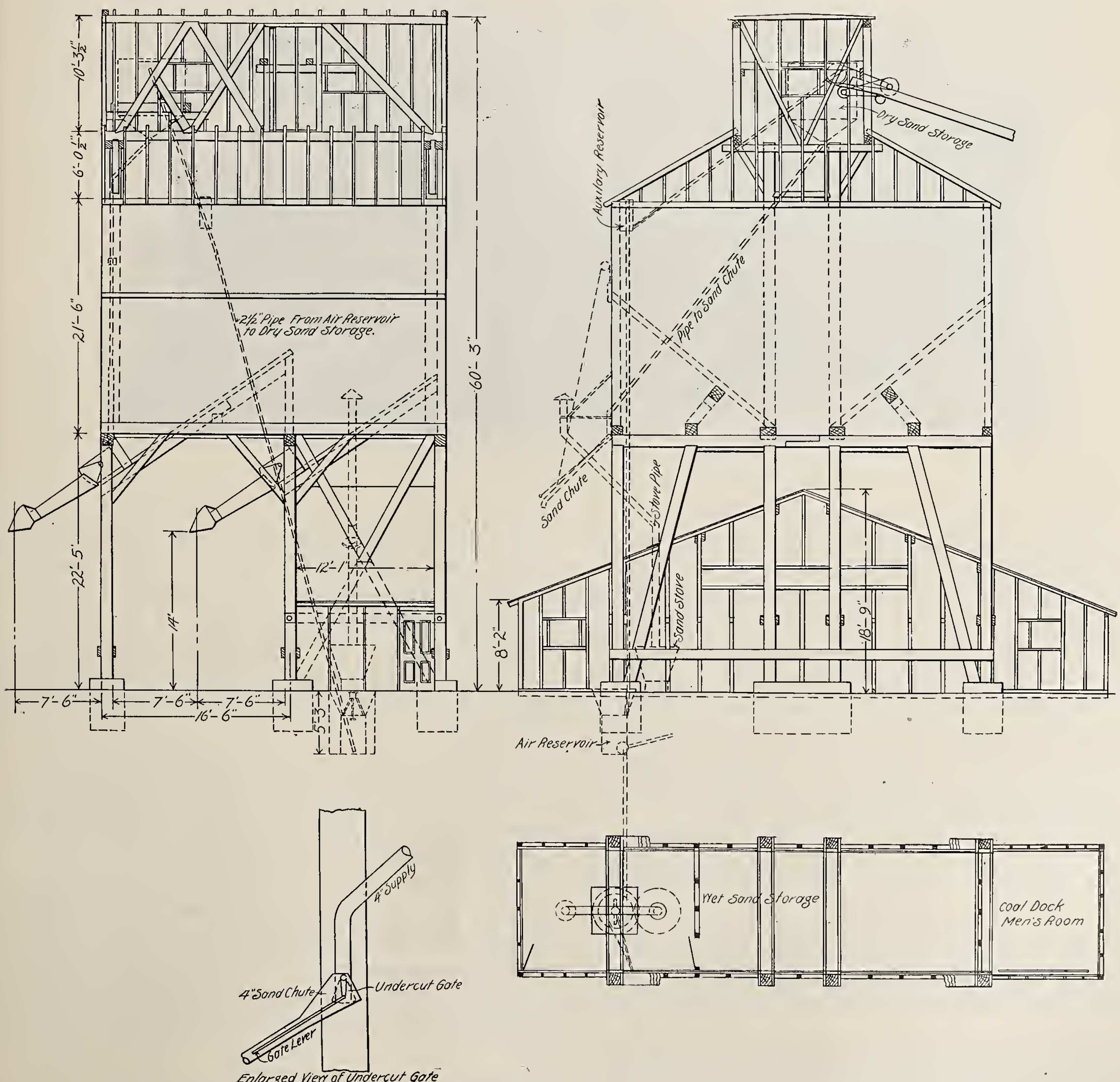


FIG. 14—KINSMAN ST. SAND HOUSE OF P. R. R. WEST OF PITTSBURG.

Union Pacific Motor Car No. 1

THE Union Pacific Railroad motor car No. 1, which is in actual operation, has thoroughly demonstrated the practicability of the gasoline motor as a transportation medium, and was built at the Omaha shops of the railroad company. It is a single-truck, four-wheel car, designed for light branch and interurban passenger service, and has a seating capacity for twenty-five persons. The car body is 31 feet in length and is mounted on wheels 42 inches in diameter. The weight is a trifle over 20 tons.

If car is too warm the water circulates below; if too cold, the majority of the water circulates through the interior coil.

Acetylene gas lighting system is used, giving a powerful light for the headlight, and the lamps inside the car are provided with opalescent panels, producing a soft and at the same time a powerful light.

Air brakes of the direct system on all four wheels are used. Attached to the crank shaft is an air pump, which supplies and maintains 100 pounds air pressure in two reservoirs of 13 cubic feet each. Numerous tests at a speed of 20 miles per hour have shown that the car stops in 112 to 115 feet, without inconvience to passengers. The air pressure is also used for starting the engine. In addition to the air brake, car is also equipped with a ratchet lever hand brake.

Union Pacific Railroad Motor Car No. 1.

The line of design of the car body is similar to that of a racing yacht, inverted, the front end being tapered off into a sharp point and the roof rounded off from the top, presenting no flat surface to the resistance of the atmosphere. The rear of the car is rounded off, avoiding the vacuum produced by square ends.

The upper deck and the old style sash ventilators have been done away with, and adequate ventilation is secured by means of roof ventilators, which exhaust by suction the air from inside the car, fresh air being taken in from the front of roof of car. A complte change of air can be obtained every four minutes, if desired. This avoids the stuffy and close atmospheric conditions so often encountered in electric and other transportation cars.

The floor of the car has been made entirely watertight and can be easily and thoroughly cleansed by flushing with hot water, destroying all germs and disease. The car can, therefore, be kept in a thoroughly sanitary condition.

The water from the cylinder jackets of the engine is run around the sides of the car, so that in cold weather the heat is radiated to the interior of the car. In warm weather this water is piped to coils immediately below the car. These two systems of coils afford a most perfect system of regulating the temperature inside the car.

The car as built is very strong, affording great safety to passengers in case of accidents or wrecks, as the strength of car almost entirely precludes the possibility of telescoping.

In addition to its efficiency, the car is a model of construction, and with its coat of maroon and aluminum striping makes a pleasing picture. The interior finish is of oil and varnish.

The motive power is a six-cylinder gasoline engine of 100 horse power. The cylinders are 8x10 inches, of the upright type, placed at right angles to center line of car. The six cylinders are arranged and connected up in opposed sets of three cylinders, resulting in three power-giving pulsations at each revolution of crank shaft.

Engine speed has a wide range of control, thus affording great economy under variation of load. A synchronizer facilitates and simplifies the changing of speeds. Reverse throttle and spark levers are all conveniently located and in easy reach of operator.

Immediately in front of operator is the air brake valve lever and the emergency spark cut-out, which enables the operator to stop engine and apply full brake power in less than half a second.

Spark current is furnished by eight cells of battery, with a "make and brake" spark device.

The clutches and controlling devices are all mechanical and of the simplest design. Special effort has been made to do away with the complicated machinery ordinarily used in utilizing gasoline power for propelling cars of this kind. By means of a special chain, the engine shaft drivers direct on the driving axle.

The car is intended for service on 4 per cent grades with frequent stops, and is therefore at present geared to a maximum speed of about 35 miles per hour, but with slight changes it could be very easily speeded to 60 miles per hour.

The acceleration of car from a standstill to 300 feet is superior to any electric car of the same horse power. The acceleration for the first 50 feet is much slower than the electric car; from 100 feet on, however, it is very rapid.

On a level or ½ per cent grade the car starts readily on high speed, direct connected, without the use of gears; although on anything over ½ per cent grade, or with a heavy trailer, it is necessary to use the gear speeds.

It is easily controlled by one operator; can be stopped and backed up at will, although it is designed to run in one direction.

The vibration and noise of the engine has been almost entirely eliminated; in fact, when car is in motion neither the vibration nor noise of engine can be distinguished. The exhaust of engine is destroyed in the muffler, the burnt gases escaping at rear of car without any inconvenience from same.

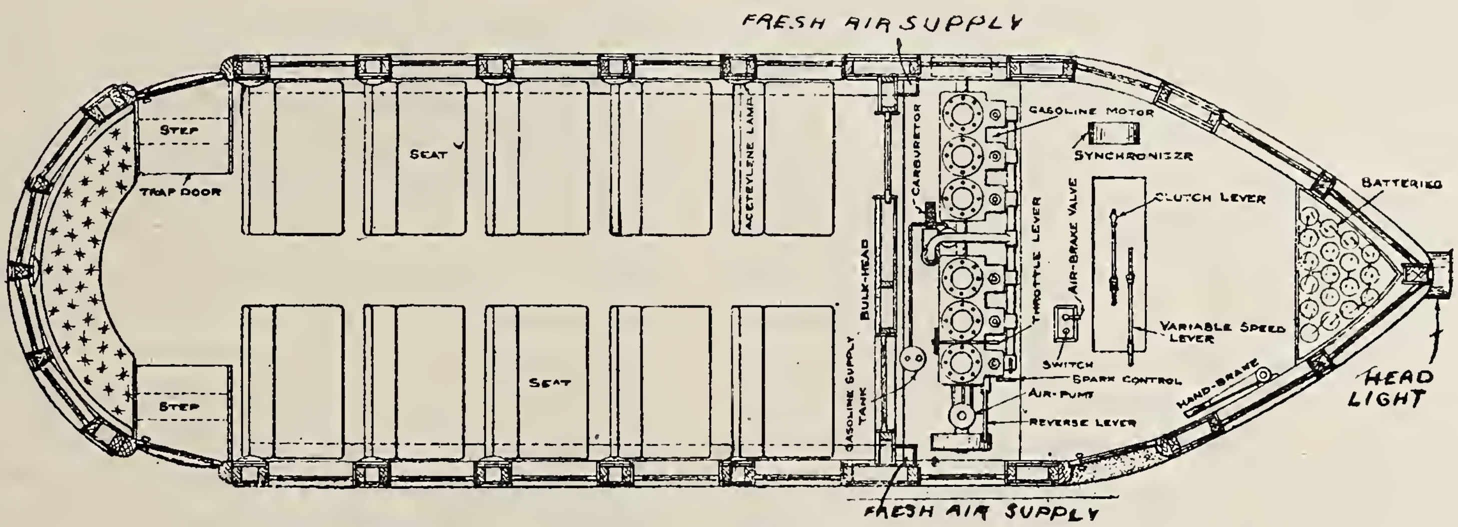
Car No. 1 was completed and turned out of the shops during the last week in March, 1905. Before being tested in actual road service the car was operated and thoroughly broken in around Omaha shops and vicinity. During these tests the motor car was coupled to two passenger cars, a standard mail car weighing 52,100 pounds and standard coach weighing 60,000 pounds. These cars were successfully started and accelerated, both on a descending grade and on a one-third per cent ascending grade, the motor thus starting a total load of 152,100 pounds.

Pulling standard mail car weighing 52,100 pounds, the trip was made to South Omaha and return. This is up a 1.6 per cent grade, which was ascended at the rate of 11 miles per hour, the total load pulled being 94,000 pounds.

In another test the motor car successfully ascended a sharp grade of 7.8 per cent, or about 400 feet to the mile, the car being stopped and started repeatedly on the grade.

On April 2, 1905, the car was given its initial long distance run. Leaving Omaha at 10:00 a. m. the run was made west to Valley on the main line of the Union Pacific railroad, a distance of 34.8 miles, and the performance of the motor car was most satisfactory, especially on the return trip, when the schedule for passenger trains was easily maintained.

April 10th a second test trip to Valley and return was made, the entire run—both east and westbound—being practically made on high speed.



Floor Plan of Union Pacific Motor Car.

April 16th the car was sent to Grand Island, Neb., and made the entire run of 154 miles in a most satisfactory manner.

April 17th to 22d, inclusive, the motor car was in regular service on branch line between Grand Island and St. Paul, Neb., making two round trips, or 89 miles, each day.

April 23d car made run from Grand Island to North Platte, a distance of 135 miles.

April 24th run was made from North Platte to Denver, 278 miles, without delay other than meeting trains, delays for orders, etc.

April 26th car made round trip, Denver to Brighton and return, distance 42 miles.

May 1st car left Laramie for Salt Lake City.

April 27th to 29th car was in regular service between Denver and Greeley, making one round trip of 107 miles each day.

April 30th car ran from Denver, Colo., to Laramie, Wyo., distance 164 miles Leaving Cheyenne, the ascent of Sherman Hill, the summit of the Rocky Mountains, was made, the 27 miles of steep grade being accomplished without difficulty.

The car arrived at Salt Lake City on the morning of May 4th. Since leaving Omaha April 16th it has made, entirely under its own power, a distance of 2,095 miles, and the performance of the car has been most satisfactory in every respect.

May 19th it arrived at Portland, Ore., its destination, to go into regular service.

It should be stated that the car has required but slight running repairs and has not been out of commission since starting on its journey.

Piece Work in the Railroad Shop

To the Editor:

I note your request regarding my opinion of the piece work system for railway shops, and in complying with same must first impress upon you that my opinions are based upon obesrvations made rather than upon actual experience, as you will remember that this experience was only of about one year's duration, while employed by the S., S. & S. Ry. (Sacramento, Seattle & Sitka). I have expressed my opinions upon this question heretofore to some prominent railway employers, who agreed that the opinion expressed was some better than the system as generally practiced. One of my tem to merit the antagonism of the majority of the labor organizations. I say majority, because there are some associations' membership who are employed entirely upon this system, two of which I understand are the strongest of the labor group. This statement does not include the Locomotive Engineers, which have only a partial membership receiving compensation per mile run. Of course, this mileage basis is not, strictly speaking, considered a piece work proposition, but it looks the same to me, whether an engineer is running an engine at 4 cents per mile or whether a machinist is turning a bolt at 1½ cents per inch.

I found that this antagonism was in fact merely a loose plank in a platform, similar to a political platform plank used to create an interest in the party which after having been elected used the plank in a manner to represent a reinforcement to the original structure, still retaining its individuality and always ready to be sprung again when the march of progress demanded an obstruction.

I have heard expressions of union men condemning the piece work system while they were actually employed at that time upon piece work in the shop, but I did notice particularly that when these same men were requested to do a "day work" job that considerable diplomacy was required upon my part to avoid an imitation artillery duel between the man and myself. He always seemed to figure it that there was no money in a day work job, although he was assured that all the time consumed in changing from the piece work job to the day work could be charged to the latter, thus preventing any loss to him. You can draw your own conclusions from this arraignment of facts as to whether the men employed upon piece work at present making fair earnings would wish as individuals uninfluenced by adverse teachings to return to the day work plan. You will remember the delay of twenty minutes in getting the 502 out of the house when you was visiting the shop; one of those Hay-Pauncefote duels was the cause of that, a duel in which about thirty minutes were consumed in taking a ten minute cut across a trailer box cellar. Notwithstanding all this seeming lack of consistency upon the part of the workman, I find that they do have good reasons for fearing this "paying a man what he is worth" system. In stating that there are good reasons, I have arrived at this opinion from making inquiries of honest, well-educated men in the ranks, men who are capable of advancing themselves as the majority of us in semi-responsible positions have done, and we are confident that our methods are absolutely correct in shop management affairs, hence their opinion is likewise worthy of weight, because they are going to fill our positions in the future when we get so bigoted and narrow-minded we cannot recognize improved methods. These men have invariably expressed themselves as fearing the system, not from any serious inconvenience that has been caused them personally, but from the fact that the majority of employers have been unfair in dealing with their workmen under this system. They realize that every shop official is out to establish a record for himself alone, and look forward with apprehension to the changing of their respective foremen, who have, generally speaking, made their record; as, according to tradition, the successor will cut the prices both per piece and per hour. By the way, the next man coming along seeking a position as foreman, guaranteeing a great large decrease in operating expenses by making a reduction in prices, is going to receive a present from me of a pick and shovel, together with free transportation to the new branch under construction, with the advice that he has missed his calling, and to start in again in the proper sphere; if, however, he should back up his proposition with a plan for installing new methods and devices he will get the best paying job around the shop, with a month's vacation each summer to spend in prospecting if he likes. And another thing, should I find him seated in some quiet out of the way place during working hours, communing with his thoughts, would give him an increase in salary, not a scorching ripping up the back because he had the appearance of having been loafing. He has got to help me do my thinking, as I haven't the time; he would be a great deal more valuable to the company than that type of foreman that has his sleeves rolled up to his elbows, hands and face plastered with grease and a dent in his hat the size of a mule's foot. In making these statements I am taking into consideration the view that our best paid men are our cheapest; judging from the recent appointment of a railway president at $120,000 salary per year. I do not stand alone in this view. You have, no doubt, seen one of those non-excitable foremen, walking around the shop, apparently oblivious to his surroundings, and when you asked him what Jones was working on or when the boxes would be borer for 510, or the pattern number of cylinder packing rings for the low pressure cylinder of the Baldwin compounds, he could tell you much quicker than you asked him, and at the same time request an increase in pay for Smith, permission to order some high speed steel and ask you to tell the blacksmith foreman that one-half an inch stock was enough on any forging. If you ever happen across one of this brand, rope him and tie him fast with the largest check obtainable each month. I simply mention this in passing, as he is the foreman you want when you start the piece work system. He will know his men and likewise their possibilities and will be able to place his work at the most advantageous points. His treatment of the workmen has inspired confidence and they will trust him to deal fairly with them. Let me add here that there is no successful piecework shop in operation at present in which the disposition is to deal unfairly by the employees. This same foreman will establish prices for you which will be economical to the company and also be profitable to the piece workers, and when these prices are finally adopted as being equitable to all concerned, don't get frightened because some of your men gradually increase their earnings until they are making double what they would at day work. This is only a healthy indication, it denotes that they were not aware of the extent of their abilities and are constantly becoming more efficient and likewise more valuable to you. Don't ever get the idea that because a group of workmen are prospering financially that they are necessarily growing dangerous; on the contrary, they are becoming more closely affiliated to your interests; your interests in this case are to increase the repaired locomotive output. If there is any reductions to be made in prices, remember that it is up to you and your foreman's ingenuity to provide methods to make these reductions without interfering with the workman's individual earnings; that is to say, if two men are required to keep up a particular job, as soon as possible devise a way whereby one man can furnish the required output. I might say here that this point mentioned is one of the principal questions of objection by labor organizations, they claiming that piece work as illustrated here is the means of throwing many mechanics out of employment, but in making this statement they will not admit that it is merely the survival of the fittest. I recently learned of a peculiar instance, which, however, I can vouch for as to its truthfulness, wherein some of the prices were set too high, a condition which was generally admitted by the workmen to be true, in this shop in question, and had there not been a sort of forced conspiracy between the foremen and their men, the output of locomotives would have been considerably less than it was. As an explanation of the "enforced conspiracy," I will mention one item as to its workings; two bar guides were listed at $2.07 per set, or per side, which price did not include reaming the holes; as you know it is indeed a poor mechanic who cannot hang two sets in ten hours; there were many instances where two sets were hung in seven or eight hours; the machinists feared to put them in on their time slips at this amount of time and their foreman also feared the results, hence some time was charged above ten hours, or, in fact, enough total time was charged up to keep the rate per hour down to thirty or thirty-two cents. Of course, all jobs done in this manner assisted in getting the engine out sooner, but had these foremen been arbitrary in the matter and forced these same mechanics to charge up actual time, I fear their output would have been lessened. This is a system much worse than no piece work at all, but goes to show that had the workmen had as much confidence in their M. M., S. M. P. or G. M. as in their foreman, this thing could have been openly discussed and the price adjusted, but it seems their committee had had some experience with these same officials previously and had branded them one and all as being record makers by unfair dealings with their employees. Railroads have many times in their experiments in this piece work question held themselves up to ridicule in establishing prices and in inspecting finished products; cheapness seems to be the rule rather than quality.

In Sacramento, cylinder packing rings are made for thirty cents per piece upon an improved 42-in. boring mill; in Sitka the same price must suffice, because everything is standard—except the locomotives—but in Sitka, instead of a double tool machine performing the operation, a lathe must be used. This of course causes a serious objection by the man behind the machine, and a righteous one, too. I believe each shop upon a railway system should have its own list of prices, and then allow each the work or kinds of work which can be produced the most economical at that point; the resulting developments will furnish all the information necessary as to the best means to employ as a whole to hasten locomotive repairs. Unless extremely careful, these results will show the need of new machines at some point; a very bad thing to show upon some railroads. I was so carried away in praising that particular foreman a few moments ago that I nearly forgot to tell you of the liking one of this class of foremen commanded from his men in a piece work shop. By his strict honesty in dealing he was enabled to obtain almost any kind of service; if in a pinch he thought it was necessary to run two machines with one man, he never had any difficulty in getting that man, and I know of many instances where mechanics would make from $5.00 to $15 more per month than they dared turn in, in fact donated these amounts each month, and this action was not on account of their having any particular liking for the company as a whole, but on account of their respect for the man and his opinion. I have not adhered strictly to the subject in this communication, and you will discover many little difficulties in actual practice which I have not touched upon.

Yours respectfully,

"Deac."

Ten Wheel Switcher for the Lake Shore

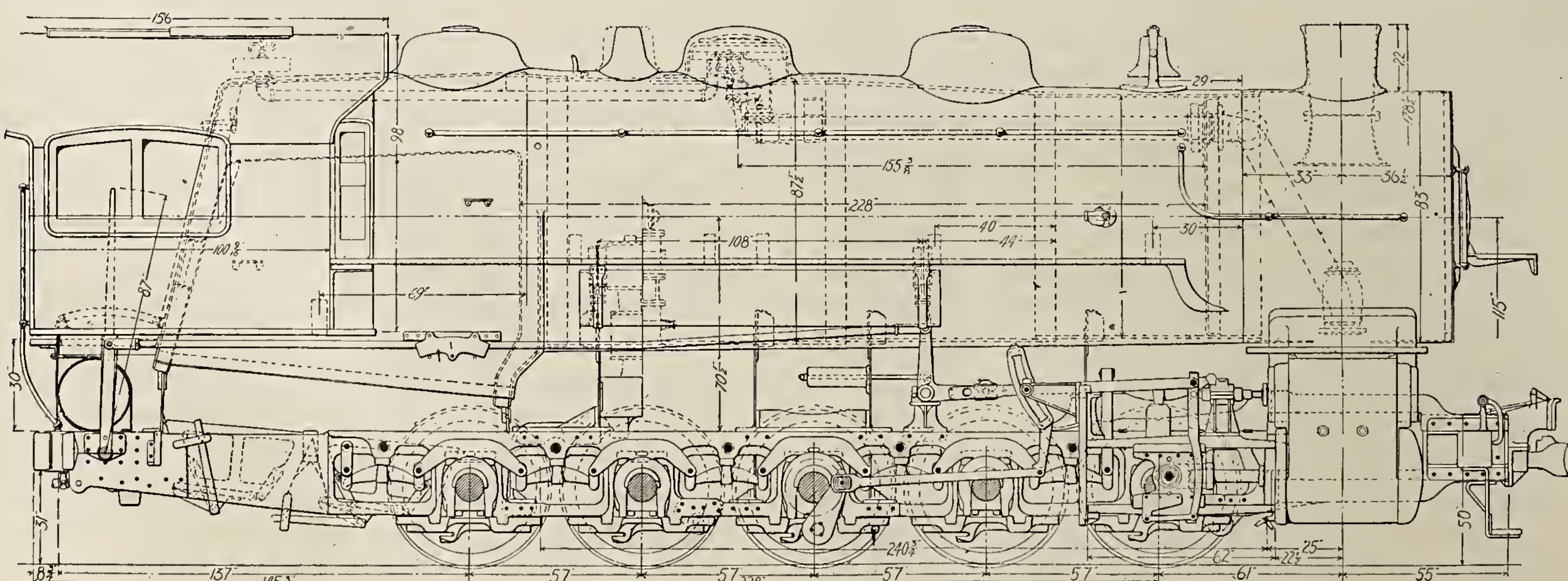
THE American Locomotive Co. has built five switch engines at their Brooks works for the Lake Shore & Michigan Southern Ry. which are remarkable productions in many respects, as our illustrations will show. These engines are the heaviest and most powerful yet built for yard service, and it is only in one or two cases that anything heavier on drivers has been built for any class of work, like for example, the Shay geared engine, also on ten wheels, or the Mallet compound, designed by the same builders for the B. & O., but which is a road engine, and has twelve driving wheels powered by two sets of cylinders.

These machines are simple, with cylinders 24x28 inches and ten drivers 52 inches in diameter. With the working pressure of 210 lbs., the maximum starting power capable of being exerted is 55,300 lbs. The total weight of 270,000 lbs. gives a coefficient of adhesion of 4.88, which is a rational factor for engines in the service these are destined for, and this broad gage coefficient will reduce to only 4.5 when the four inch tires are down to two inches in thickness or 48 inches in diameter.

The hump or gravity yard will be the scene of operations of these engines, and is responsible for their immense proportions. The modern system of receiving yards and classification tracks in which the gravity section is centrally located, necessitates the use of a high powered machine, since the approach to the hump, from which the cars descend by gravity to their assigned tracks, is usually on a rise of one per cent in each direction, while the classification tracks are practically level. The fact that all switching is done over the hump explains the need for a heavy engine, one that is able to take an incoming train without breaking a coupling, and make the proper distribution of the cars composing it. In fact such an engine requires more power to negotiate the one per cent grade than the engine that delivered the train, especially on such a level road as the Lake Shore.

All wheels are flanged and the equalization extends through the system with cross equalizer at front. The driving boxes and wheels are of cast steel, as are also the well designed transverse frame braces and pedestal binders, the latter being of the tapered slot style and secured by six through bolts. The water spaces are 4½ inches wide all around at the mud ring, and the firebox side sheets are nearly vertical; the latter feature being one that will no doubt have a strong influence on the

Ten Wheel Switch Engine for the Lake Shore.



Elevation Lake Shore Ten-Wheel Switch Engine.

steaming capacity of the boiler, which has a total heating surface of 4,625 square feet. The Walschaert valve gear controls the steam distribution, that system working out nicely in its application to these engines, and probably much better than a link motion in the space available for it.

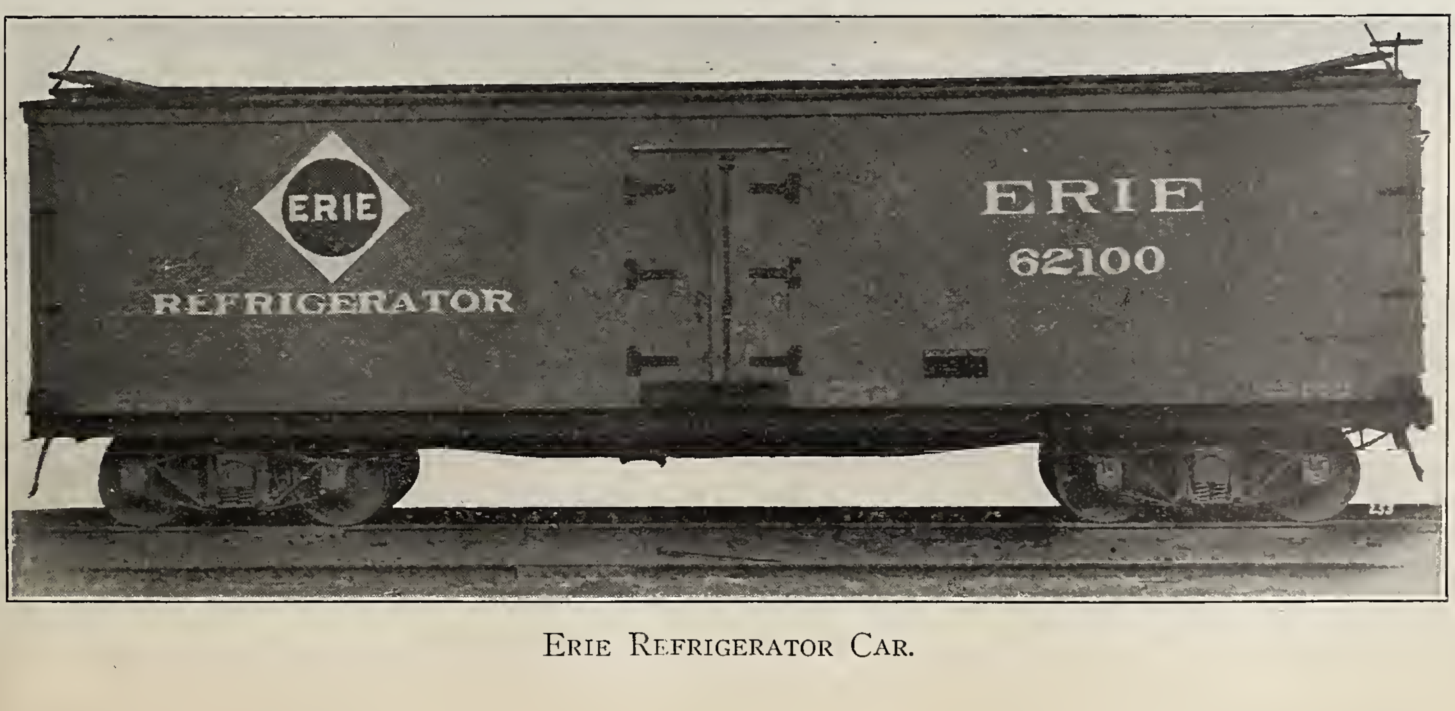
The headlight is brought down to a point where it will better serve its purpose, by means of a cast bracket on the front end door. The air reservoirs, of which there are two, are located, one under the running board in the usual place, and one under the deck, the latter reminding one of the original and common practice of placing the reservoirs is 66,000 cubic inches. These engines are at the front in point of design and construction, and represent what may properly be termed the most advanced ideas of the American mechanical engineer in steam practice for the service. They rank very closely with the heaviest of any type, weighing, with the 8,000 gallon tender, 419,600 lbs. in working order.

The following general description, will in connection with the illustrations, furnish a clear understanding of the more important details:

Cylinder, type simple piston valve; diam., 24 in.; stroke, 28 in.
Track gauge....................................4 ft. 8½ in.
Wheel base, driving..........19 ft.; rigid, 19 ft.; total, 19 ft.
Wheel base, total, engine and tender...........54 ft. 5½ in.
Weight, in working order, 270,000 lbs.; on drivers, 270,000 lbs.
Weight, in working order, engine and tender......419,600 lbs.
Heating surface, tubes........................4,422.2 sq. ft.
Heating surface, firebox............................203 sq. ft.
Heating surface, total.........................4,625.4 sq. ft.
Grate area..55 sq. ft.
Axles, driving journals, main, 10½ x 12 in.; others, 9½ x 12 in.
Axles, tender, truck journals, diameter, 5½ in.; length, 10 in.
Boiler, type radial stayed wagon top; O. D. first ring, 80 1-16 in.
Boiler, working pressure, 210; fuel, bituminous coal........
Firebox, type, wide.........Length, 108⅛ in.; width, 73¼ in.
Firebox, thickness of crown, ⅜; tube, ½; sides, ⅜; back, ⅜
Firebox..........water space, front, 4½; sides, 4½; back, 4½
Crown staying................................Radial 1 in.
Tubes...........material, charcoal iron; No. 447; diam., 2 in.
Tubes.................length, 19 ft.; gauge, No. 11 B. W. G.
Boxes, driving, main............cast steel; others, cast steel
Brake, driver.......................Westinghouse American
Brake, tender .... Westinghouse
Brake, pump.............11 in.; one reservoir, 18½ x 120 in.
Engine truck...................one reservoir, 24½ x 72 in.
Trailing truck ....
Exhaust pipe .... Single
Grate, style..............................Ry. Co.'s Rocking
Piston. rod......diam., 4¼ in.: piston packing, cast iron snap
Smoke stack.......diam., 20 in.; top above rail, 14 ft. 10½ in.
Tender frame............................13-in. channel steel
Tank, style.................................Water bottom
Tank, capacity..............................8,000 gallons
Tank, capacity, fuel............ ....12 tons
Valves, type......12-in. piston; travel, 5⅝ in.; steam lap, 1 in.
Valves, ex. lap.....................................None
Valve motion .... Walschaert
Wheels....driv. diam. outside tire, 52 in.; centers diam., 44 in.
Wheels......driv. material, main, cast steel; others, cast steel
Wheels, tender truck, diam., 33 in.; cast iron plate, No. 700

Erie Refrigerator Car-Steel Substructure

THE Standard Steel Car Co. has recently built for the Erie road an extensive freight equipment of composite construction, having steel sills and a modern superstructure, all from designs by the builders. Among these are a lot of refrigerator cars which possess all of the best features required for cold storage transportation. The sill construction is essentially the builders, and used largely on their output; the outside sills being made of channel section steel with the flanges placed outside, while the center sills are of the built up type, consisting of deep flat plates to the top and bottom of which the riveted steel angles at both sides of the plate, making an I-beam of considerable depth at the center of the car, giving a maximum section modulus at a point to best sustain the load, and bringing the neutral axis of the sills practically in line with the center of draft, which is seen to be an ideal construction for resisting buffing shocks. The draft sills, which are of channel section, effect a connection with the center sills at a point just outside of the bolsters. The flooring is secured to channels, which extend across the



Erie Refrigerator Car.

car between the sills, affording a fine foundation for a permanent job, and at the same time easily removed or renewed when required. General dimensions of this car are as follows:

ERIE REFRIGERATOR CAR.

Length over buffers............................37 ft. 11 in.
Length over end sills............................37 ft. 8 in.
Length inside............................36 ft. 0 in.
Width over sills............................9 ft. 2 in.
Width inside............................8 ft. 4 in.
Height from top of floor to underside of ceiling....7 ft. 5⅜ in.
Height of floor from rail............................4 ft. 1¾ in.
Width of door openings............................4 ft. 0 in.
Height of door openings............................5 ft. 11⅝ in.
Height of center of drawbar from rail...........2 ft. 10½ in.
Height of brake shaft from top of rail.............13 ft. 7 in.
Width at eaves............................9 ft. 9 in.
Height of running board from top of rail..........12 ft. 9 in.
Height at eaves............................12 ft. 0⅝ in.
From center to center bolsters..................26 ft. 10½ in.
Wheel base............................5 ft. 6 in.
Transverse distance between centers of journals...6 ft. 3 ins.
Diam. and length of journals............................4½ x 8 in.

The specialties used are:

American Steel Foundries Bolsters.
Symington journal boxes.
Standard Steel Car Co.'s brake beams.
Westinghouse air brakes.
Miner draft rigging.
Kelso M. C. B. couplers.
Hutchins three-ply plastic roofing.

Central Vermont Two-Cylinder Compound

THE Schenectady Works of the American Locomotive Co., has recently built a lot of nine two cylinder compound consolidation engines of the Richmond type, for the Central Vermont Ry., this order being the outcome of an extended trial of borrowed freight power of the compound system. The service demanded of these engines is of a severe character, the maximum grade being 1.13 per cent, while the sharpest curves, many of which are of the reverse variety, are of five degrees. These engines overcome the resistance due to the above conditions, with about 1,300 tons of train at a speed of 10 miles an hour. A few calculations will show that there are no pampered features about the performance of these machines for such loading is remarkably near the limit of their power, which is 39,700 lbs., maximum drawbar pull. The general dimensions and other particulars of interest will be found below:

CENTRAL VERMONT TWO-CYLINDER COMPOUND.

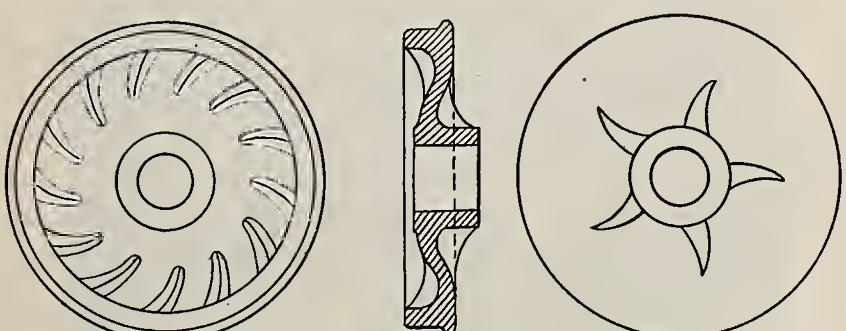
Cylinder, type, Richmond Comp.;
............................diam., 22½ and 35 in.; stroke, 32 in.
Track gauge............................4 ft. 8½ in.
Wheel base......driving, 17 ft.; rigid, 17 ft.; total, 25 ft. 6 in.
Wheel base, total...........engine and tender, 53 ft. 10⅞ in.
Weight, in working order, 192,500 lbs.; on drivers, 167,500 lbs.
Weight, in working order, engine and tender......327,800 lbs.
Heating surface, tubes............................2,757 sq. ft.
Heating surface, firebox............................154.9 sq. ft.
Heating surface, total............................2,911.9 sq. ft.
Grate area............................50.62 sq. ft.
Axles, driving journals...........main, 9 x 12; others, 9 x 12
Axles, engine truck journals........diam., 6½; length, 12 in.
Axles, tender truck journals......diam., 5½ in.; length, 10 in.
Boiler, type...........Ex. wagon top; O. D. first ring, 68⅜ in.
Boiler, working pressure, 210; fuel, bituminous coal.........
Firebox, type...........wide; length, 96⅛ in.; width, 75¼ in.
Fireboxes, thickness of crown, ⅜; tube, ½; sides, ⅜; back, ⅜
Firebox, water space..........front, 5½; sides, 4½; back, 4½
Crown staying .... Radial
Tubes, material, Nat. Tube Co. charcoal iron; No. 353; dia., 2 in.
Tubes...................length, 15 ft; gauge, No. 12 B. W. G.
Boxes, driving, main.............cast steel; others, cast steel
Brake, driver.............Westinghouse Amer. O. S. equalized
Brake, tender.............Westinghouse air signal, West. J.
Brake, pump........11 in. left hand; reservoir, one 24½ x 14
Engine truck................Two-wheel swing center bearing
Exhaust pipe...............single; nozzles, 5¼, 5½ and 5¾ in.
Grate, style............................Rocking, Cent. Vt. St'd
Piston rod..............diam., 3¾; piston packing, C. I. rings
.......16 in. and 17¾ in.; top above rail, 14 ft. 11 3-16 in.
Smoke stack, diameter,
Tender frame............................13-in. steel channels
Tank, style............................ U
Tank, capacity............................6,000 gallons
Tank, capacity, fuel............................14 tons

Valves, type, H. P. Piston; travel, 6 in.; steam lap, 1¼ in.; L. P. Allen-Richardson, 1 1-16.
Valves, ex. lap.............................clearance, 5-16 in.
Setting, 1-16 in. lead in full gear F. & B., both high and low pressure cylinders.
Wheels...driv. diam. outside tire, 57 in.; centers, diam., 50 in.
Wheels..........driv. material, main, cast steel; others, C. S.
Wheels, engine truck,
............diam., 30 in.; kind, A. L. C. cast iron spoke
Wheels, tender truck, dia., 36 in.; kind, A. L. C. cast steel plate

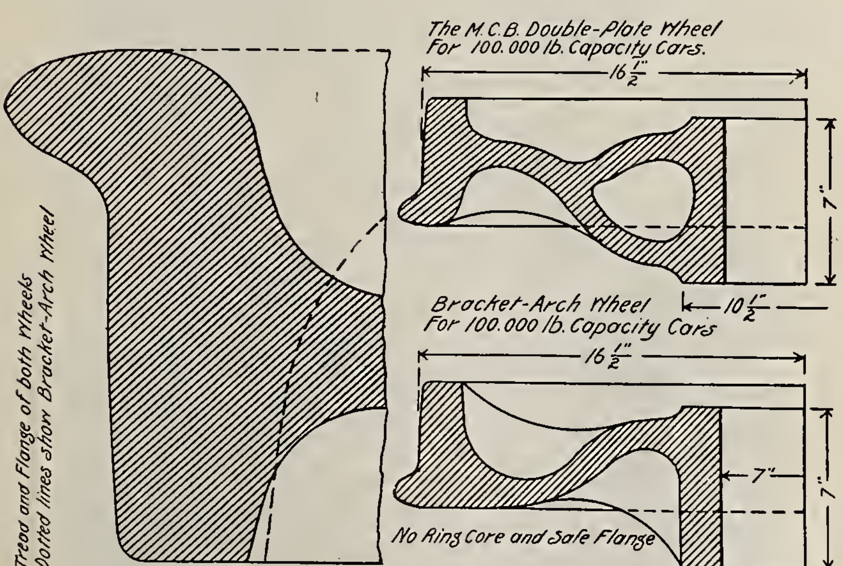
Bracket Arch Cast Iron Car Wheel

IN this type of wheel, there is no ring core nor double plate around the hub. This allows the wheel to be thoroughly inspected and makes it absolutely safe, as any defect can be readily detected. The large amount of gray metal over the flange, by the gray metal ending over it, adds additional strength and absorbs and conducts the heat from the flange caused by brakage and friction of flange against the rail. The arch plate and heavy fillet over the flange prevents the development of seams in the throat of flange so often met with in the double plate wheel in general use under the modern heavy cars. As this wheel takes but half the time in joining that the double plate wheel requires, it has better chill, the metal is more regular in grain, and the wheel is much stronger. According to the M. C. B. drop and thermal tests, this wheel is from 25 to 30 per cent stronger than the double plate wheels of the same weight and of the same iron; 700-lb. wheels of this type are in regular service on two of the principal railroad systems in the country under 100,000 lbs. capacity. D. P. Rennie.

Bracket-Arch Car Wheel



700 lb. Wheels of this Style in service under 100.000 lbs Capacity Cars



Reduction of Loss Caused by Clearance in Locomotive and Other High Speed Engine Cylinders

To the Editor.

Several years ago a writer for the "American Machinist" figured out the area of all of the clearance from the valve to the piston head and said that this volume of steam was all loss at initial pressure, each exhaust. Another writer took the subject up and proved that it was only loss at terminal pressure, as the expansion had been utilized. Now, I am going them one better and say that in high speed engines where it is necessary to have cushioning in cylinder to retard the piston as it comes to the end of its stroke, if the valve is proportioned and set right, that there will be practically little loss from clearance in the ordinary engine. We use an indicator in determining what to give our valves and find that one thirty-second of an inch inside lap is right for both passenger and freight engines, and then we set our valves at the cut off that the engine works in at its highest speed, making the valves line and line at this cut off, or at five inches on passenger and eight inches on freight engines. Valves proportioned and set like this will close up the exhaust port as piston approaches the end of the cylinder and the piston will then compress the remaining exhaust steam until at end of stroke it will reach the initial pressure of the live steam then being admitted and the temperature of all walls will be up to the right point to prevent excessive condensation of the live steam. Engines with valves set like this will always run smoothly, develop more power, and run faster and do it with less steam than what they would with their valves set in the old way, when the valves had inside clearance and then give them one-eighth of an inch of lead in full gear or three-eighths at eight inch cut off. We have all seen them, when they broke down and had to run with one side working, it was a question which way they were going to go when the throttle was opened. No matter which way the lever was, they took steam pretty near the quarter stroke. E. N. Wiest,

M. M., M. & N. E. R. R.

Dining Cars in Red and Yellow

The Burlington is spreading itself on its dining cars. The cars are going to the shops as they can be spared, with their cherry, mahogany, gold and sky-blue finish looking a little the worse for wear, and they come out a marvelous creation in yellow, Flemish oak and red. The dining car Ottumwa, in service west of Lincoln, the woodwork in the interior of the car is finished Flemish oak; the furniture and the panels are the same. The ceiling is a bright yellow, studded with white Pintsch gas lights. Over each table are delicate candelabra in red and gold. The chairs are Flemish oak with red leather backs; red and yellow tile on the floor; red curtains mounted below colored light filters.—Nebraska State Journal.

New Angus Shops Canadian Pacific Railway

(Continued from page 159.)

BLACKSMITH SHOP.

The blacksmith shop is constructed in the shape of an L; one leg being about 146 ft. wide and the other over 130 ft. wide. The wider section, which is also the longer, extends parallel to the midway and is used principally for locomotive work, while the shorter leg, extending toward the passenger car shops, is used for car forgings. Both parts of the building are divided into three bays of about equal width, the center one being considerably higher with windows on both sides and a longitudinal monitor with a glass roof on top. This arrangement makes the center of the shop comparatively light and well ventilated. The center bay has a separate roof truss supported on rows of steel columns, as is also the construction of the roof trusses for the side bays, which are supported by brick pilasters in the wall and by the steel center columns. The side walls are divided into panels 21 ft. 7 in. wide by the brick pilasters, and in the center of each panel is a very large double window with six sashes, all of which can be swung, to provide good ventilation. On the side of the main wing farthest from the midway is a fourth bay with a concrete roof supported by I beams. The ends of the larger roof trusses on this side are supported by steel columns instead of brick pilasters, as is the case in other parts of the building.

The location of tools is clearly shown in the floor plan. From this plan it is seen that the heavy hammers with their furnaces, are located at the end of the shop nearest the locomotive department. A large number of open fires for hand or light hammer work occupy the central location, while the machines, such as bolt headers, upsetting machines, shears, etc., are located at the opposite end. In the wing extending back from the midway are found the large bulldozers, punch and shears, some large hammers and small machines, which are used principally for car forgings.

Practically all the machines are individually driven by induction motors, the size being shown in the list of tools. Each bulldozer is usually served by an oil furnace and a jib crane, arranged to cover the adjacent track, furnace and machine.

The forges use direct draft, and ventilation is procured by means of hoods over the forge with pipes leading upward to an induced draft fan.

CAR MACHINE SHOP.

This building is constructed of brick and is 130 ft.x280 ft. outside. It is one story in height and divided into three bays by a double row of steel posts which support the wooden roof trusses. In the center of each roof panel, with the exception of the two end ones, are monitors, of a design similar to those used on the other buildings.

There are three tracks running through this building, which also pass across the midway and through the blacksmith shop. The floor is of 3 in. plank laid on 4x6 sleepers imbedded in cinders.

The location and grouping of machines is clearly shown in the floor plan. The size of motors and names of machines are given in the list of tools.

The wheel lathes for steel wheels are located in this building, but no freight-car wheel work is done here. The machines using material directly from the black-

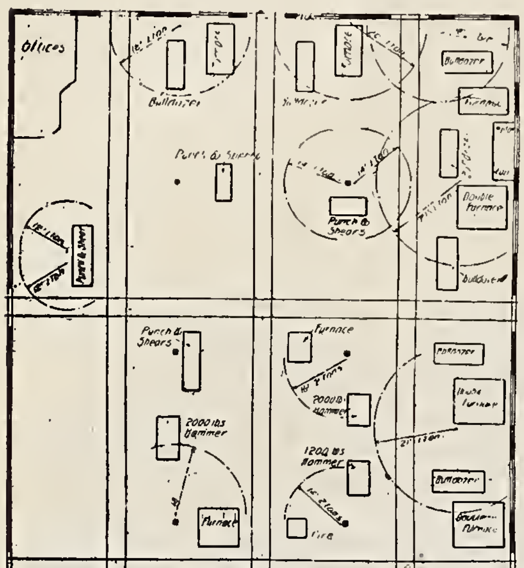
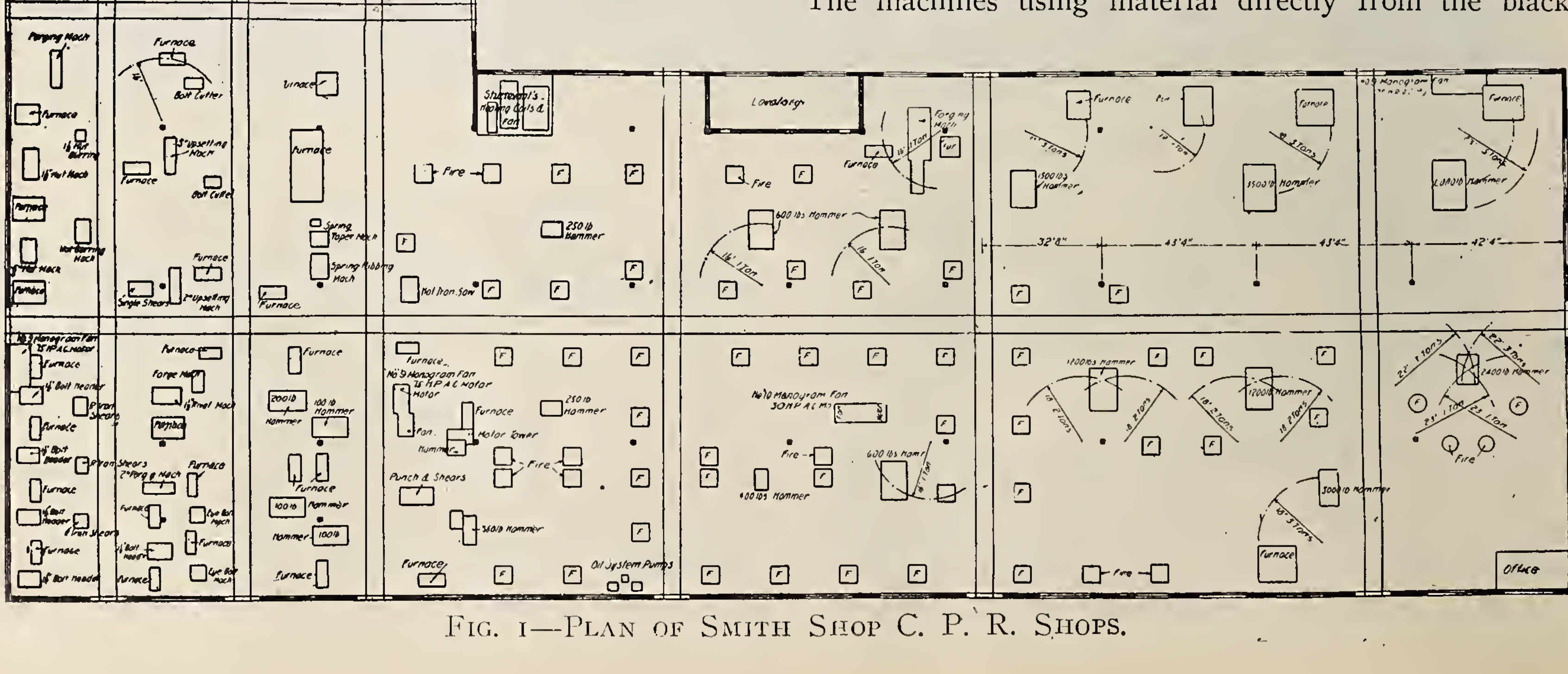



Fig. 1—Plan of Smith Shop C. P. R. Shops.

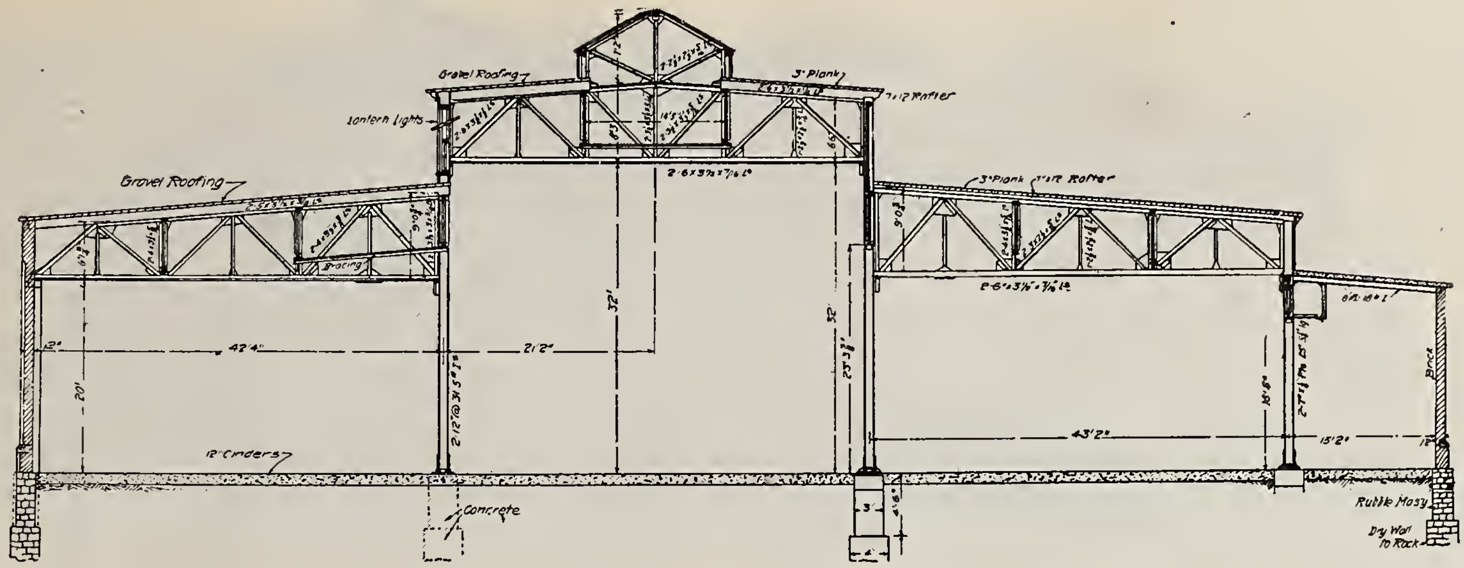


Fig. 2—Elevation of Smith Shop C. P. R. Shops.

smith shop are located at the end of the shop nearest the midway or the end nearest the smith shop.

A novel arrangement of axle lathes has been installed in this shop. Two machines are put back to back, with distance enough between them to allow swinging an axle, over a concrete pit. This pit extends from the front sides of both machines for their whole length, and is about 12 in. deep at the sides, draining to a well in the center about 18 in. below the surface. Concrete piers are provided for the rear legs of the lathes. The water used in turning is allowed to run off the machine into the pit from which it drains into a covered well at the center. This well is connected to the pumps on the lathes. The chips also fall into the pit where they can be shoveled out.

TRUCK SHOP.

The truck shop is 82x434 ft., and is built of brick. It is divided into four bays at the eastern end by a triple row of wooden columns supporting wooden roof girders. At the western end it is divided into three bays by steel

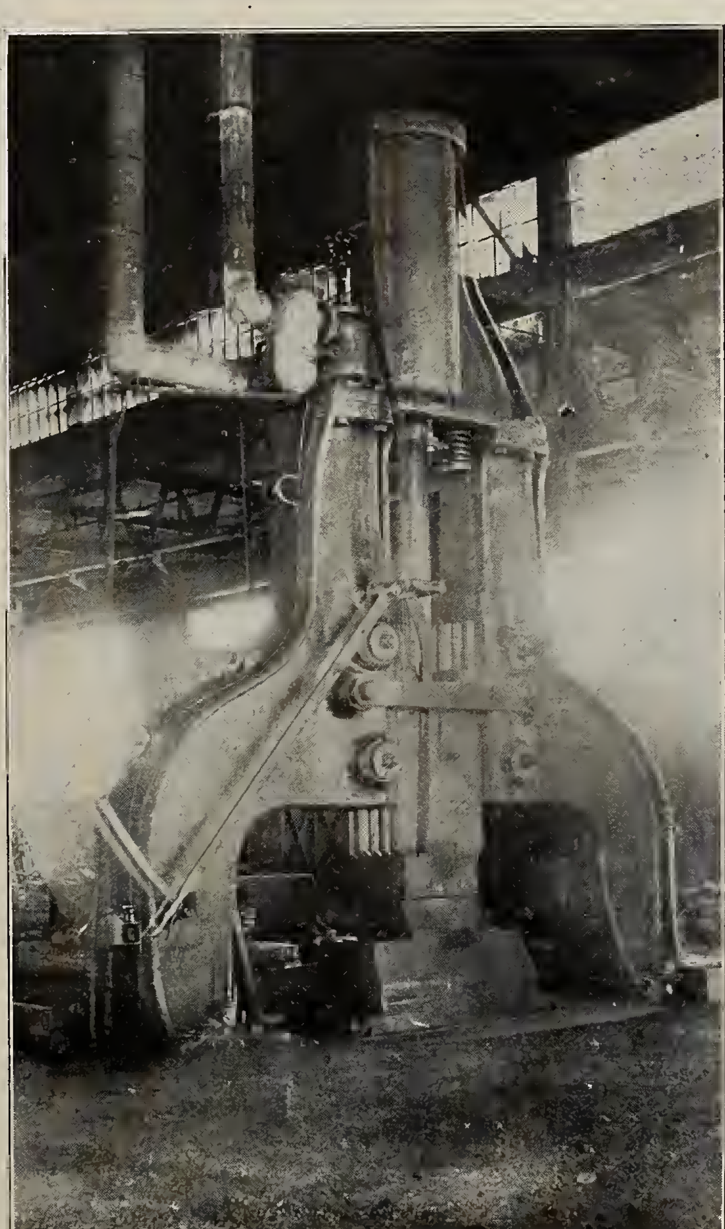


Fig. 3—Steam Hammer in Smith Shop C. P. R. Shops.

Fig. 4—Interior View of Smith Shop C. P. R. Shops.

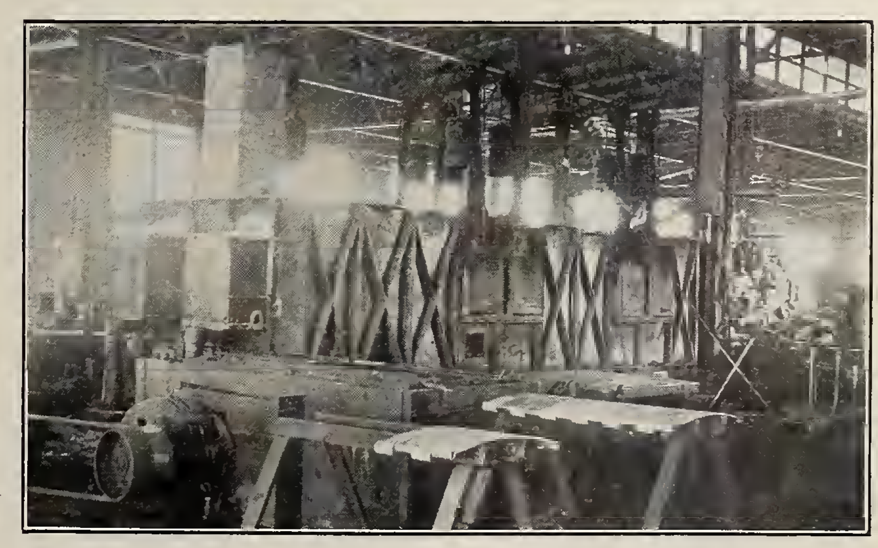


Fig. 5—Railway Materials Company Oil Furnaces in Spring Shop C. P. R. Shops.

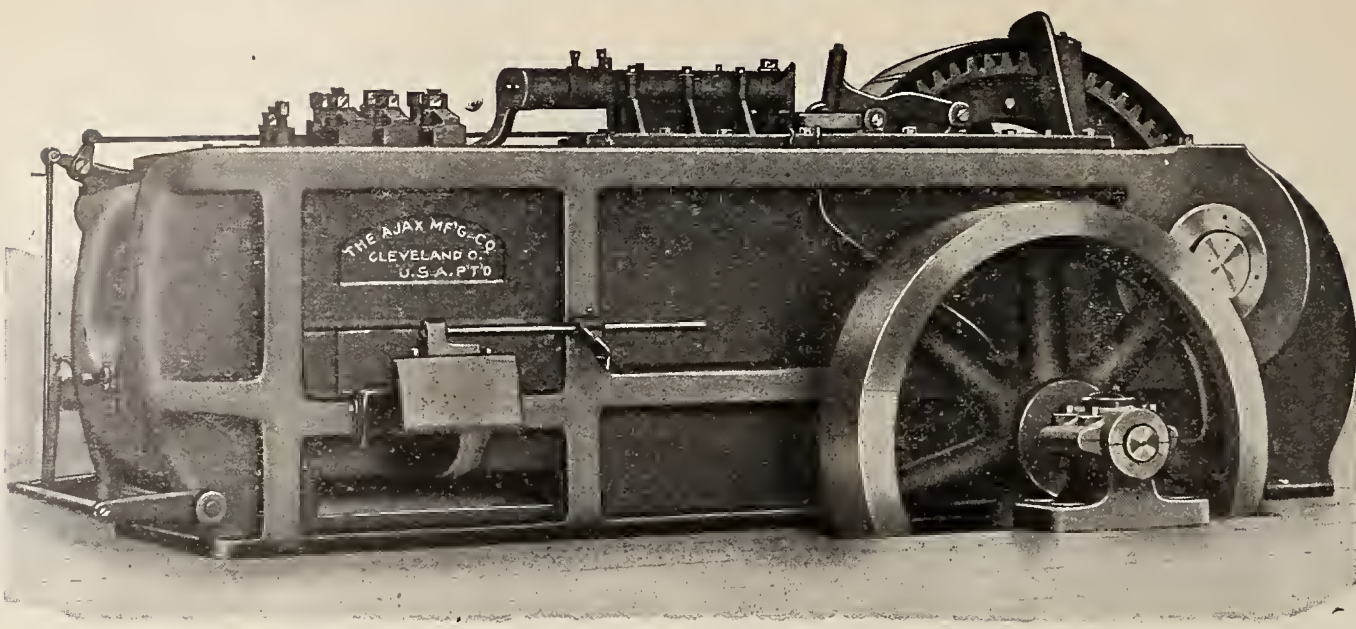


FIG. 6—5-IN. AJAX HEADING, UPSETTING AND FORGING MACHINE C. P. R. SHOPS.

columns supporting steel I-beam roof girders. The wheel and axle work is done in this eastern portion nearest the wheel foundry, and the erecting at the western end. Steel construction was used at this end to allow cranes capable of handling trucks to be placed over the pits. On each side of the erecting tracks are two shallow pits about

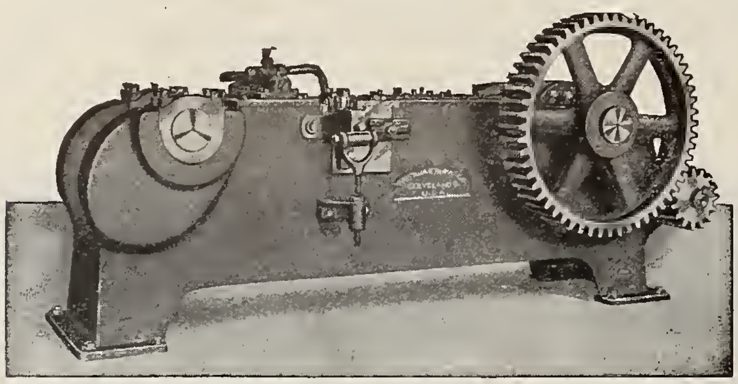


FIG. 7—1½-IN. AJAX HOT PRESSED NUT MACHINE C. P. R. SHOPS.

15 in. deep and 18 in. wide, outside the rails, which have been found to be of great convenience in erecting trucks. The general lighting of this building has been given the same attention as that noted in the other buildings.

WHEEL FOUNDRY.

The wheel foundry is a building of brick and steel construction, 107x187 ft. outside dimensions, with an extension 27x148 ft. on one side for the cupolas, blowers, core ovens, etc. About forty feet at one end of the building is used for annealing pits and storage space. The main floor is in two bays, divided by a row of steel columns down the center supporting the steel roof trusses. The space over the annealing pits is open, and the roof is supported by five steel girders extending from the pilasters in the end wall and from steel posts at the next roof truss. A 1½-ton electric crane serves the space over the annealing pits. Part of the cupola additon is two stories in height, the upper floor being a charging platform. The charging material is brought in small cars from the supply on the elevator which raises it to the charging platform.

The moulds are set in rows transversely across the building, and over each row is a traveling hoist for handling flasks and castings. Between each row of moulds is a narrow gauge track for carrying the metal from the cupola.

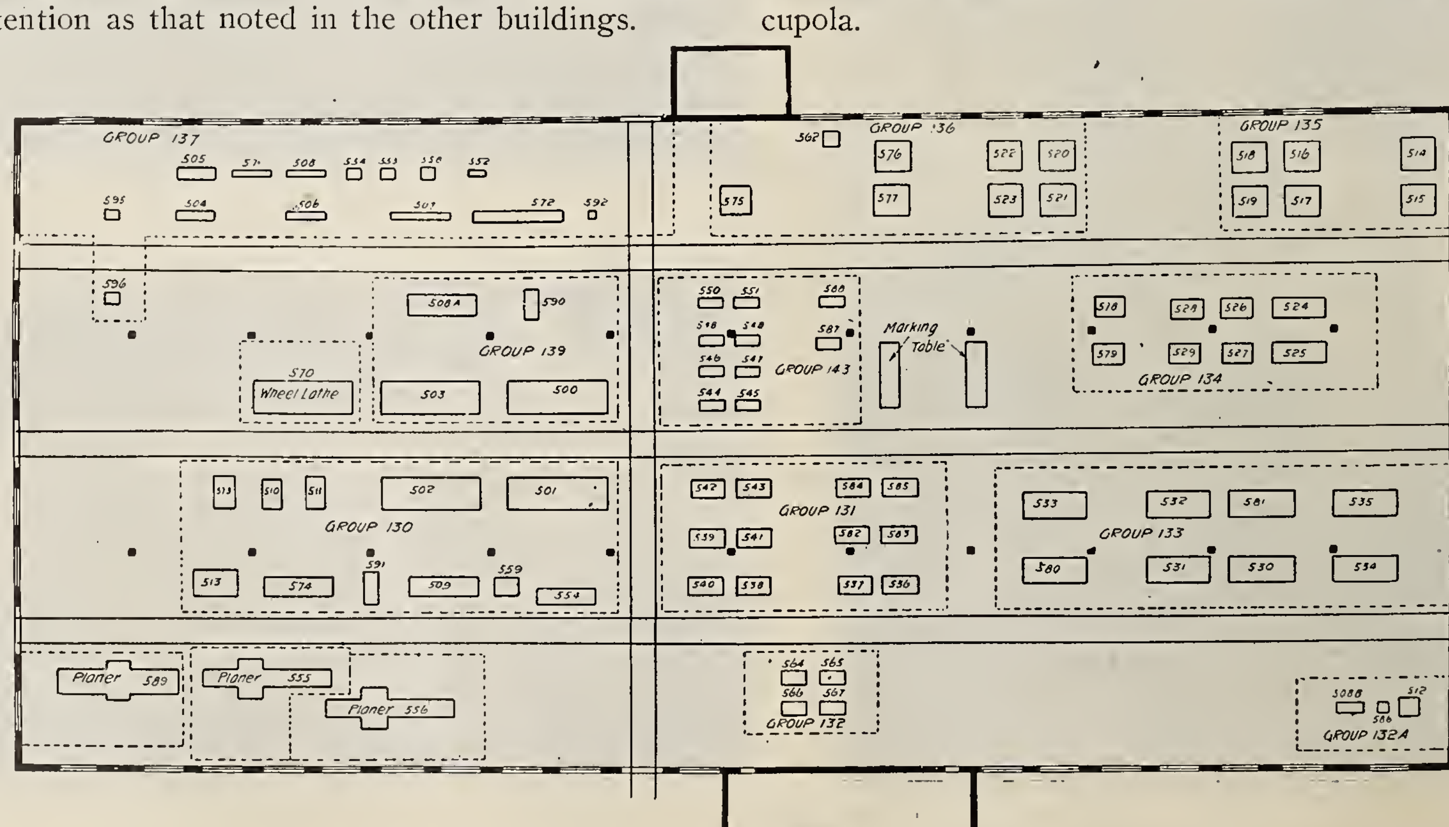


FIG. 9—PLAN OF CAR MACHINE SHOP C. P. R. SHOPS.

FIG. 10—INTERIOR VIEW OF WHEEL FOUNDRY C. P. R. SHOPS.

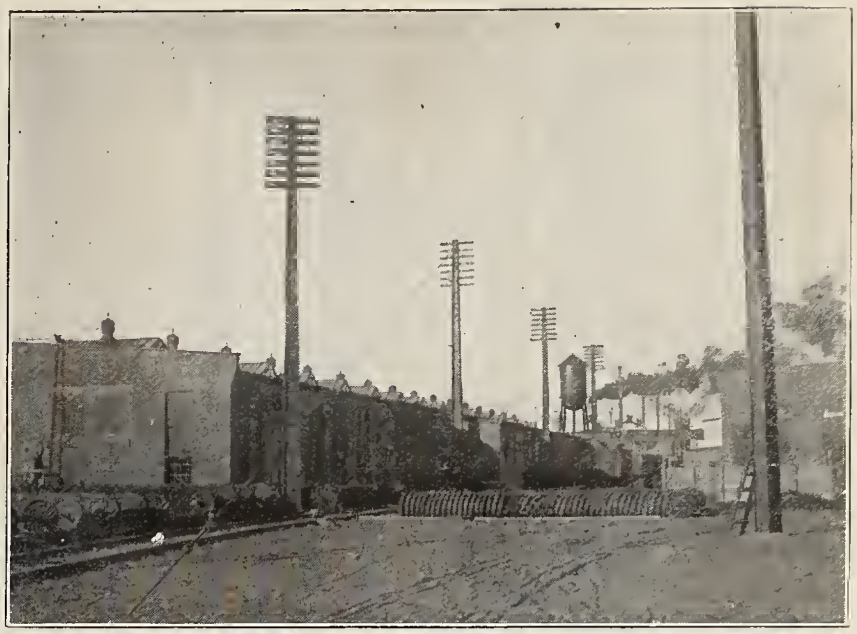


FIG. 11—OUTSIDE VIEW OF TRUCK SHOP C. R. P. SHOPS.

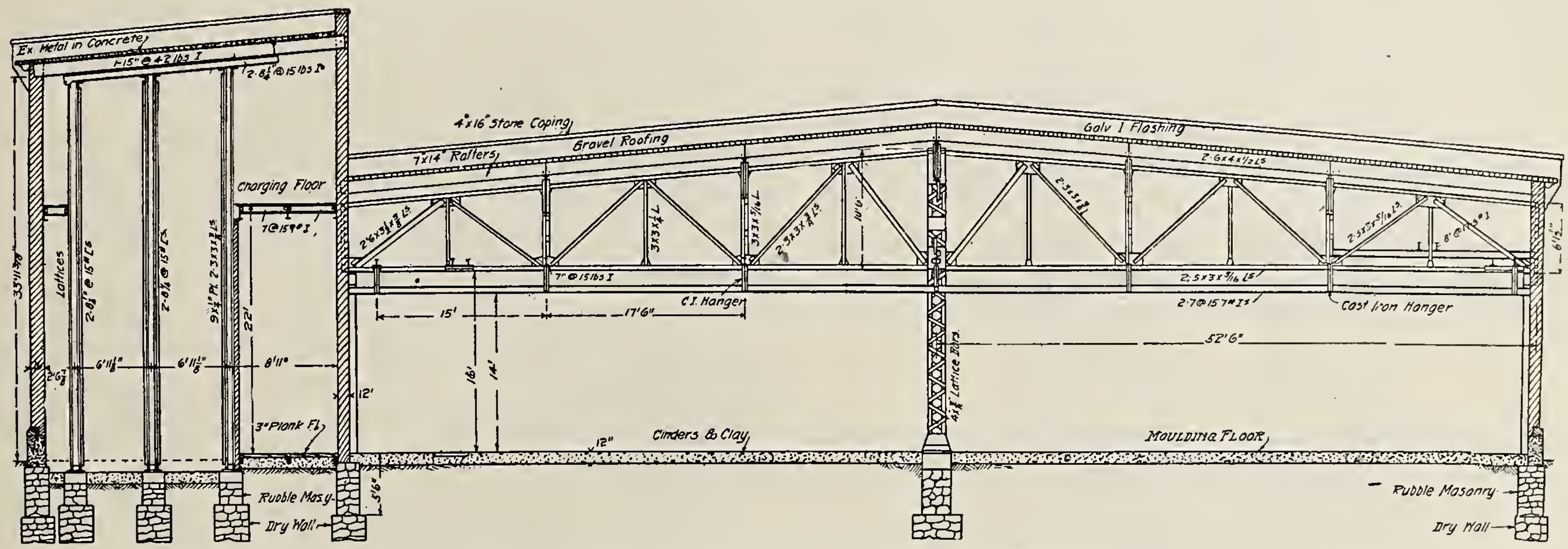


FIG. 12—CROSS SECTION OF WHEEL FOUNDRY C. P. R. SHOPS.

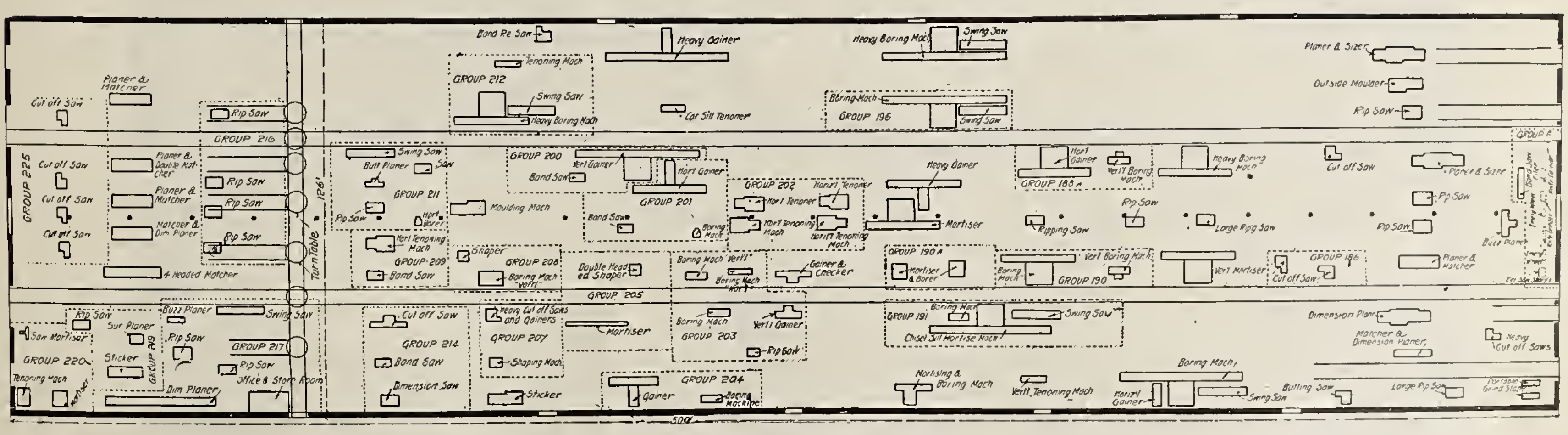


FIG. 13—FLOOR PLAN OF WOOD MILL C. P. R. SHOPS.

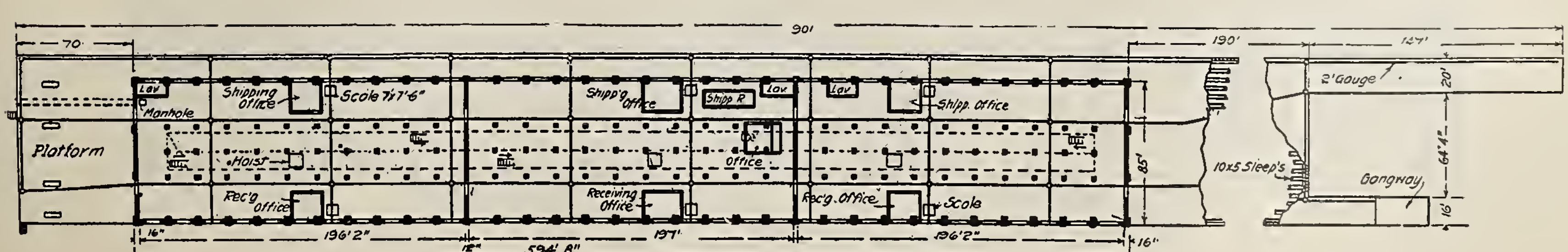


FIG. 14—FLOOR PLAN OF STORE HOUSE C. P. R. SHOPS.

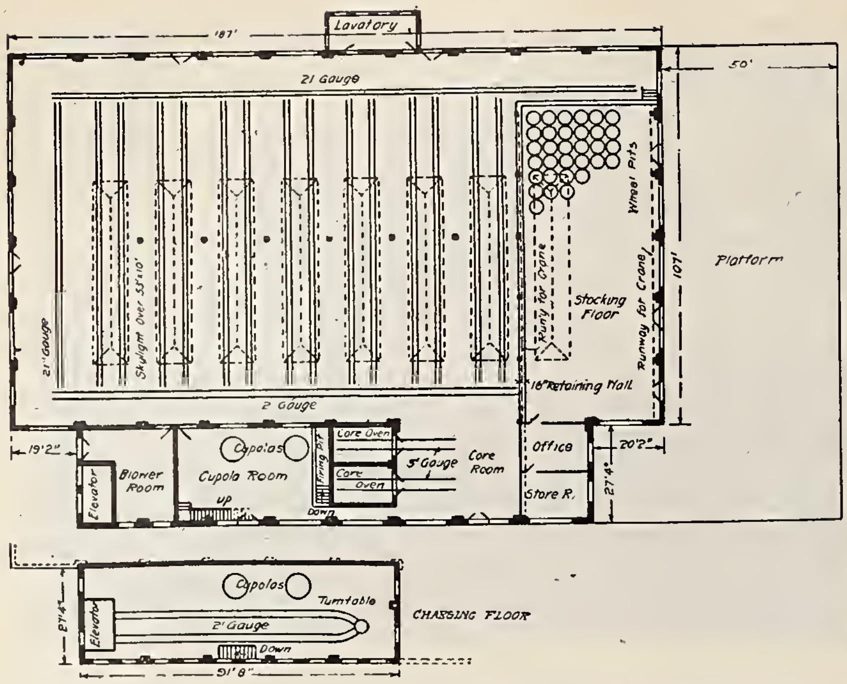


Fig. 15—Plan of Wheel Foundry C. P. R. Shops.

Fig. 16—View of Switch Board C. P. R. Shops.

FREIGHT CAR SHOP.

The freight car shop is of brick construction with wooden roof trusses supported by pilasters in the walls and a row of steel columns down the center of the building. The outside dimensions of the building are 107x540 ft. There are four erecting tracks running the full length of the building, and two standard gauge supply tracks between them. Six traveling cranes fitted with air hoists span the erecting tracks and handle the heavy material. The crane runways are supported on the side walls by steel brackets set into and bolted through the brick pilasters.

PLANING MILL.

The planing mill, which is 126x500 ft., is a brick building with wooden roof trusses constructed similar to that of the car machine shop. There is one row of wooden columns through the center. A supply track passes down the center of the two bays formed by the columns. A track from the dry kiln passes across the building with turntables at each of the longitudinal tracks. The longitudinal tracks extend across the midway and a short distance into the freight car shop, which allows long sills and other heavy wooden parts to be carried beneath the cranes on the freight car shop. They also extend through the opposite end of the building and connect with the numerous tracks through the lumber yard.

The location of machines and general arrangement of equipment is shown in the floor plan. From this it is seen that the machines for heavy work are located along the west longitudinal supply track, where the work can be easily transferred to push cars.

The machines are individually driven to a large extent,

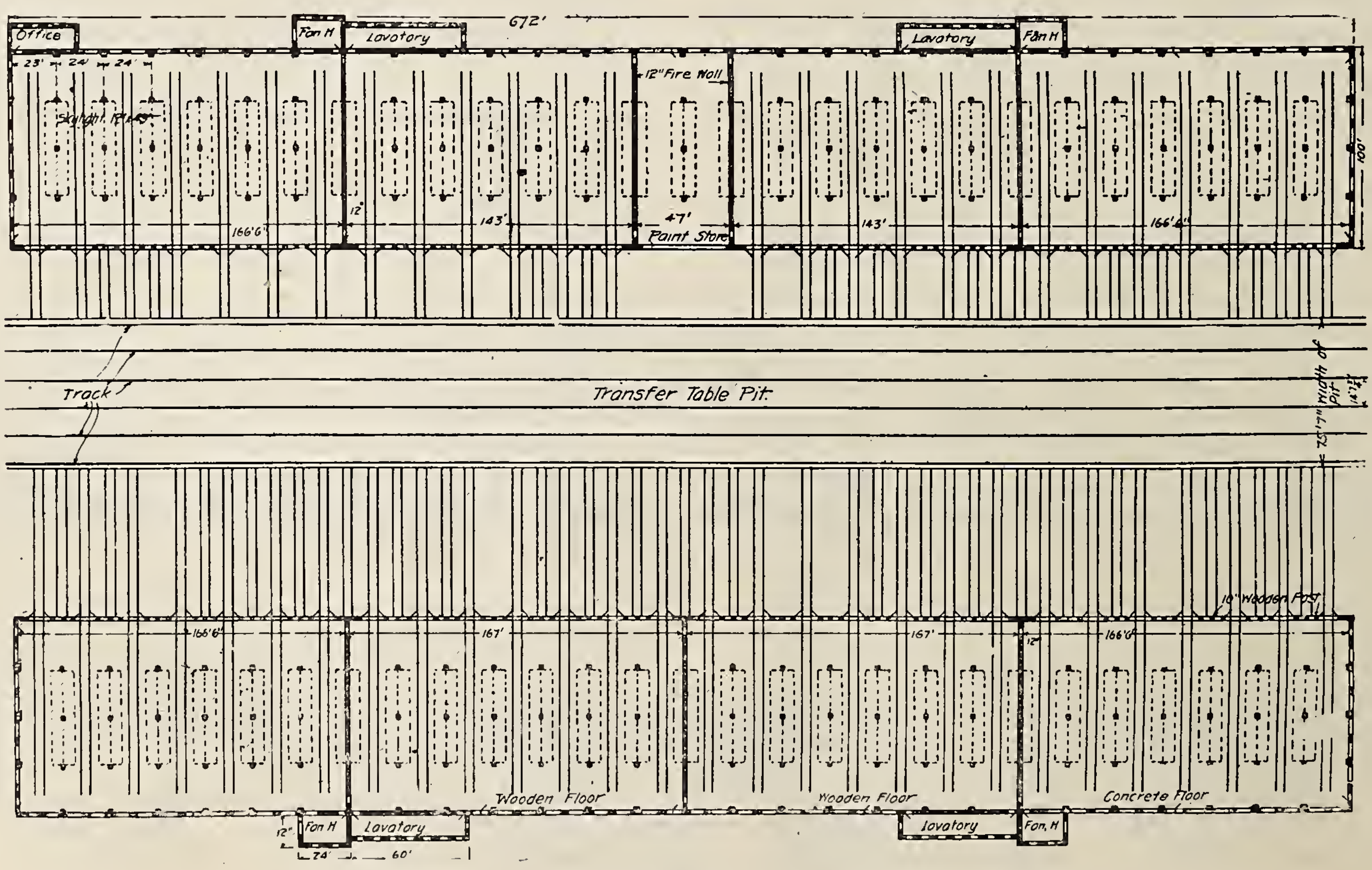


Fig. 17—Plan of Passenger Car Shops C. P. R. Shops.

FIG. 22—VIEW OF SHAVING COLLECTOR ON POWER HOUSE C. P. R. SHOPS.

although there are a number of groups containing two or three machines.

PASSENGER CAR SHOPS.

There are two buildings for passenger car work, each 100x672 ft., with a 75 ft. transfer table between them. Each shop has 28 tracks spaced 24 ft. centers. The buildings are constructed of brick with wooden roof trusses supported by a triple row of wooden posts similar to the construction of the truck shop. There are transverse monitors over the space between each track, and particular attention was given to lighting in the wall facing the transfer table. One of the buildings is set back 75 ft. from the transfer table, which allows for the storage of a car outside the shop. Both of the buildings are divided into several sections by 12 in. fire walls.

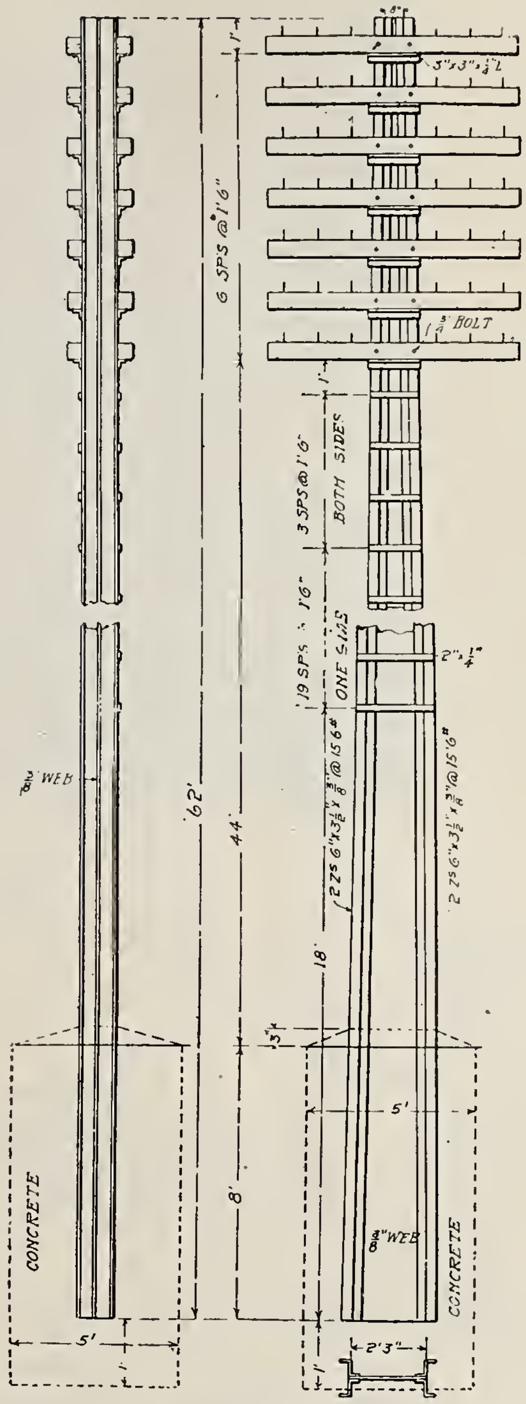


FIG. 18—DETAIL OF ELECTRIC WIRE POLES C. P. R. SHOPS.

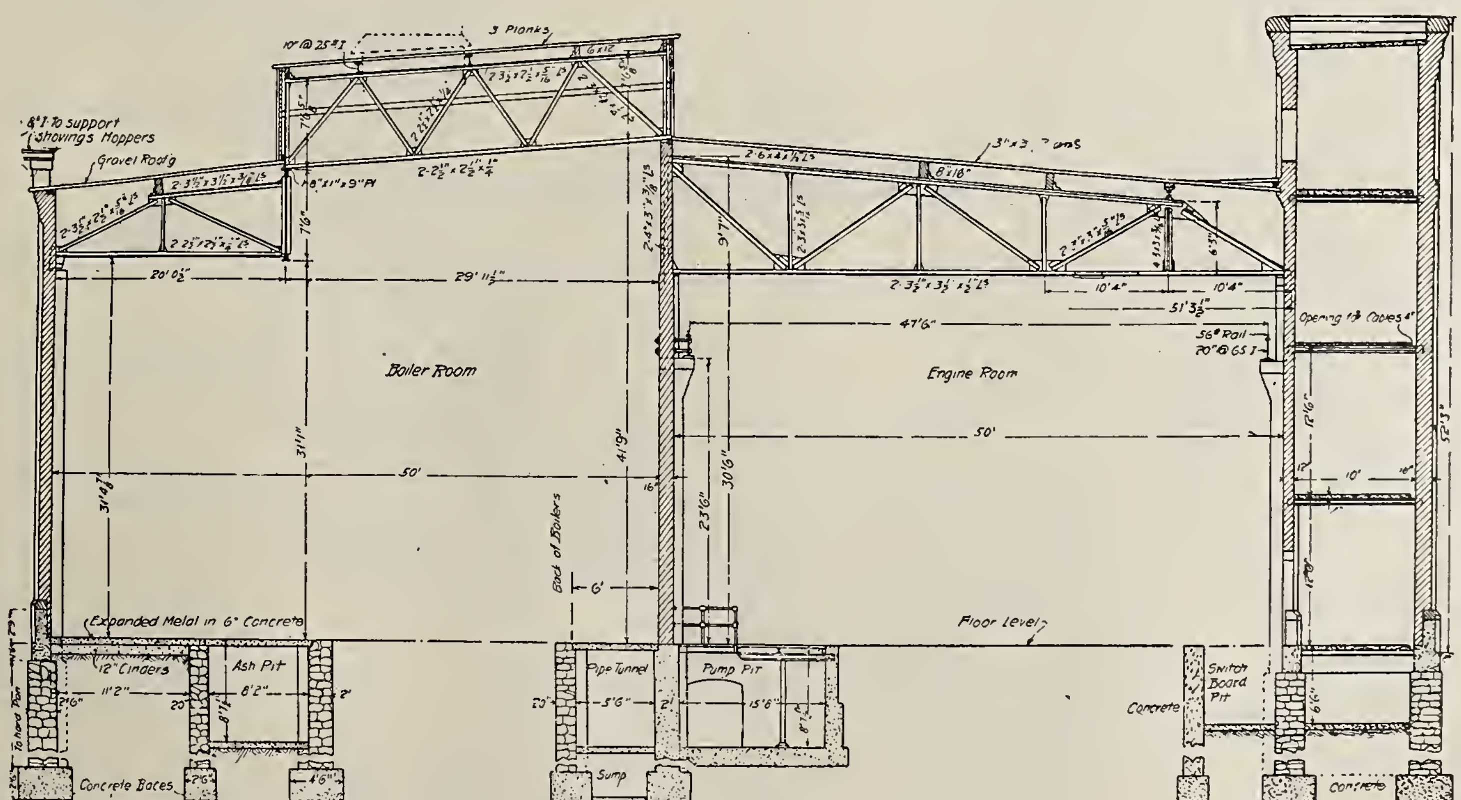


FIG. 19—CROSS SECTION OF POWER HOUSE C. P. R. SHOPS.

The transfer table is driven by a three-phase variable speed alternating current 20 h. p. motor. The table was installed by Geo. P. Nichols & Bro., Chicago, and has their standard arrangement of connections. It has two running speeds of 125 and 300 ft. per minute and a drum for hauling cars. The motor is reversible, which greatly simplifies the gearing.

CABINET SHOP.

The cabinet shop is 62x500 ft. About half of the building, which is two stories high, is set apart for hard wood storage. In the other section are located the upholstering department on the upper floor, and general cabinet work on the lower.

There are but few machine tools, as most of the work consists of fine hand work for the interior of coaches. In the upholstering department the sewing machines are driven by a motor.

POWER HOUSE.

The power house is located near the wood mill in order to use the refuse. Between the power house and planing mill is a tall brick structure for the storage of shavings.

The building is 103x163 ft., the engine room occupying 50 ft. of the width. There are four longitudinal monitors, two over the engine room and two over the boiler room. The section for the engine room is spanned by an electric 10-ton traveling crane.

Running along one side of the engine room, next to the boiler room wall, is a pit 9x16 ft. for the pumps and low pressure piping. Part of this is covered by a grating. On the boiler room side of the wall is another pit which is entirely covered by a concrete floor, and forms part of the tunnel system carrying the piping to the different shops. Below the grates of the boilers is an ash pit, which comes to the surface outside the building, where the ashes are removed on small cars. On the side of the building farthest from the planing mill is a brick tower for electric cable connections. A pit running along the inside of the building wall contains the cables com-

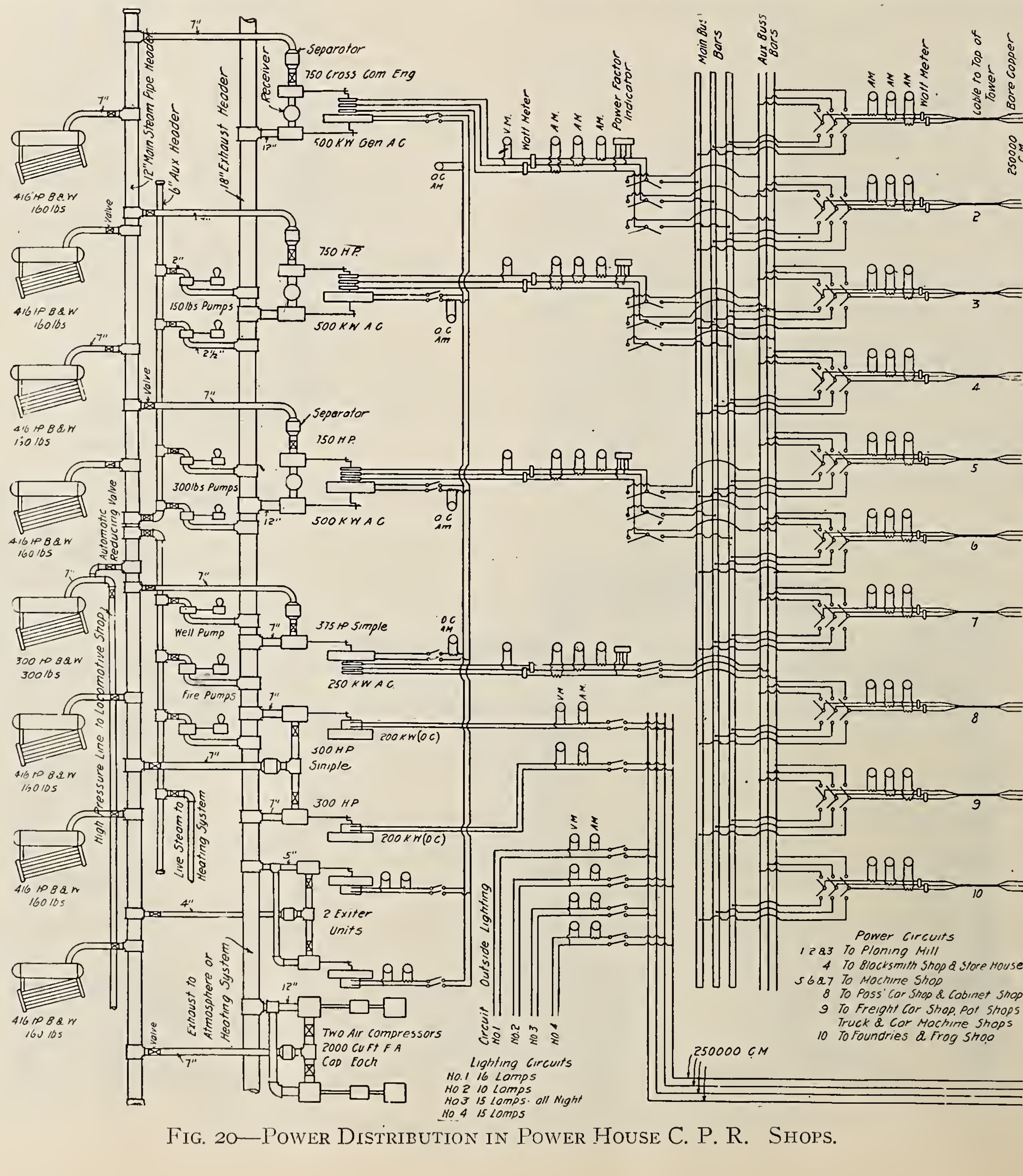


FIG. 20—POWER DISTRIBUTION IN POWER HOUSE C. P. R. SHOPS.

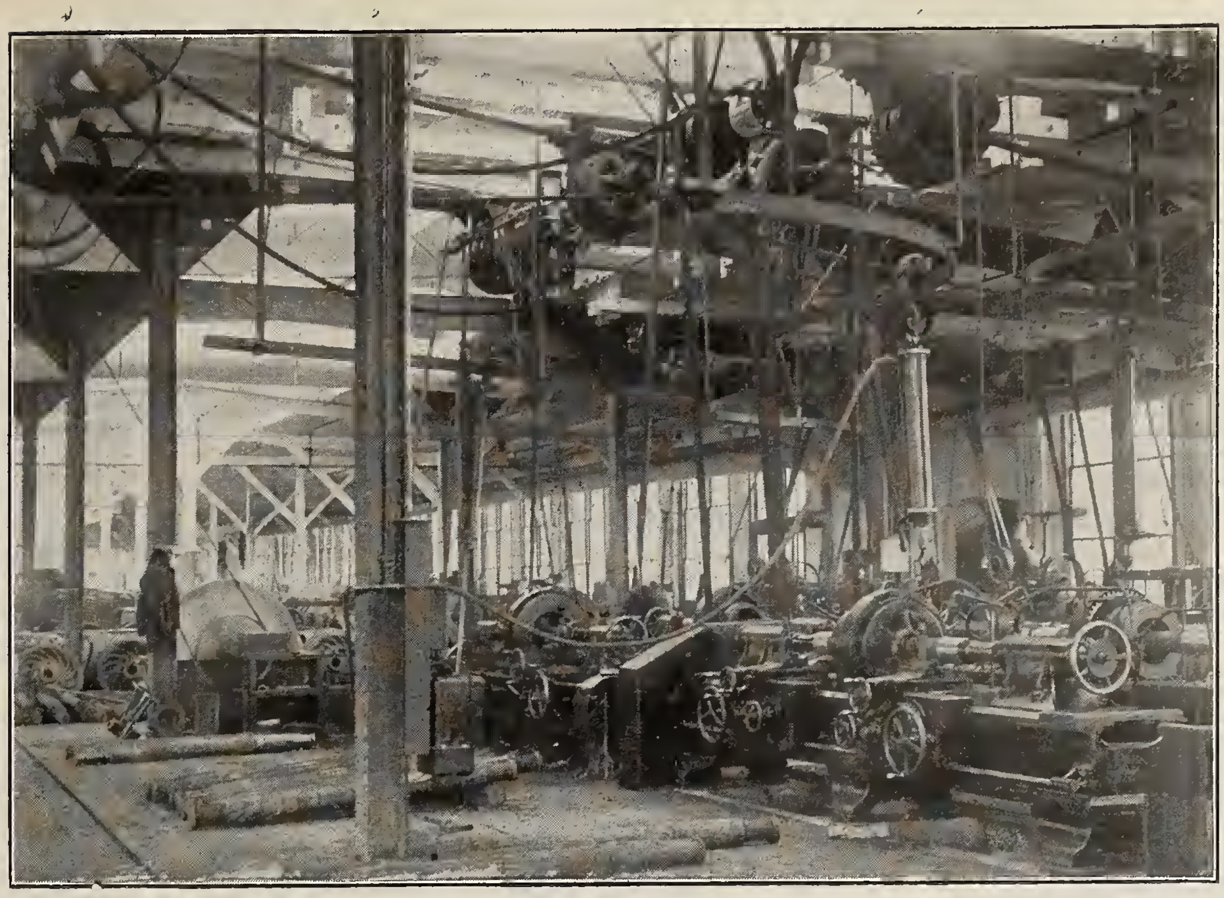


Fig. 21—View in Car Machine Shop C. P. R. Shops.

ing from the switchboard, which are conducted up this tower and connections made for the shops.

In the engine room there are alternating generators to the capacity of 1,750 k-w., driven by engines of a total capacity of 2,625 h. p. This gives a power house equipment of about 46 per cent of the total motor h. p. in electrical horse power and 56 per cent in engine horse power.

The combined rated h. p. of the alternating current motors for the different shops is as follows:

Locomotive shop	1,074
Planing mill	1,750
Cabinet shop	250
Blacksmith shop	705
Car machine shop	245
Frog and switch shop	130
Truck shop	142
Wheel foundry	70
Transfer table	20
Total	4,386

In the boiler room are seven B. & W. boilers carrying 160 lbs. pressure, each of 416 h. p. capacity, and one 320 h. p. boiler carrying 300 lbs. working pressure. The latter boiler is to be used for testing locomotive boilers in the boiler shop. All the boilers are fitted with B. & W. superheaters to superheat the steam 150 degs. F. There are two Green economizers of 480 pipes for heating the feed water. The draft is obtained from 200-in. steel plate fans located on a platform supported by a steel frame work above the economizer.

The shaving exhaust system is very complete. The pipes from the wood working machines lead into main headers and the shavings are drawn into the pipes leading to the shaving vault by large fans in the planing mill. Such refuse as is to be used immediately is discharged directly into the boilers, and any excess is stored in the vault until it is needed. A separate set of pipes and fans draw this fuel from the tower to the boilers.

In the engine room are three 750 h. p. direct connected units, consisting of cross compound Corliss engines 21 and 33x24 in., and a 500 k-w. three-phase 300 alternating current generator. There is also a 375 h. p. simple engine direct connected to a 250 k-w. three-phase generator. The direct current for the cranes and variable speed machinery is obtained from two 200 k-w. 250-volt direct current generators driven by simple engines. There are also two simple engines driving the exciter units. The two compound air compressors are of 2,000 cu. ft. free air capacity, and furnish a pressure of 100 lbs.

The outside alternating current circuits, of which there are ten, each connect to a cable, which is carried to the top of the tower. From this tower the leads are carried through bare copper wires on steel poles to the different shops.

The steel poles used in this connection are of special design, and built very strong and high as shown in the illustration. From this it is seen that they are constructed of ⅜-in. steel plate about 27 in. wide at the bottom and narrowing to 8 ins. at the top, having a height of 62 ft. over all. Four Z-bars are riveted to the edges of the plate. In the poles near the power house there are stiffeners riveted across the outside flanges of the Z-bars as shown in the illustration. The poles are set in a block of concrete 5 ft. square and 8 ft. deep, with the top on the level with the ground. The cross-arms at the top are of wood, bolted through the flanges of the Z-bar and supported by an angle iron riveted to the pole. Each set of cross arms is double, one on either side.

STORE HOUSE.

The store house is 85x94 ft. The roof is supported on wooden columns arranged longitudinally with monitor extending nearly the whole length of the building. The building for the most part is one story high, but there is a gallery in the center of about two-thirds the width and the same length as the main floor, for the storage of lighter material. The building is divided into three separate rooms by heavy fire walls. There is a large platform at each end and a narrow one along one side.

LIST OF TOOLS.

Pattern Shop:

751 Grindstone.
752 84-in. surface lathe.
757 Large turning lathe.
756 Small turning lathe.
755 Bandsaw.
750 20-in. hand planer.
754 Universal saw bench.

Size of Motor A. C.	Machines.
	PLANING MILL.
50 H.P.	No. 8 planer and sizer.
30 H.P.	No. 6 outside moulder.
20 H.P.	No. 3 rip saw.
50 H.P.	No. 8 planer and sizer.
10 H.P.	Group No. 174: Bandsaw filer, Auto knife grinder, Knife grinder, Emery wheel, Knife grinder, Emery wheel, Circular saw sharpener.
20 H.P.	No. 3 rip saw.
20 H.P.	No. 3 rip saw.
30 H.P.	No. 24 planer and matcher.
5 H.P.	Buzz planer.
40 H.P.	4 head dimension planer.
20 H.P.	Four head matcher and planer.
15 H.P.	No. 6 cutoff saw.
15 H.P.	Large rip saw.
15 H.P.	Large butting saw.
20 H.P.	Horizontal gainer.
15 H.P.	Group No. 186: No. 2 auto cutoff saw. No. 5 auto cutoff saw.
15 H.P.	No. 14 mortiser.
15 H.P.	No. 5 auto cutoff saw.
20 H.P.	Heavy car boring machine.
20 H.P.	No. 3 ripping saw.
15 H.P.	Group No. 188A: Horizontal gainer, 3-spindle boring machine.
15 H.P.	No. 2 ripping saw.
15 H.P.	No. 2 ripping saw.
20 H.P.	Group No. 190: 5-spindle boring machine. 3-spindle boring machine.
15 H.P.	Group No. 191: Three-spindle boring machine, Swing cutoff saw, Sill mortiser.
30 H.P.	Vertical end tenoning machine.
15 H.P.	Mortiser and boring machine.
10 H.P.	No. 6 mortiser and borer.
15 H.P.	No. 14 mortiser.
15 H.P.	No. 3 gainer.
20 H.P.	Group No. 196: Boring machine, 40-ft. table, Swing cutoff saw.
20 H.P.	Group No. 197: Boring machine, 40-ft. table. Swing cutoff saw.
15 H.P.	No. 3 gainer, 40-ft. table.
15 H.P.	No. 4 tenoner.
20 H.P.	Group No. 200: No. 14 mortiser, 40-ft. table. No. 58 band saw.
20 H.P.	Group No. 201: Band saw. Boring machine. Gainer.
40 H.P.	Group No. 202: Two No. 5 horizontal car tenoners, Two horizontal tenoners.
40 H.P.	Group No. 203: 3-spindle boring machine, Rip saw. Vertical gainer.
15 H.P.	Group No. 204: 3-spindle boring machine. Gainer.
20 H.P.	Group No. 205: Double-headed shaper. Hollow chisel mortiser.
20 H.P.	Four-headed sticker,
15 H.P.	Group No. 207: No. 3 cutoff saws and gainer, Shaping machine.
10 H.P.	Group No. 208: Double-headed shaper. 3-spindle boring machine.
10 H.P.	Group No. 209: Horizontal tenoning machine, Band saw.
10 H.P.	Moulding machine.
30 H.P.	Group No. 211: Swing cutoff saw, Circular saw, Buzz planer, Rip saw.
20 H.P.	Group No. 212: Vertical sill tenoning machine, Car boring machine
15 H.P.	Band resaw.
15 H.P.	Group No. 214: Cutoff saw, Band saw. Dimension saw.
40 H.P.	No. 46 planer and matcher.
50 H.P.	Group No. 216: Four No. 1½ rip saws.
30 H.P.	Group No. 217: Buzz planer, Swing cutoff saw, Two rip saws, Dimension planer.
30 H.P.	Group No. 219: Rip saw, Surface planer, Four-headed sticker.
10 H.P.	Group No. 220: Chain saw mortiser, Sash and door mortiser, Light tenoning machine.
20 H.P.	Four-headed matcher.
30 H.P.	Four-headed matcher and dimension planer.
30 H.P.	No. 44 planer and matcher.
40 H.P.	No. 46 planer and double matcher.
20 H.P.	Group No. 225: Four No. 1 cutoff saws.

Eleven 30 H. P. and three 20 H. P. motors on shaving exhaust fans in planing mill and two 30 H. P. and one 20 H. P. in power house.

Size of Motor A. C.	Machines.
	CABINET SHOP.
15 H.P.	Dimension planer.
5 H.P.	Swing saw.
20 H.P.	Group No. 233A: Grindstone, Emery wheel, Dimension saw table, Double-headed saw, Buzz planer.
5 H.P.	Feed rod machine.
5 H.P.	Group No. 236A: 20-in. wood turning lathe. 24-in. wood turning lathe.
5 H.P.	Swing saw.
15 H.P.	Group No. 236: Universal wood worker, Rip saw.
20 H.P.	Group No. 237: Panel planer, Tenoning machine, Rip and crosscut saw.
15 H.P.	Group No. 238: Chain mortiser, Chain grinder, Three-sided sticker.
15 H.P.	Double tenoning machine.
20 H.P.	Group No. 233: Four-headed sticker, Pony planer.
5 H.P.	Group No. 231: Chain mortiser, Sash sticker.
7½ H.P.	Group No. 231A: Jig saw, Sash and door mortiser, Band saw.
10 H.P.	Group No. 232A: Band saw, Finishing saw.
10 H.P.	Group No. 239: Shaping machine, Shaping machine.
10 H.P.	Group No. 240: Single-spindle boring machine, Friezing machine, Two-spindle carver.

40 H.P. Sander.
5 H.P. Group No. 242:
Blind mortiser,
Blind slot mortiser,
Boults carver.
2 H.P. Double combination glue spreader.
7½ H.P. Upholstery shop.
3 H.P. Sewing machines.
5 H.P. Passenger Car Shop.
5 H.P. Passenger Car Shop.

WHEEL FOUNDRY.

20 H.P. Cable carriers.
50 H.P. Blower.
15 H.P. (D. C.) Elevator.
3 H.P. (D. C.)
3 H.P. (D. C.) Crane.
7½ H.P. (D. C.)
2 H.P. (D. C.) Ladle.
2 H.P. (D. C.) Ladle.

TRUCK SHOP.

20 H.P. Group No. 146:
Axle lathe,
Axle lathe,
Water emery wheel.
15 H.P. Group No. 148A:
Two wheel borers.
30 H.P. Group No. 147A:
Three axle lathes,
Grindstones.
30 H.P. Group No. 147:
Three axle lathes,
5 H.P. Wheel Press.
15 H.P. Group No. 148:
Two axle lathes,
Emery wheel.
15 H.P. Group No. 146A:
Two wheel borers.
5 H.P. Wheel Press.
7½ H.P. Wheel Press.

CAR MACHINE SHOP.

10 H.P. Group No. 132:
Four buffing machines (564, 565, 566, 567).
5 H.P. Group No. 132A:
Turret lathe (508B).
Drill (586),
Milling machine (512).
30 H.P. Group No. 133:
Five six-spindle drills (530, 531, 532, 533, 580),
Three arch bar drills (534, 535, 581).
10 H.P. Group No. 134:
Five 1-in. nut tappers (527, 528, 529, 578, 579),
Three 1½-in. nut tappers (524, 525, 526).
10 H.P. Group No. 135:
Two 1½-in. triple screwing machines (518-9),
Three 1½-in. double screwing machines (514, 516, 517),
One 1⅜-in. double screwing machine (515).
10 H.P. Group No. 136:
One 2-in. triple screwing machine (520),
Two 1½-in. double screwing machines (521, 522),
Three 1-in. double screwing machines (523, 576, 577),
Drill grinder (562),
Milling machine (575).
20 H.P. Group No. 137:
Three emery wheels (558, 595, 596),
Six lathes (504, 505, 506, 507, 508, 571),
Two drills (552, 553),
Key way cutter (554),
Universal grinder (592).
10 H.P. Wheel lathe (570).
15 H.P. Group No. 139:
Two-wheel lathes (500, 503),
Lathe (508A),
Grindstone (590).
30 H.P. Group No. 130:
Three shapers (510, 511, 573),
Two wheel lathe (501, 502),
Slotter (513),
Double shaper (574),
Grindstone (591),
Journal lathe (509),
Bolster drill (554),
Emery wheel (559).
20 H.P. 48 in. x 48 in. x 12 ft. planer (589).
7½ H.P. 36 in. x 36 in. x 10 ft. planer (555).
7½ H.P. 30 in. x 30 in. x 10 ft. planer (556).
5 H.P. Group No. 143:
Ten small drills (544-5-6-7-8-9-550-1, 587-8).
15 H.P. Group No. 131:
Two 20-in. drills (541-543),
Three 26-in. drills (538, 539, 540),
One 25-in. drill (585),
Three 28-in. drills (582, 583, 584),
Three 30-in. drills (536, 537, 542).
10 H.P. Car Haul.
10 H.P. Car Haul.
10 H.P. Freight Car Shop.

BLACKSMITH SHOP.

15 H.P. Punch and Shear.
10 H.P. Bulldozer.
10 H.P. Bulldozer.
10 H.P. Bulldozer.
10 H.P. Bulldozer.
100 H. P. Fan.
15 H.P. Bulldozer.
10 H.P. Punch and shear.
10 H.P. Bulldozer.
3 H.P. Bolt cutter.
10 H.P. Forging machine.
10 H.P. 1½-in. nut machine.
5 H.P. ⅝-in. nut machine.
3 H.P. Nut burring machine.
10 H.P. 3-in. upsetting machine.
10 H.P. 2-in. upsetting machine.
3 H.P. Bolt cutter.
5 H.P. Spring nibbing machine.
5 H.P. Spring taper machine.
5 H.P. Hot iron saw.
75 H.P. Fan.
5 H.P. 1½-in. bolt header.
5 H.P. 1½-in. bolt header.
5 H.P. 1½-in. bolt header.
5 H.P. 1½-in. bolt header.
3 H.P. Shears.
3 H.P. Shears.
3 H.P. Shears.
5 H.P. Forging machine.
5 H.P. 1½-in. rivet machine.
3 H.P. Eye bolt machine.
10 H.P. 2-in. forging machine.
5 H.P. 1½-in. bolt header.
3 H.P. Eye bolt machine.
5 H.P. 200-lb. Bradley hammer.
3 H.P. 100-lb. Bradley hammer.
3 H.P. 100-lb. Bradley hammer.
3 H.P. 100-lb. Bradley hammer.
75 H.P. Fan.
3 H.P. Beaudry hammer.
10 H.P. Punch and shears.
5 H.P. 350-lb. Beaudry hammer.
30 H.P. Fan.
75 H.P. Fan.
10 H.P. Punch and shears.
15 H.P. Punch and shears.
3 H.P. Single shears.
3 H.P. 1½-in. nut burring machine.
3 H.P. 2-in. nut boring machine.
15 H.P. Rivet machine.
50 H.P. Fan.

FROG AND SWITCH SHOP.

15 H.P. Frog filling planer.
15 H.P. Rail planer.
20 H.P. Rail planer.
20 H.P. Rail planer.
20 H.P. Rail planer.
10 H.P. Rail bender.
5 H.P. Bradley hammer.
30 H.P. Bulldozer.
10 H.P. Group No. 154:
Planer,
Shaper,
Shaper,
Lathe.
3 H.P. Rail saw.
15 H.P. Group No. 152:
Emery wheel,
Four drills.
10 H.P. Punch and shears.
10 H.P. Group No. 155:
Two drills,
Emery wheel.
5 H.P. Group No. 158:
Two drills.
30 H.P. Fan.
7½ H.P. Fan.
20 H.P. Transfer table.
5 H.P. Fan.

Personals

Mr. R. Gunn, heretofore master car builder of the Erie, has been appointed superintendent of the car shops at Buffalo, N. Y.

Mr. W. B. Combs has been appointed master mechanic of the Mcaon, Dublin & Savannah at Macon, Ga.

Mr. Thomas Tracy, general foreman of shops of the Erie at Kenton, Ohio, has been appointed assistant master car builder, with office at Meadville, Pa.

Mr. Webb C. Ball has been appointed general time inspector of the Union Pacific, with headquarters at Omaha, Neb., to succeed Mr. J. W. Forsinger. Effective on July 15th.

Mr. F. L. Carson, heretofore master mechanic of the Gulf, Colorado & Santa Fe at Cleburne, Tex., has been appointed master mechanic of the El Paso & Northwestern at Alamogordo, N. M.

Mr. C. A. Snyder, general foreman of the Gulf, Colorado & Santa Fe at Galveston, Tex., has been appointed master mechanic at Cleburne, Tex. to succeed Mr. F. L. Carson, resigned. Mr. Raymond Bell has been appointed to succeed Mr. Snyder as general foreman.

Mr. Q. A. Parker has been appointed division storekeeper of the Atchison, Topeka & Santa Fe at Argentine, Kan., to succeed Mr. T. Scully, who has been appointed division storekeeper at La Junta, Colo., to succeed Mr. Joseph Ost.

Mr. Dennis O'Brien, heretofore assistant master mechanic of the Grand Trunk at Point Saint Charles, has been appointed assistant to the vice-president and general manager of the Grand Trunk Pacific, with headquarters at Winnipeg.

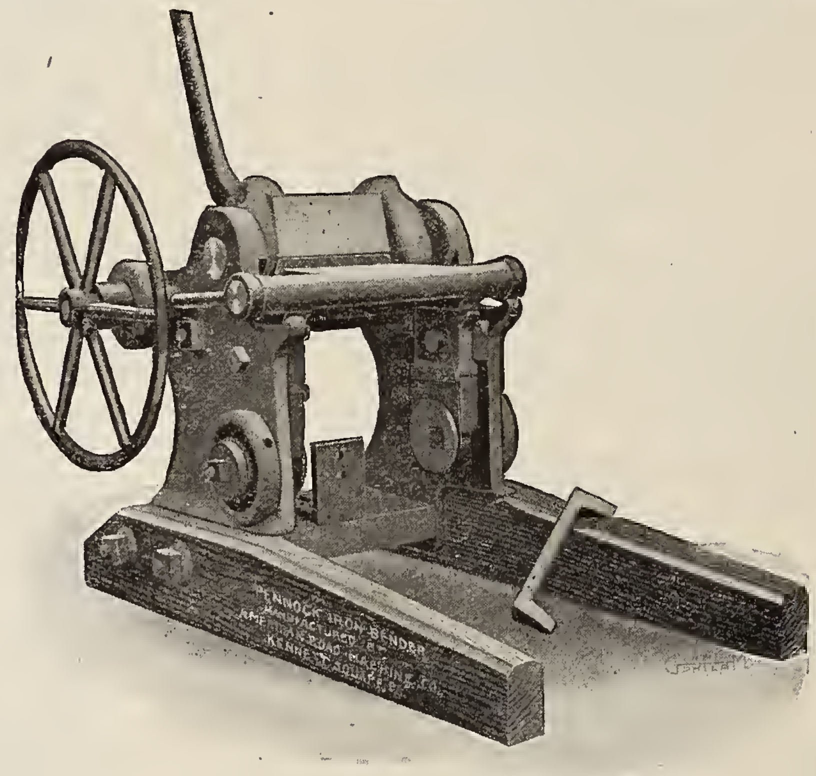
Mr. Jacob Kastlin, heretofore assistant division master mechanic of the Chicago, Burlington & Quincy at Galesburg, Ill., has been appointed division master mechanic at Saint Joseph, Mo., to succeed Mr. J. H. Dacey, resigned.

Mr. Elliott Sumner, assistant engineer of motive power of the Pennsylvania at Jersey City, N. J., has been appointed to a position in the office of Mr. Theodore N. Ely, chief of motive power. Mr. Harry P. Meredith, assistant master mechanic of the Pennsylvania at Altoona, Pa., has been appointed assistant engineer of motive power at that place, to succeed Mr. Sumner.

The Chicago, Rock Island & Pacific announces that superintendents of motive power will report to their respective general managers on all matters pertaining to the operation and maintenance of the rolling stock, motive power and other machinery on their respective districts. They will make such reports and perform such duties as are required by the general superintendent of motive power, and will be subject to his directions in matters of shop practice, standard plans, etc. All plans will be approved by the general superintendent of motive power. The superintendent of East Moline shops will report direct to the general superintendent of motive power. The general superintendent of motive power will report to the second vice-president.

The Pennock Iron Bending Machine

Our illustration of the Pennock bending machine represents a device that is one of the prime factors in the reduction of cost of manufacturer's and railway shop output. This machine bends iron of any thickness up to one and one-half inches, and of a width up to twelve inches, the thinner sec-



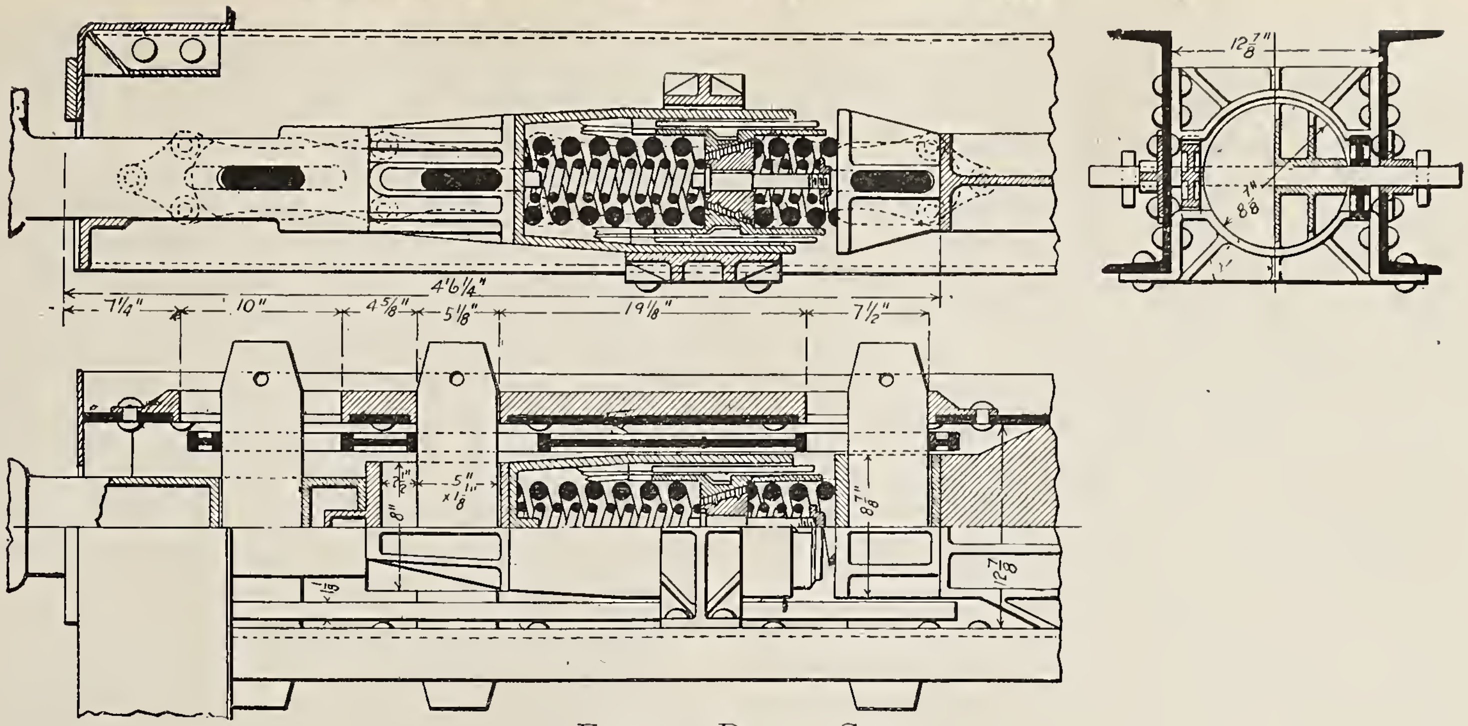
Pennock Iron Bending Machine.

tions being worked cold easily and without fracture. The heavier material only, requiring heat to produce results. The shapes are die-formed, and therefore identical in outline and dimensions, which are the first requisites in obtaining and maintaining a standard. The fact that dies produce the shapes, conveys an idea of the scope of the machine, which is limited only by the number of dies in use

The machine is hand operated by the lever and wheel shown, requiring but one man on all work except the heaviest within the capacity of the machine, and the fact that it is not a powerful tool makes it one of the most convenient devices about a plant, since it can be set down and operated anywhere, and need not have a regular place assigned for its work, in other words, it is equally as efficient in the machine or car shops, as in the smith shop. Filling, as it does, a field for the forming of light and average weight sections, it follows that it should do such work more economically than the powerful machine designed for heavy work, and this would seem to be the estimate held by several large plants which have several of these machines in commission. They are made by the American Road Machine Co., Kennett Square, Pa.

The Farlow Draft Gear Attachments Combined with Westinghouse Friction Draft Gear

The Farlow Draft Gear Co., Baltimore, have brought out their gear adapted to a combination with the Westinghouse friction gear, as shown in our illustration. This was shown at the M. M. and M. C. B. conventions and excited much favorable comment among the practical men that viewed it on that occasion, for the ingenuity and mechanical beauties of the whole device, as well as its simplicity in attaining the end sought. All of the parts are so designed that they can be assembled and applied by one man, by the act of removing any of the draft keys. The coupler or the friction barrel can be taken down and replaced by one man in from five to ten minutes without the aid of any tool whatever. These points are mentioned as strong ones when considering the question of replacing broken or damaged draft rigging, and emphasize the claims for simplicity of design and construction.



FARLOW DRAFT GEAR.

The old style riveted yoke and follower plates have been eliminated, and the stresses and shocks of service are by this mechanical arrangement, distributed throughout the entire length of the draft sills, from end sill to body bolster inclusive. The first or initial blow, to the full capacity of the friction details, is received by the rear key and filler casting. After the coupler has traveled 2½ inches the horn of the drawhead comes in contact with the buffer plate on the end sill. The front key has then moved to its bearing on the cheek plate, and the front block has moved over center key to bearing on same, these movements showing six separate places of contact over which the blow is distributed.

In pulling, the front and rear keys travel forward to a bearing in the cheek plates, the middle key being stationary, the load then being drawn at three separate points in the draft sills. In either operation of pulling or buffing, the coupler automatically adjusts itself laterally. The draft sills as shown, are 15-inch steel channels which forms an ideal foundation for carrying the mechanism involved in the combination, and a very rigid medium through which to transmit the resistances overcome by the 1⅛ x 5 inch keys which pass through the draft sills at three points, two in front and one at the rear. A study of this gear shows the strong points of two admirable systems in a combination that is well calculated to reduce to a minimum, the failure of draft rigging in heavy freight equipment.

Notes of the Month

Chas. H. Burgess, son of the late L. C. Burgess, superintendent of the Chicago Railway Equipment Co., Chicago, Ill., is now with the Holland Co., 77 Jackson boulevard.

Mr. G. D. Mitchell, formerly of the United Shoe Machinery Co., but better known as the Jones & Lamson, expert with which company he has been connected for the past five years, has just become associated with the Warner & Swasey Co., in the capacity of western representative.

The twelfth International Conference of the Railroad Department of Young Men's Christian Associations will be held in Detroit, September 28 to October 1, 1905. The Detroit Associations have offered to bear a generous portion of the expense connected with the conference. Special rates will be secured at hotels and boarding houses but delegates will pay for their own entertainment.

A trial trip of the new steel street car recently received on the Manhattan Street Railway demonstrated that the all-steel car was the correct thing for surface roads, as well as for the elevated and subway. This car is the product of the Pressed Steel Car Company and the trial was participated in by the engineering and operating officials of the road, including F. N. Hoffstatt, president of the Pressed Steel Co., and H. H. Vreeland, president of the Manhattan Street Railway Co. In finish, the new car is a fine sample of the car builder's art, and for smoothness of action it cannot be excelled.

John F. Allen, 370-372 Gerard Ave., N. Y. City, who builds the famous Allen Portable Pneumatic Riveting Machines, reports a good demand for these well-konwn tools, with shipments during the month of June, as follows John Pirkl Iron Works, Brooklyn, N. Y.; Kalamazoo Fdry. & Mach. Co., Kalamazoo, Mich.; J. K. Petty & Co., Lebanon, Penn.; Cambria Steel Co., Johnstown, Penn; Morava Con. Co., Chicago, Ill.; Dornfield, Kunert & Co., Watertown, Wis.; American Car & Fdry. Co., Memphis, Tenn.; Standard Bridge Co., Red Oak, Ia.; Dept. of Marine & Fisheries, Sorel, Cal.; Hay Fdry. & Mach. Co., Newark, N. J.; Fenwick Freres & Co., Paris, France; Manning, Maxwell & Moore, N. Y. City.

The U. S. Consul at Dublin, Ireland, reports an interesting departure made by the Great Northern Railroad Company of England in conveying milk, and the idea has been taken up in Ireland to the extent of urging the railroad companies to use similar apparatus. The milk cars are fitted with a special adjustable ventilating apparatus, and the oscillation which has on a number of occasions nearly churned milk into butter during a journey has almost disappeared. Even at rapid speed on sharp curves there is scarcely and oscillation. The vans are 45 feet long and run on two 4-wheeled bogies. The absorbing of oscillation in milk cars seems to be worthy of study on the part of American railways.

Under date of June 6, 1905, the American minister at Lima, Peru, Irving B. Dudley, transmits copies printed in English of proposals for the supply of earthenware and cast-iron drainage piping for the city of Callao, containing form of tender, conditions, and bill of quantities. The copies of proposals were sent to the American legation by the water inspector with a view to their being brought to the attention of American contractors. Proposals must be sent sealed on or before October 5, 1905, to the secretary of the municipality of Callao. The printed proposals, containing all necessary information for American contractors, are on file in the Bureau of Statistics, Department of Commerce and Labor, where they may be inspected by interested parties.

At the last meeting of the Lourenco Marquez Chamber of Commerce, a local firm presented a letter from one of its London correspondents pointing out that the conference shipping lines, otherwise known as the "shipping trust," controlling practically all of the steam shipping between England and continental ports and South Africa, had recently doubled the former discrimination in the freight rate on cement in favor of Durban against Lourenco Marquez, the difference hitherto had only been 2s. 6d. (60 cents). This means that the freight charges on cement from England or the Continent are $1.21 per ton higher to this port than to Durban, and Durban is only 300 miles distant from this port. The chamber of commerce decided to communicate with local shipping agencies with a view to obtaining official confirmation on this important matter, and, if needed, to endeavor to divert the trade of its associates to the United States, where the shipping ring policy does not reign supreme.

The Consular clerk at South Catharines, Ont., reported on June 12 that a German firm had recently patented a system for consuming smoke and preventing the wasting of coal which, it is claimed, is proving very successful. The system has been tested at the experimental station of the Bavarian "Revisions-Verein" in Munich, where it was found that 72 per cent of the combustible value of soft coal from the Saar district can be utilized when this smoke consumer is used. The conditions were unusually favorable at this station, but it is confidently claimed that almost anywhere the saving of coal will amount to from 12 to 25 per cent. The director of a rope and cable factory at Frankfort, Germany, where the system has been in use for some time, reports a minimal development of smoke only when fires are started or replenished; at other times no smoke is visible and the saving of coal amounts to more than 20 per cent. The owners of the patent allow to interested factories a four-weeks' trial, guaranteeing a saving of at least 10 per cent in coal. At the end of the four weeks a contract may be made for a period of five years, the annual charge for the use of the smoke consumer and for keeping it in order being $125 to $175, according to construction and size.

Technical Publications

Basis of Railway Rates and Private vs. Governmental Management of Railroads. By Marshall M. Kirkman. Published by the World Railway Publishing Company, Chicago. Price $2.50. This book, which covers a subject at present discussed by the daily papers covers the ethics of trade, including that of carriers; railway rates, their bases and the influences affecting them; railway rates—discrimination—pools, special rates and their relation to commerce, necessity and value of pools; railway rates and government control; unnecessary railroads and their effects; the limits within which legislative interference is valuable; value of private ownership and interest; government control—its inadequacy; government supervision and control and its limitations against private ownership; the interstate commerce law of the United States; mutuality of interest in the prosperity of railways; cost of railroads not fully capitalized, local and through traffic; the use of private cars on railroads and table showing decline of freight rates. in the United States.

Tools for Engineers and Wood Workers. Including modern instruments of measurement by Joseph Horner. Bound in cloth, published by D. Van Nostrand Co., New York. Price $3.50. The object of this book is to give an account of such tools as are commonly used by engineers and woodworkers, chiefly from the standpoint of the men who use them, and who desire to understand the principles which underlie the forms. Its 335 pages and 456 illustrations are very comprehensive in their scope, the subject of instruments of measurement being treated in a very full manner. The general contents are as follows: General Survey of Tools; Tool Angles; Chisels and allied forms of Woodworkers' Planers; Hand Chisels and Allied Forms for Metal Working Chisels—like Tools for Cutting Metal by Turning Planing, etc. The shearing action and shearing tools; Examples of Scraping Tools; Saws; Files; Milling Cutters; Boring Tools for Wood; Boring Tools for Metal Taps and Dies; Punches, Hammers and Caulking Tools; Moulding and Modelling Tools; Miscellaneous Tools and Tool Holders; Hardening and Tempering; Tool Grinding and Sharpening; Standards of Measurement; Squares, Surface Plates, Levels, Bevels, Protractors, etc.; Surface Gauges or Scribing Blocks; Compasses and Dividers; Calipers, Vermier Calipers, and Related Forms; Micrometer Calipers; Depth Gauges and Rod Gauges; Snap, Cylindrical and Limit Gauges; Screw Thread, Wire and Reference Gauges; Indicators and Templeting.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of Master Car and Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

Some Matters Revieved

Editor Paint Shop,
Railway Master Mechanic.
Dear Sir:

Until very recently I was not aware how slow travel was toward the rising sun. True, the speed of trains appears to be as rapid as they are when westward bound, but the impart of advanced ideas seem to be much slower in their eastward course. Is it the fact that the journey being made east, facing the rising sun, retarded the forward movement? or is it the snail-like pace struggling against opposition or obstruction that brooded delay? Whatever the cause these remarks are drawn forth by recent reading of articles published in late issues of the "Railway Master Mechanic," and in writing these words I will touch lightly and briefly upon various topics noted, viz., The Knifing filler and Sandpaper process, Rubbing of Rough stuff, Enamel or varnish-color finish of exterior of Postal, Baggage and other so-called common cars, the painting of sash exterior, body-color, etc., all of which are of interest and have been in use, or have been tried in the middle west, some becoming an adopted system of practical benefit, some found wanting and others not much better. It does seem odd to me after ten years, or nearly so, that these systems should spring up in the far east like something new—spring up like an almost forgotten flower that comes up in unexpected places in the spring.

Taking the first thought, the surfacing of the exterior of passenger cars by knifing and sandpapering, will say this has been a very successful practice in these wilds for now nearly ten years, with results improving. It is used upon all classes of passenger car equipment, excepting observation and sleeping cars and cars of a like character and, to our mind, the results have been satisfactory both for durability and finish. While it is true that the finished surface is not as slick as one that has been properly rough-stuffed and stone-rubbed, it is for the class of equipment, the service required, and the care given during servcie all that is necessary, and in all other requirements appearing satisfactory.

The use of enamel, or varnish-color, lettered with same and placed into service without varnishing was first undertaken, as near as I can recollect, some fourteen years ago by one of the leading roads running northwest out of Chicago. That these cars gave a fair appearance when first out of shop and placed into train goes without saying; they took their place alright but did not keep it. Having noted during several years the wear and tear upon the surface of these cars I can say there was not the results one would exepect, judging from quality of materials used. One thing must be admitted by all, and that is that the equipment finished in this way requires equally as much cleaning and attention at terminals as does the surface of a varnished car, and I believe more attention is required in an effort to keep it clean. I have noticed that this cleaning in time removes the lettering. The gloss it does not injure because there is none, and I understand that cars done with the enamel finish require shopping every six months to retain anything like a fair condition, although at this shopping it is given but one coat of enamel, cutting it around the lettering and renewing the lettering. What a beautiful picture of clouded sky, lacking the coloring, was presented; not only by this, but it necessitated the burning off of such cars after a service of about four years. And why should it not be so when we consider how necessary it is to apply, perhaps not pudding, mush or plaster, but mud? For what we consider a fair, honest coat would give undesired results as to body and covering capacity. I have known of cars done with the enamel having been taken back to the shop and given a coat of varnish over the enamel after having only a few weeks service, all owing to the unsatisfactory appearance. Still there may be, has been, or will be, improvements and it is perhaps well for some one to keep on trying or experimenting for perchance, through some accident they may discover something, somehow that will produce satisfactory results economically, like the filling up and obliterating of cracks in varnish upon the surface. It can; it cannot; it is; it is not; now you don't see it; now you do; there it is!

A few words regardng the painting of body sash on exterior same color as body of car. This, like some other recently practiced modes, is not altogether new. This was undertaken in this far west quite a number of years ago, owing to the disagreeable appearance and the dissatisfied expressions of the traveling public, the plan was abandoned and the return made to the best, the present apparently obnoxious mode of sash graining. Like many dead issues, they will arise again, so that at this time we all know that this recent idea emanates from a contract shop; and because it is so, we like to follow, or if we do not like it we follow anyway. But in my opinion, judging from experience obtained through the handling of equipment coming from contract shops, if we should follow out literally all that emanates from contract shops, both in materials and labor, or class of labor, it would require but few years to prove to us the undoing of that success and durability which we have attained and have endeavored to establish through years of effort; and all will have come to naught. I do not believe it wise to adopt every new fangled, penurious idea that comes from any contract shop. While there are some that are good, there are more that are not; and even the good results that might be obtained from the good are destroyed by undue effort at economy. The long efistablished system of painting exterior of body-sash and graining same in imitation of baywood and mahogany cannot be improved upon by whatever color one may endeavor to introduce. Color has practically no effect other than for appearances when foundation is properly prepared. And in this day when the practice is becoming prevalent to eliminate all striping from the exterior of the body of cars, it appears to me a necessity that the sash be of some other color than of the body of the car so as to relieve a portion at least of that plainness, I might say cheapness, which would otherwise be so exceedingly attractive.

Sash properly brought up in foundation and proper materials used in the graining stock, sufficiently varnished to insure protection, certainly give best results; and when done under these conditions are more easily maintained at a less cost than the body-colored sash. In this quarter of the globe sash done in this wise have been giving good service from eight to ten years without scraping or burning off, a record which a do not believe will be maintained where sash are colored and kept in color with the body exterior of a car. I have heard it said that the object for changing the color from mahogany-grained to the body-color was for the reason that the graining color chipped off and left unsightly spots upon the sash. If so, look to some other cause for this than in the mode; look to the preparation of your foundation; look to the quality of the goods used, especially that used for producing the grain, and these difficulties will be avoided. Above all stick to some method that will remove from the exterior finish of the equipment that funeral conspicuousness of those cars that are intended for the transportation of that living, that everbustiing, hustling, that joyous traveling public and avoid presening such a prominent reminder of a catafalque.

Referring again to our adopting ideas and systems emanating from contract concerns, I liken the work sent out for the railroad companies to care for to a cactus plant blooming in all its brightness and beauty, coming forth in blossom with richness only to fade away in a few short hours and is then turned over to the care and gentle administration, as it mayhap, of others that it may be preserved. So the car is sent forth, brilliant in its lustre of varnish, a beauty to the eye in its newness, to die out and fade away in a very brief service and is then to be cared for, nourished and preserved in the effort to prolong the life of the paint to obtain anything like a reasonable service and still be in condition to be revived, beautified and sent forth again in all its brilliancy to gladden the eye, the heart of man; an effort entailing much care and attention, labor, cost and worry and all because of the continual grind toward economy, the ever-existing grasp for financial gain, the ever ready and willing desire to beat the other fellow, sacrificing quality for gain and beauty and durability of finish for economy, both of which in my judgment are detrimental, producing false economy and only is economical for the time being as the actual cost to again place such equipment in proper condition is greater than proper workmanship and quality of materials at first cost would have shown, to say nothing of the extra cost entailed in an effort to maintain such equipment for a reasonable time service.

I do not wish to be understood as claiming that these facts exist in painting alone; much can be shown and attributed to quality of materials used in construction, lumber, etc., and manner or condition in which it is turned over to the painter for his final effort. Yet this much can be hinted at, at least, and that is that the changes taking place in the exterior and interior finish of passenger car equipment is not so much on account of a desired appearance as it is to enable the work to be accomplished by cheap boy labor and eliminate from the rolls the higher-priced practical painter.

Respectfully submitted,
A. J. BISHOP.

Mr. Bishop's Article

We admit Mr. Bishop's article in another column under our general policy to let onr association members be heard on all matters affecting its welfare and the good of the craft, whether we are personally criticized or not. We have no sickly theory to bolster up. Fire away. We have always said that truth, like pebbles in a sieve of dirt, comes to the surface by agitation, whether in our convention discussion, or in these columns. Jnst give us your honest convictions candidly told without personalities or prejudice; that is all.

He states that some of the things recently told about in our columns as just done "down East" were long ago accomplished in the West. Well, we suppose we shall have to acknowledge that they are smarter out that way. However, this great republic got a good start right down here at Boston and Lexington some 130 years ago, when the shot was fired that was "heard around the world." So the West is not always ahead. This reminds us of the Yankee who was over in England on a visit and continually saying that it was done before and better in America whatever was under discussion. Sick of his talk the Johnnies determined to play a practical joke upon him. So one day when he was dead drunk they dug a grave and laid him in it, thoroughly embanked with flowers, and hid behind trees and awaited results. In the course of time he sobered and, scrambling out, said: "Sh! Morning of the resurrection! America is still ahead!"

The enamel method to which he refers as being tried "by one of the leading roads running northwest from Chicago some fourteen years ago," is not that system at all, if we understand the matter correctly and onr memory serves us. That was a four-coat method. As practiced by this writer, yet in a small way, and described in the articles referred to, we will put it against any method of painting and varnishing for durability that we have ever seen. It stands to reason that if the durable varnish upon which he depends for the life of his painted car has the pigment incorporated with it properly its wearing qualities are not impaired but will last as long as the clear varnish will over the stain of color underneath. Below the color we assume that the process of building up the coats and surface is the same in both instances. So we fail to see where he makes a point here. We have not yet put this way of doing things on record for coach work, though we may yet. We only named cars used in rough service in which all the passengers have any interest is the safe hauling of their baggage, mail, express, and—not their milk bnt—cow's milk. If when some cars come in another year that we have finished and sent out in this way show it to be defective we will "acknowledge the corn" before the whole world. At present we do not fear.

He says this equipment "reqnires equally as much cleaning and attention at terminals as does the surface of a varnished car." Why not? We never supposed that any method of painting will keep a car clean. But when he "believes more attention is required in an effort to keep it clean" he merely states a belief and not a fact.

He also states that he "understands that cars done with enamel finish require shopping every six months to retain anything like a fair condition." This is not this writer's experience and observation, having had cars done in this way over a year in service and in good condition. He says he has "known of cars done with enamel having been taken back to the shop and given a coat of varnish over the enamel after having only a few weeks service, all owing to the unsatisfactory appearance." We can go him one better: We have given some a coat of varnish over the enamel before they left the shop and saved time and money over the old way. To explain: If on a baggage, express, mail, or milk car the cutting-in coat of color and the first coat of varnish are combined in one coat of enamel, or varnish color the labor and material of one operation is saved, is it not? It depends upon the condition of car—how long in service—whether a coat of varnish is needed over the enamel to prodnce a suitable gloss or not. We have been doing our decks, or clear stories, for years in this way, also trucks and steps, with none but good results, where we before gave them a coat of color and a coat of varnish. We looked upon that as an innovation, but practice has proved its practicability.

He next says, "still there may be, has been, or will be improvements and it is perhaps well for some one to keep on trying, or experimenting, for perchance though some accident they may discover something somehow that will produce satisfactory results economically." That's what we are bound to do and all we are doing at present. We have no new painter's doctrine that we are sent to preach just yet—simply trying something, that's all. About all we know so far somebody has had to try and find out for us. If we stop now further progress will stop.

What he says regarding the painting the exterior of body sash Pullman color we fully concur in. It is all he says and more. It produces all the more of a funeral" aspect with the silvered gothic glass in the top sash—jnst like a hearse, for all the world, with live folks in it instead of the deceased.

Some B. & M. Repair Shop Changes

At the close of the varnishing season it has been decided to abolish the Somerville paint shop of the Boston & Main and it is now (July 20) being removed to extend the Union Station yards, this increasing the capacity of yard No. 2, which lies alongside of that shop. The output of that shop was 436 cars cleaned and varnished during the year ending June 30. This will necessitate running the shops at other points on the system to their utmost capacity to make up as far as possible for this loss, in some cases making additional facilities for the purpose, until new shops are built.

The history of the Somerville shops, which are one mile from the Boston terminal, is something like this: Soon after the lease of the Eastern R. R., which occurred December, 1884, a small shop for emergency repairs was built there, holding about four cars.

Some cars were varnished in this one season, the Salem and Lawrence shops making details of men for this purpose. Some 13 years ago an extension of some 800 ft., containing two tracks, holding ten cars each, was added longitudinally to the end of this shop as an overflow paint-shop for the Eastern and Western divisions, the passenger equipment having entirely outgrown the capacity of the Salem and Lawrence shops to keep in repair. This was done under the administration of the present Master Car Builder, Mr. J. T. Chamberlain, and the late Geo. H. Worrall was transferred from Salem as its foreman painter, who died suddenly a year ago last May, and was succeeded by his assistant, Wm. B. Getchell.

It is proposed to retain the small emergency repair shop that was first built there, until a new shop for a like purpose is constructed in the new yard by the Pintsch gas works at E. Cambridge, for which plans are already made. In fact, the lumber of the Somerville paint-shop will be utilized as far as possible in the construction of this shop, the width of which being the same admits of its use bodily. It it will be 200 ft. long.

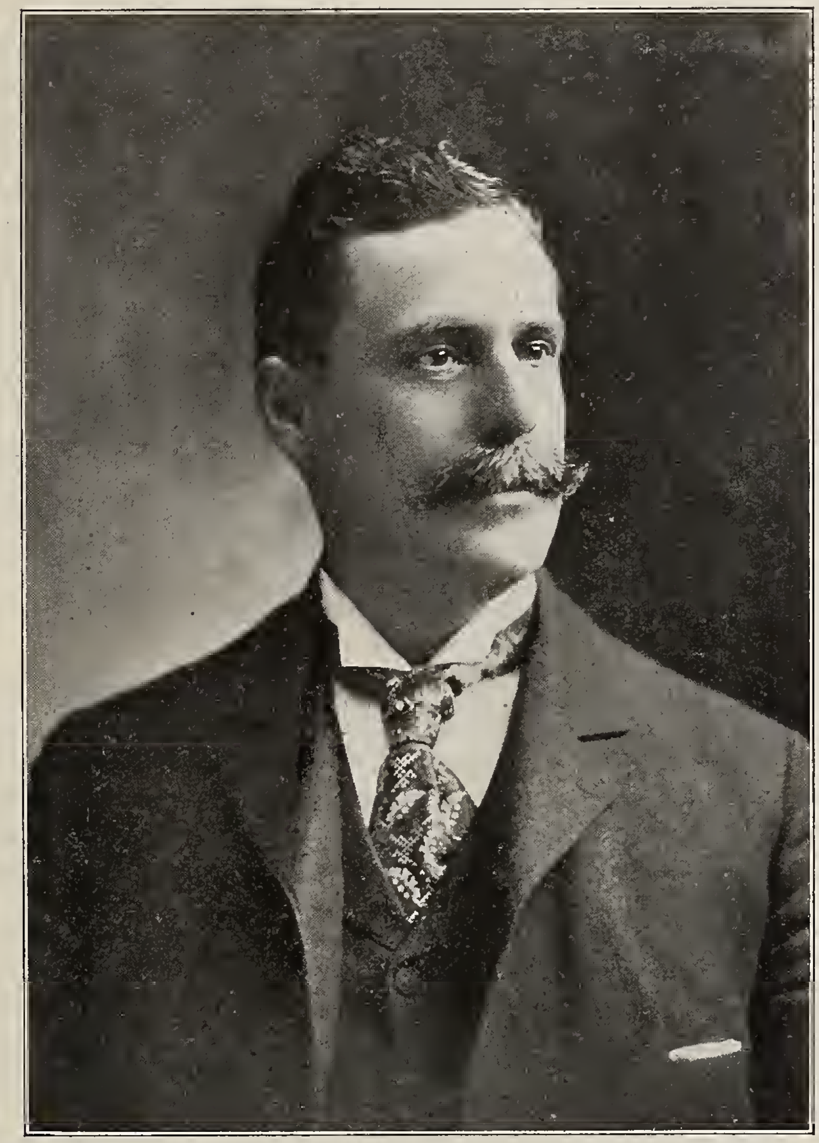
Among the Supply Men

John B. Hicks.

Among the supply men probably few are better and more favorably known than Mr. John B. Hicks, whose portrait ornaments our columns this month.

Mr. Hicks was born in New York, Feb. 2, 1855, and started in the varnish business with Edward Smith & Co. about 22 years ago and has since been in the first ranks of representative paint and varnish salesmen. Several years Mr. Hicks was sent for by Robert Ingham Clark & Co., of London, Eng. Mr. Hicks went to London and returned with the appointment as manager of the Robt. Ingham Clark Co's. interests in the United States. He succeeded so well that at the close of one year Mr. Robt. Ingham Clark bought the controlling interest in the Pratt & Lambert Co., of New York.

Mr. Hicks is at present manager of the railway department



John B. Hicks.

of the D. B. Crockett Varnish Co., of Bridgeport, Conn., and the C. A. Willey Co., manufacturers of railroad and carriage paints, surfacers, etc., Hunter's Point, N. Y.

Just at this time he is rusticating at his summer home in Delhi, N. Y., with his family.

The Paint Spraying Issue

Continued from page 262.

The operator's health will be protected by a safe respiratory device. He will atomize on all classes and makes of protective paints, instead of confirming machine application to the simple carbon and earth paints now almost exclusively used as the only safe spraying paint mixtures, due to the fact that all such pigments are deemed less poisonous to the

As a kindred sequel to the advancement of machinery in other mechanical traits, we predict that the immense plain-painted surfaces will be machined on as a matter of recognized economy; that any slower method will be deemed as lost time by the coming world of ease-loving, labor-saving people.

The millions of steam railway and traction-burdened cars to come will be spray painted. The work will be done in suitably constructed buildings, protected from wind and weather.

human system than those of the protective paints made up of lead, carbonate, etc.

The winning machine will be well balanced on air control—as it is a well established fact that all excess air force used is both a costly tax on the generating powers and in material waste.

There will be no trouble with labor when once assured the machine is not a menance to their trade position or health, but a remedy against common drugery. There will be no trouble experienced in procuring intelligent labor to operate and care for a good paint-atomizing machine.

In conclusion, we will say, that it is a needless task for any would-be authority to attempt the telling of the painting world that the paint brush will ever be wholly superseded by the atomizing machine, as the brush and the skilled brushman will be with us until the end of time. But we do not think there should be any serious disputes arise when we claim that in this day of an uncompromising profit system, the brush must make way for the work most economically adapted to machine, and the machine to that of the brush's exclusive adaptations; that it would be a folly to consume five dollars' worth of brush labor on a plain job of protective coating which a machine will do just as well at one fifth the cost. The machine simply becomes the competitor of the brush on class work only, leaving no cause for further pro and con argument other than that the brush will always have the first call on account of its more general adaptation to requirements of the painting world's various crafts and craftsmen of a modern progressive age.

McKees Rocks, Pa., May 22, 1905.

W. O. Quest, P. & L. E. R. R. Shops.

Notes and Comments

We learn from the daily press that a large appropriation has been made and plans drawn to so extend and increase the Norwood shops of the N. Y., N. H. & H. R. R. as to concentrate all its locomotive work at that point, the Readville plant for the concentration of its car work having proved so satisfactory.

John T. McCracken, formerly Master Painter at Jackson & Sharpe's, Wilmington, Del., shops, and more recently connected with Flood & Conklin Co., varnish makers, as traveling salesman, has been appointed Master Car Painter of the Interborough Railway, New York, the appointment effective June 16th, Vice William R. Skinner resigned.

The first installment of ten of the twenty first-class coaches that the Pullman company are building for the Boston & Maine have arrived, July 14, and have been consigned to service. The remainder of the order will immediately follow. They are the same in construction and finish as the fifteen built by the same company last year, which were described in these columns. The Pullman people build a good car.

CORRECTION. If those who received the July issue will draw their pen through the line "View of Readville Shops," page 263, and write Fitchburg Shops of the Boston & Maine, all will be well. Gen. Foreman F. H. Eddy of those shops took the view and gave it to the editor of these columns and we regret the wrong credit.

Also on page 266 correct "an entire Saturday holiday" to a half-holiday, which the B. & M. is giving its shop employes, during July and August.

At the funeral of Col. T. B. Kennedy, President of the Cumberland Valley R. R., which occurred at Chambersburg, Pa., June 22, our esteemed associate John W. Houser, foreman painter at the shops of the road at that point, was one of the active pallbearers, of which there were ten taken from the various departments of the shops. The honorary pall-bearers were fourteen in number and were the Justice of the Supreme Court of Pennsylvania, some of the officials of the P. R. R., and others in high station in the Keystone state.

Over the River.—The new bridge across the East River at New York City makes the factory of the Hildreth Varnish Co. more easy of access. When this company first started they had a factory at Hunter's Point, but some years ago they erected a large, modern varnish plant in Brooklyn, or that portion of it known as Williamsburgh. The offices of the company are at 32 Broadway, New York, and their goods are well known in many carriage factories. Superfine quality. —From "The American Vehicle."

We are informed of the death of Mrs. Thomas Byrnes, which occurred at the family home, Richmond, Va., June 16th, after a long and painful illness, interment being made the 18th. Mrs. Byrnes has been a constant atendant at our annual conventions for years, in company with her esteemed husband, who is Master Painter of the Chesapeake & Ohio at Richmond, and will be missed very much. The information that first reached us was to the effect that it was Mr. Byrnes himself who had passed away.

The last of the former officials of the N. Y., N. H. & H. R. R. to retire from that road under the new management is Mr. Fred M. Twombly, Master Mechanic at the Roxbury shop, which occurred July 8th. He was presented with about $70.00 in gold, and "Sam" Brown was the spokesman on the occasion. Mr. Twombly, a personal friend of the writer, though, we should guess, not much, if any, over 55 years of age, has seen, we believe, 39 years of service as a railroad master mechanic, and is a fine man and in no sense should he be retired from the railroad world. He is a past president of the N. E. R. R. Club.

In a personal note, July 14, Associate Butts of the N. Y. C. & H. R. at W. Albany, says: "Our work in the coach department is slacking off. We now have 25 cars under way in the paint shop. We have 98 men at work in the paint shop today, although most of them will not work full time. Our men all work by the piece. We still have about 400 cars which have been in service 12 months or more. Most of this number will not be shipped before October as they are in fairly good condition which will allow the shopping date to be extended. Tbs is made possible on account of our system of terminal cleaning which we find preserves the life of the varnish."

In a note sending his communication in another column, Mr. A. J. Bishop, of the Northern Pacific Ry., St. Paul, Minn., writes as follows, under date of June 19, which shows that we down East here are not the only ones afflicted with a slack time. "Misery loves company:"

"This is the day of our discontent. Not quite 'dead broke' but certainly broken in force and shop work. Nothing much doing. Portland fair, excursions and picnics using all equipment, so get nothing for shops, necessarily cutting down the shop force to a minimum. Expect, however, to soon start the cleaning up and varnishing of coach storm sash of which we have some 16,000 pieces, which must be out of the way by October 1st., as we then expect to begin a winter rush."

Associate A. P. Dane and the writer called today (July 21) on associate "Sam" Brown at the Roxbury shop of the N. Y., N. H. & H. R. R. The visit over, he was escorting us out to the street, when suddenly he exclaimed, "Oh! I forgot to show you the new gavel I have had made for the M. C. & L. P. A. from wood out of the battleship Olympia." So we went back to his sanctum, and with great solemnity and, reaching to a closet over his desk, he whispered, as he drew it forth, "Sh!—ellac," meaning the nice finish he had put upon it. If well enough he will present it in person, suitably inscribed, at the Cleveland convention in accordance with the promise at Atlantic City. (See page 107 of proceedings.) This was because of the loss of the old gavel and President Cook's use of a piece of a board. "Sam" is not feeling well and may not go to Cleveland, in which case he will send it by some one else.

A Corporation.—That big coach color business at Hunter's Point, New York City, will hereafter be conducted as a corporation, under the title of the C. A. Willey Co. It has been a steady and rapid growth. About fifteen years ago C. A. Willey, a practical coach painter, with experience in the best shops of Boston and New York, evolved a system of coach painting which he realized was of value to the trade. He rented a room at Hunter's Point, with transmitter power, and started on a very small scale. Incidentally he took the trade into his confidence by advertising in a modest way. The business grew by leaps and bounds, and a few years ago Mr. Willey erected a factory, which has since been greatly enlarged, and which is the only plant in the world devoted exclusively to the production of coach colors and painting specialties. Mr. Willey has our congratulations and best wishes for the C. A. Willey Company.—From "The American Vehicle," July 15, 1905.

BUFFALO, July 21.—The three big linseed mills in this city, which are outside of what is known as the linseed trust, have shut down. The American linseed company, backed by John D. Rockefeller, has obtained control of all the flaxseed in the country at the present time, and prices have soared to a point which prevents the independent mills from crushing at a profit.

The prevailing rate is $1.48 a bushel, as compared with the normal rate of $1.24 and as low as $1.10.

The failure of the crop in India and a shortage in the Argentine have contributed to the present situation. Until the market in September or October, the Rockefeller interests are likely to remain in complete control.

We clip the above from the Boston Globe. It is high time that it was known that there is a better oil than linseed for painting steel cars, bridges and buildings and all metals.

The Boston & Maine passenger equipment paint shop output for the year ending June 30, 1905, is as follows:

Cars painted and varnished	190
Cars cleaned and varnished	1,263
Total	1,453
Burned off	111
Painted over all paint	34
New or resheathed	41
Cut in	1,133
Varnished inside	283
Enamel treatment	80

There were painted by car department men at Concord 130 engines and 130 tanks; at Lyndonville 49 engines and 52 tanks; at Springfield 7 engines and 7 tanks. Total 186 engines and 189 tanks.

There were 77 cars that failed to be shipped for the year, on account of operating department, as follows

Twenty-one passenger cars, 2 private cars, 16 combination cars (smoking and baggage), 9 mail cars, 17 milk cars, and 12 baggage cars. Total 77 cars.

Established 1878

RAILWAY MASTER MECHANIC

Published by the

BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago

TELEPHONE - - MAIN 3185

Eastern Office: Room 714, 132 Nassau Street, New York City.

Telephone: - - 3524 John

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent

Vol. XXIX. CHICAGO, SEPTEMBER, 1905. No. 9.

Contents.

Machine Tool Output

It does not take the most casual observer very long to note the improved status of machine tool operation in railway shops, over what it was prior to the introduction of high speed tool steel, the use of which being responsible for the remarkable revolution in tool output. There was considerable misgiving among shop managers when high-speed steel demonstrated the increased possibilities on modern tools as it was thought to entail the scrapping of many good tools having a past. but when experiment showed that many of the old equipment was able to double their output by the simple expedient of putting on a double belt, and in some cases a new cone of a wider belt face, the situation cleared at once, for the outlay for a properly designed high-speed machine could be deferred.

The high-speed machine tool is the logical outcome of the tool steel that is able to turn steel stock at a speed of about 100 feet per minute. To do this, the machine, while practically retaining its old lines, has been given a stiffness commensurate with the increased power necessary to overcome the greater resistances due to the higher speeds and coarser feeds. The extent of such power increase may be shown in a new 36-inch lathe which absorbs 65 horse power when working at its maximum this energy being sufficient to wreck an old machine of the same swing. High speed deep cuts and coarse feeds are now the order for rapid production in lathes. while the best results on milling machines are produced by coarse feeds and a lighter depth of cut.

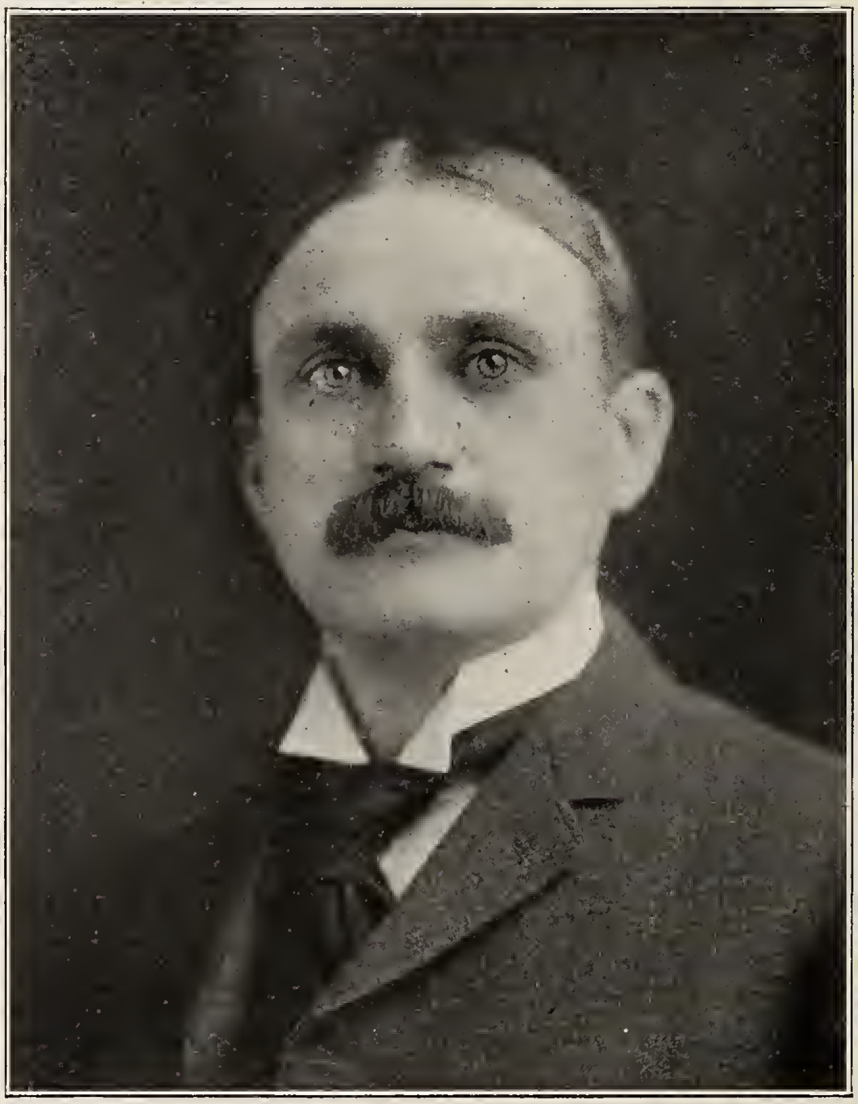
In planer practice coarse feeds instead of high speeds are preferable for cast and wrought iron, while the contrary holds for high carbon steels, 40 feet per minute being none too great on the machine powered for the work. The speed of drills has been profitably increased to a ratio way beyond old practice, but feeds are dependent on the resisting strength of the boring tool and have not been increased proportionately with other cutting tools; means have recently been found, however, to overcome this difficulty encountered in ordinary drills, and the machine when thus equipped will enter the category of metal removers in which the capacity is measured by pounds of metal removed per hour.

Electric Tool Drives

THE popularity of electricity as a motive power for shop tools has been a growing feature in shop economies from the first installation, which was simply a method to produce motion and do work without regard to the requirements of speed control as now perfected, and which has given the electric drive its high place in modern machine shop practice. Like every other remarkable move made in the domain of mechanics, for the betterment of previous existing conditions, this one has been approached from different positions and by numerous degrees of talent, all working to the same end, by attaining results by means that are too strongly flavored with diversity to give all the advantages inherent in the electric drive, and hold it in its high plane earned by pure merit; in other words, what is needed now, is a scheme of standardizion for the design and also the application of motors to machine tools. Such a scheme involves a standard range of speeds, and standard dimensions of motors for the performance of like duty. This is well understood by shop managers who have been forced to plead with electrical designers to get together and consider the factors that will give the required results.

The National Machine Tool Builders have gone on record in this direction, not in retaliation for the action, have been obliged to take in perfecting their output to a standard of efficiency that could properly absorb the power put into their tools by the new drive, and this increased efficiency was one of the best things accomplished by the new power, since it exposed weak features that would never have been corrected if left to the initiative of the original designer. The electric motor in bringing to the surface the weaknesses of machine tools, is working out to a needed solution a phase of the tool drive problem that will make for an increased output all along the line, and its influence is felt even where the line shaft still obtains.

The attitude of the tool builders on the question of motor design, and the status of the situation from their viewpoint, is reflected in a communication to the association of tool builders by Mr. F. A. Geier, an abstract of which is given herewith: "The success of direct connected motor-driven tools has been thoroughly demonstrated, and they are here to stay. Much of the uncertainty connected with the design of tools suitable for motor driving has been eliminated during the past twelve months by those manufacturers of electrical machinery who have given a great deal of attention to the subject of supplying suitable motors. However, a satisfactory solution of the general problem has not yet been reached by any means, and in order to have a satisfactory solution, it will be necessary for us, machine tool builders, to first of all decide upon a standard speed range for variable motors, a speed range that will cover the field of machine tool driving. This point settled, we can put the matter before the motor manufacturers, and should have no difficulty in getting them to bring out a line of such motors as a standard for machine tools. There is considerable variation in the specifications issued by the several machine tool builders at the present time, because each of us has been struggling along as best he could, and applying a motor that seemed to offer the least difficulties. In order to arrive at definite figures, let us analyze the case of the milling machine. From experience we find that we need a variation of 150 per cent in the motor—that is, a maximum speed of 2½ times the minimum speed. This is more speed range than is required by some tools, but probably falls a little short of the range required by others. However, it would seem that a motor that would be suited to a milling machine drive would have plenty of range for any other machine tool. This will be clear from a further analysis of the problem. We require a speed of, let us say, from 25 or 30 to 1. By using a motor with a 2½ to 1 speed variation, and then applying double back gears to the machine, we get the speed range without any difficulty whatever. The method of speed variation of such motors through shunt field rheostats supplies plenty of speeds between the gear speeds."



MR. HENRY MILLER,

GENERAL MANAGER WABASH RAILROAD

Mr Miller was born at Hannibal in 1863; entered railroad service in 1878 with the Hannibal & St. Joseph as boilermaker's apprentice; made switchman in 1879; appointed yardmaster in 1883; appointed trainmaster of the St. Louis, Keokuk & Northwestern line in 1890; promoted to assistant superintendent in May, 1892; promoted to superintendent in May, 1902; promoted to general superintendent of the Missouri lines of the Burlington in January, 1903; promoted to general manager of the Wabash Railroad, May 1, 1905.

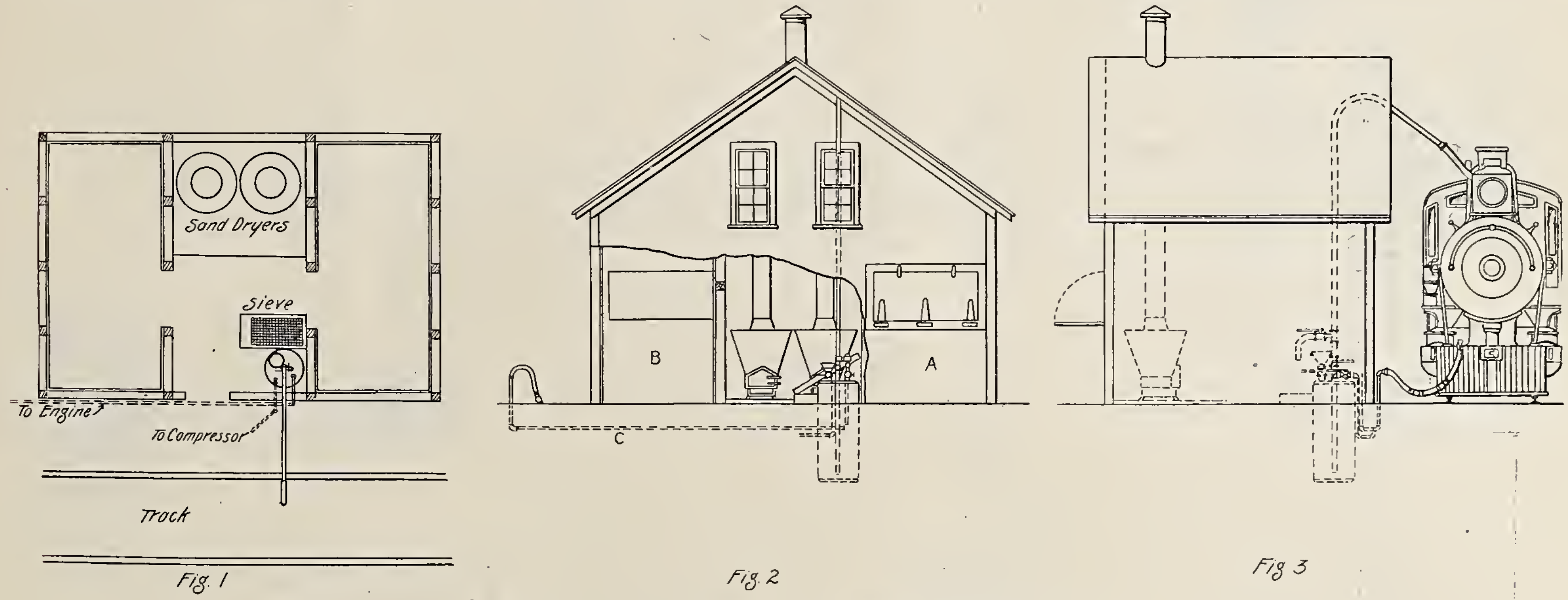
Mr. Geier made a suggestion that had a wide bearing on the question of cost of motor drive details for machine tools, that is, such parts as come within the scope of the tool builder. His suggestions for standards were as follows: "First, the size and shape of base for the motor; second, the distance from center of the driving pulley to the center of the base; third, height of motor from the bottom of the base to the center of the armature shaft; fourth, diameter of the armature shaft." It is plain that if these suggestions, from a well-known tool builder, are observed by the builders of motors there will be little left to improve the tool drive situation, since the builder has met the requirements imposed by the electrical engineer, with reference to absorption of power put into the tool.

Sand Houses and Appliances---III.

THE sanding apparatus of the Duluth & Iron Range Railroad Company is shown in Figs. 1, 2 and 3. The sand is unloaded from the cars by hand into the bins marked A B, which hold about four cars each. It is then shoveled into the hoppers for drying (these hoppers are ordinary sheet iron cylinders resting on the base of a common cast stove). As the sand dries it falls of its own weight to the floor and is then sifted through an eight mesh screen into a box. From this then it is poured into a reservoir through the filling funnel. The reservoir can be supplied with air either from the compressor or can be taken from the front end of the engines, as shown in Fig. 3. The sand is forced into the engine sand box through a pipe leading from the reservoir up through the roof of the house. In case there is any moisture in the pipes it can be disposed of through the pipe marked C.

We are indebted to Mr. H. S. Bryan, S. M. P., for the illustrations and description.

The Chicago Great Western sand handling plant is shown in Figs. 4, 5 and 6. Figure 4 shows the general arrangement, as well as enlarged details of the drier and elevating drums. The drier consists of two layers of



SAND HOUSE OF THE DULUTH & IRON RANGE.

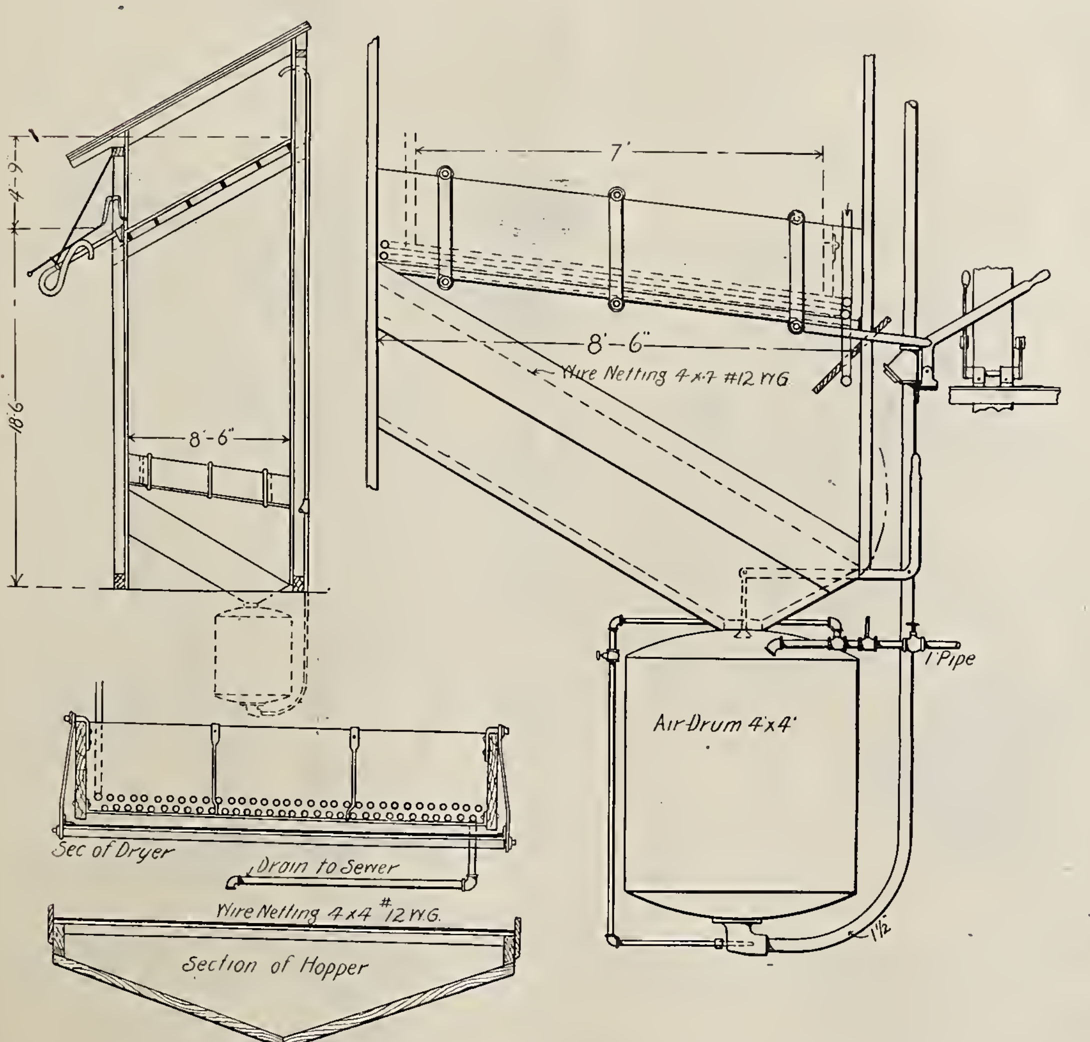


FIG. 4—CHICAGO GREAT WESTERN SAND HOUSE WITH STEAM DRIER.

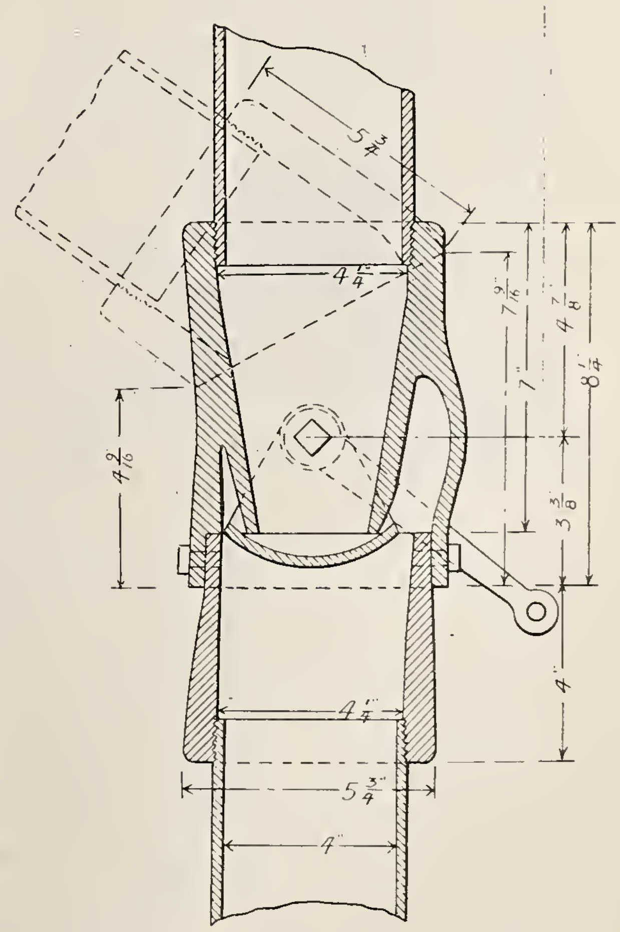


FIG. 5—CHICAGO GREAT WESTERN SAND VALVE.

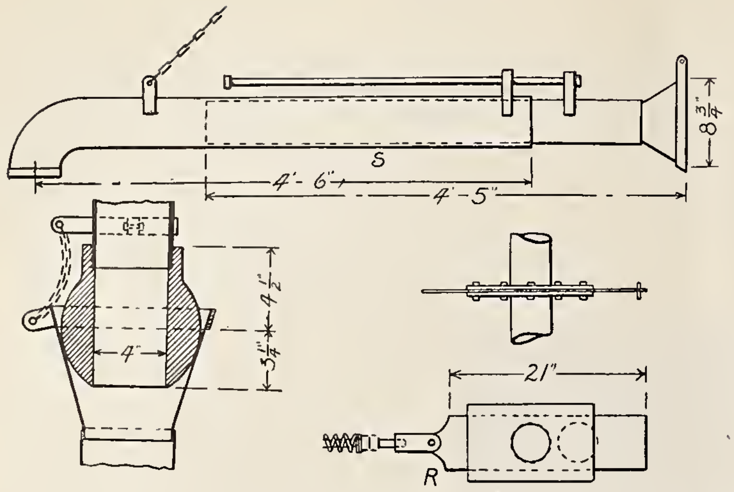


Fig. 9—Sand House Details, Wabash R. R.

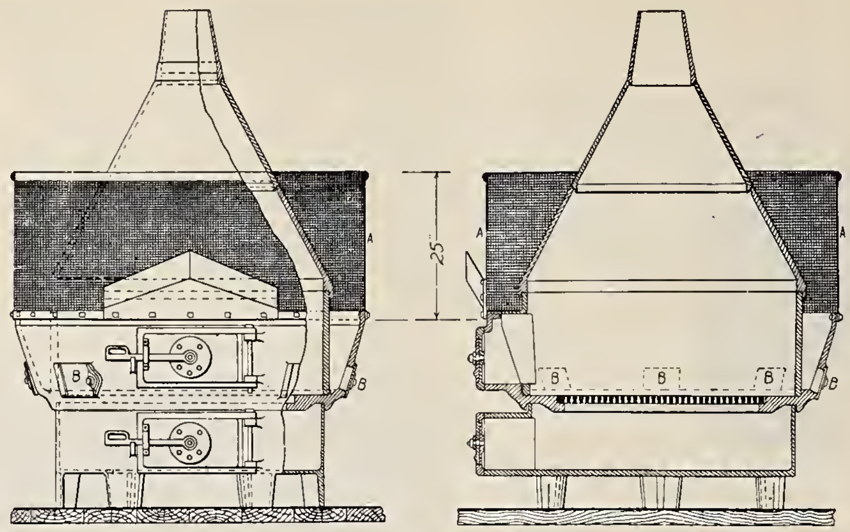


Fig. 8—Sand Stove, Wabash R. R.

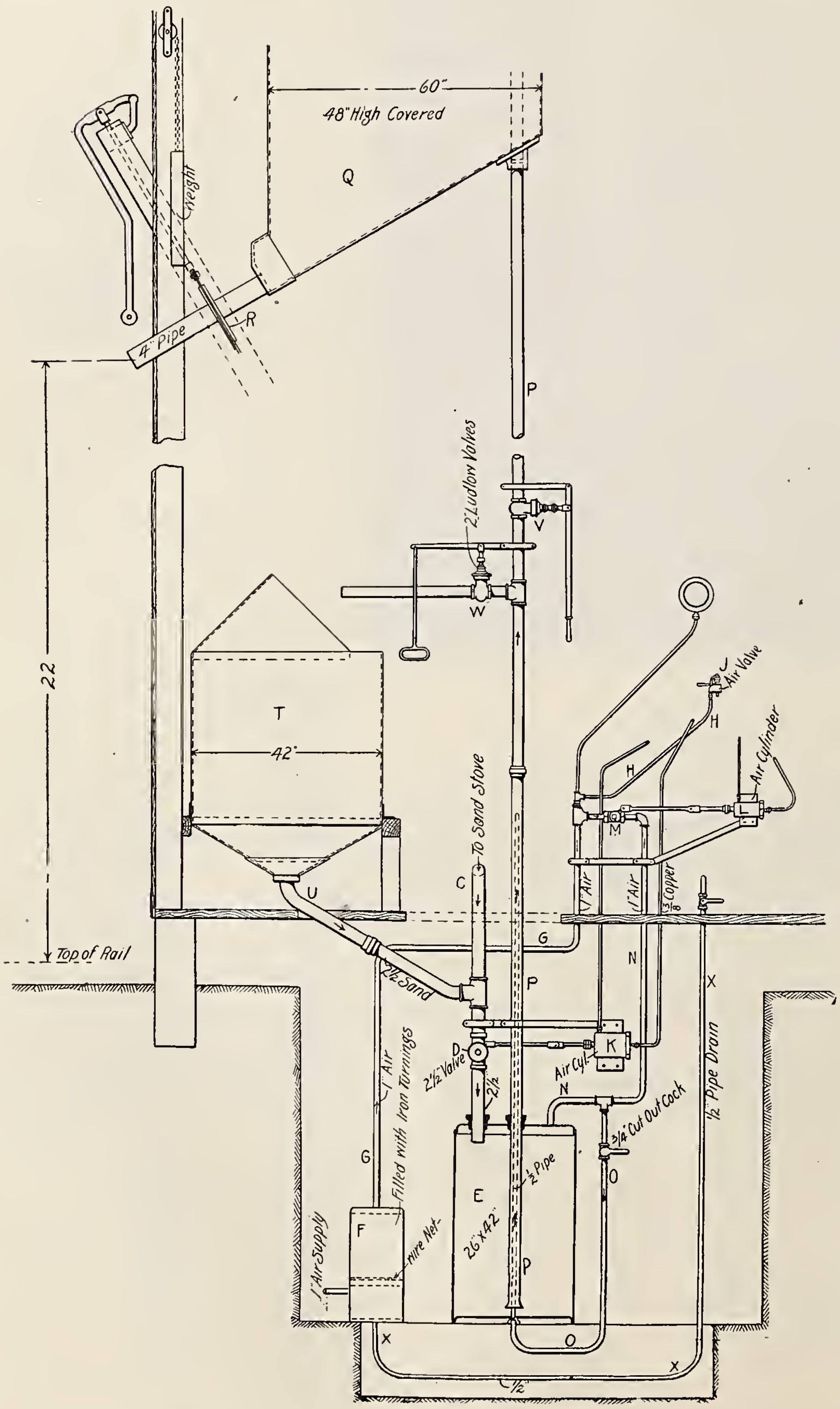


Fig. 7—Pneumatic Lift for Sand, Wabash R. R.

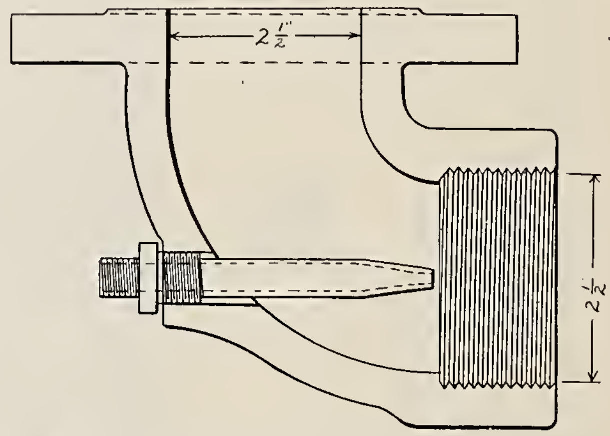


Fig. 6—Chicago Great Western Tank, Bottom Casting and Primer.

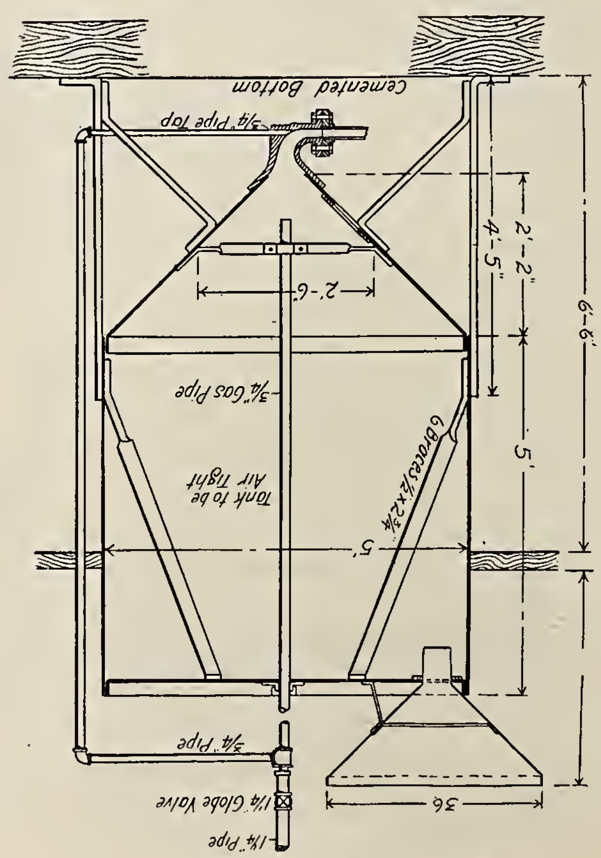


Fig. 10—Sand Supply Tank, C. & E. I. R. R.

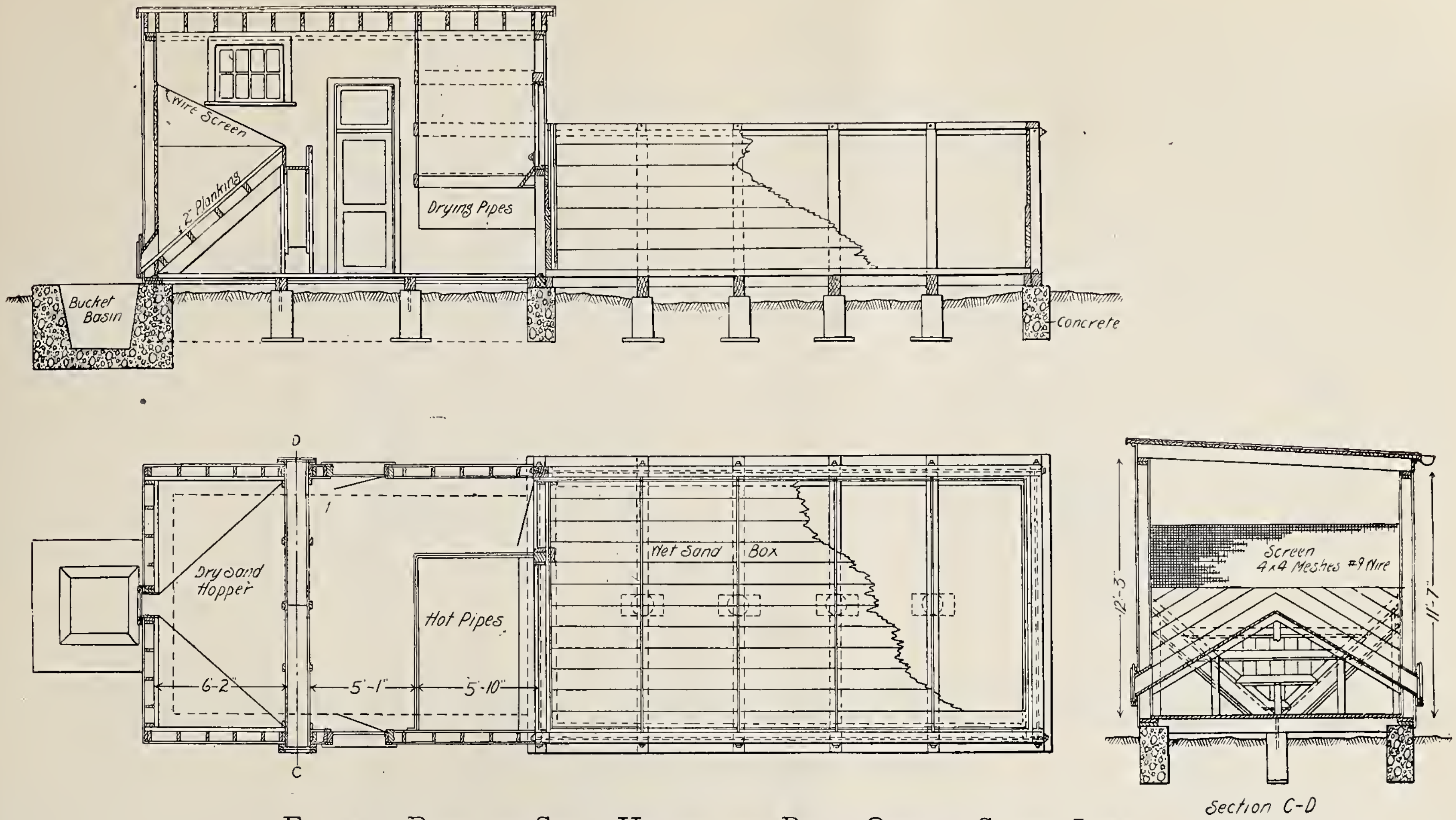


FIG. 11—PLAN OF SAND HOUSE AND BINS, OREGON SHORT LINE.

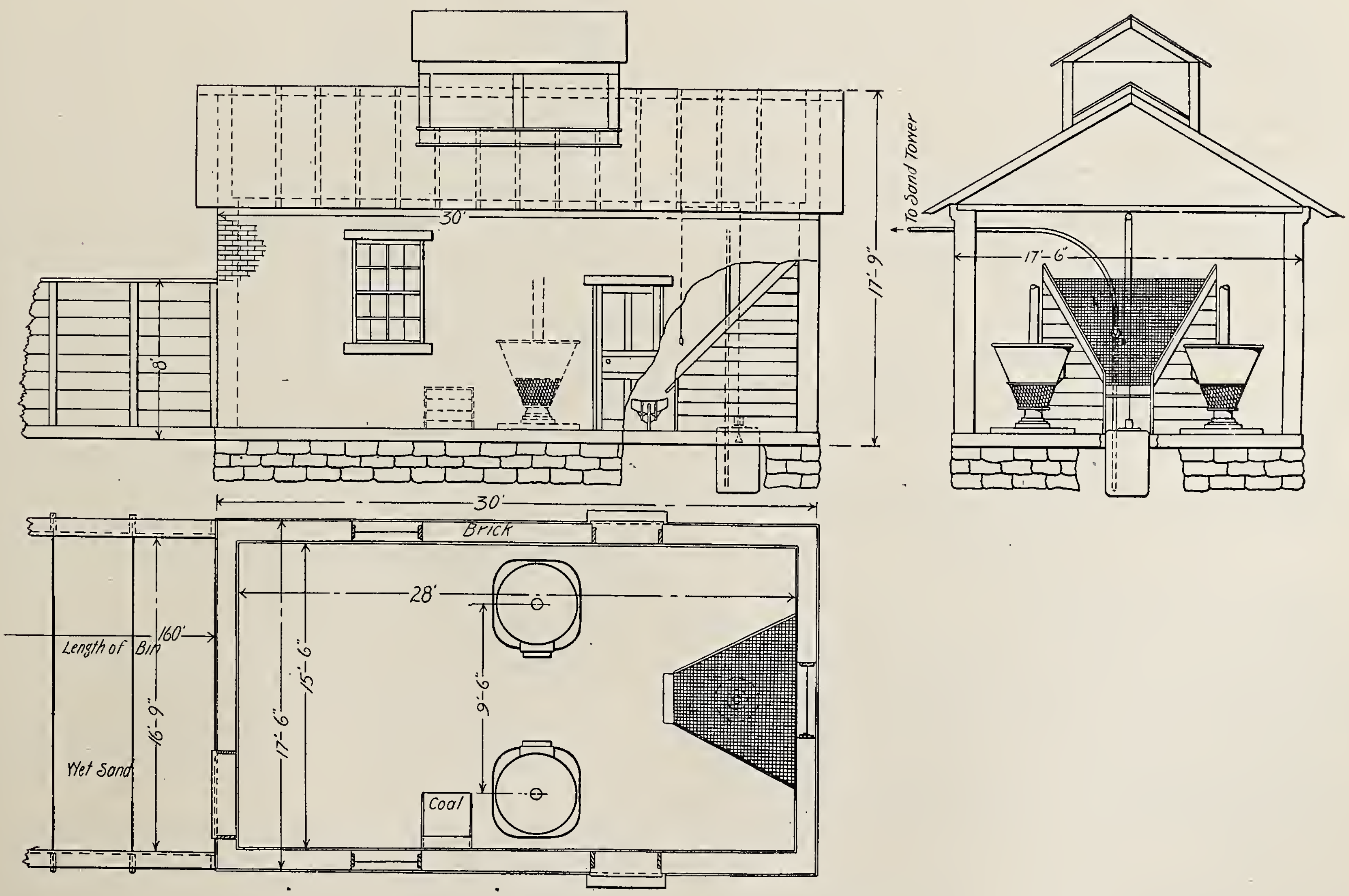


FIG. 13—HOCKING VALLEY SAND HOUSE.

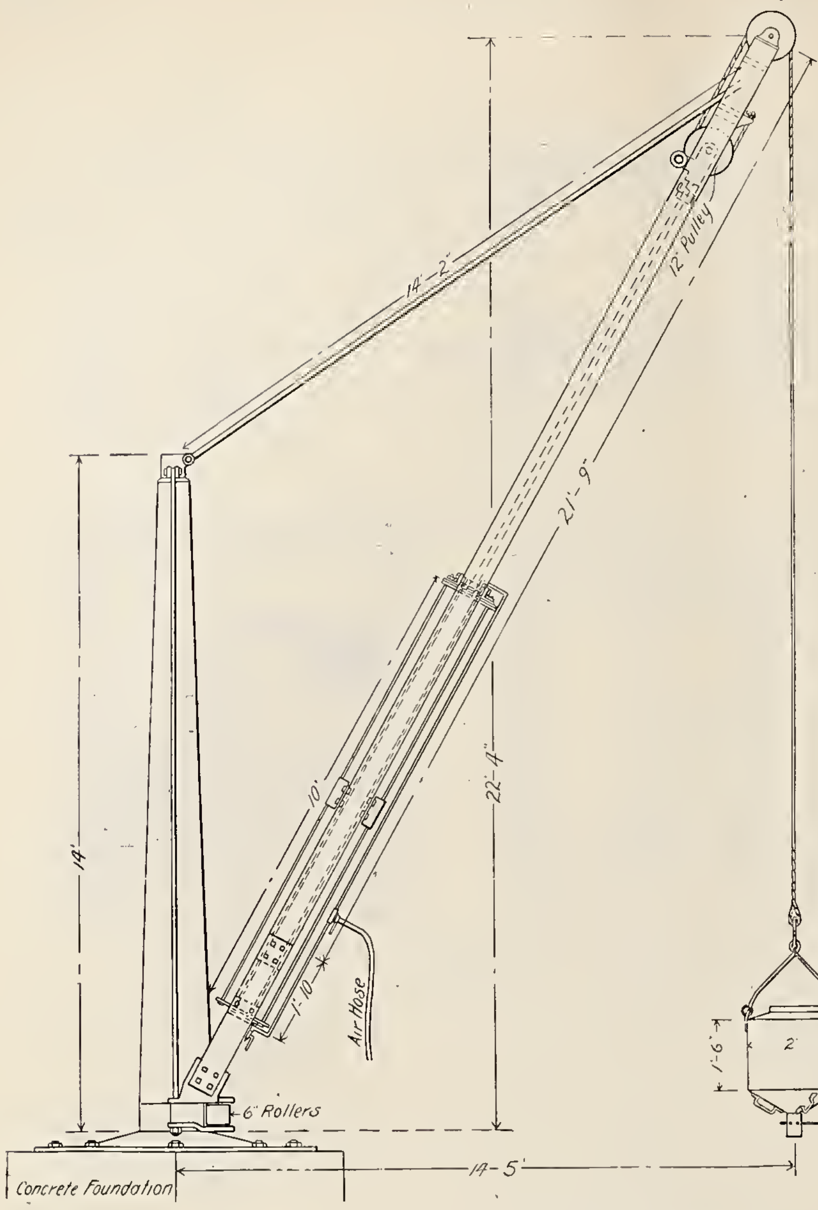


Fig. 12—Sand Crane, Oregon Short Line.

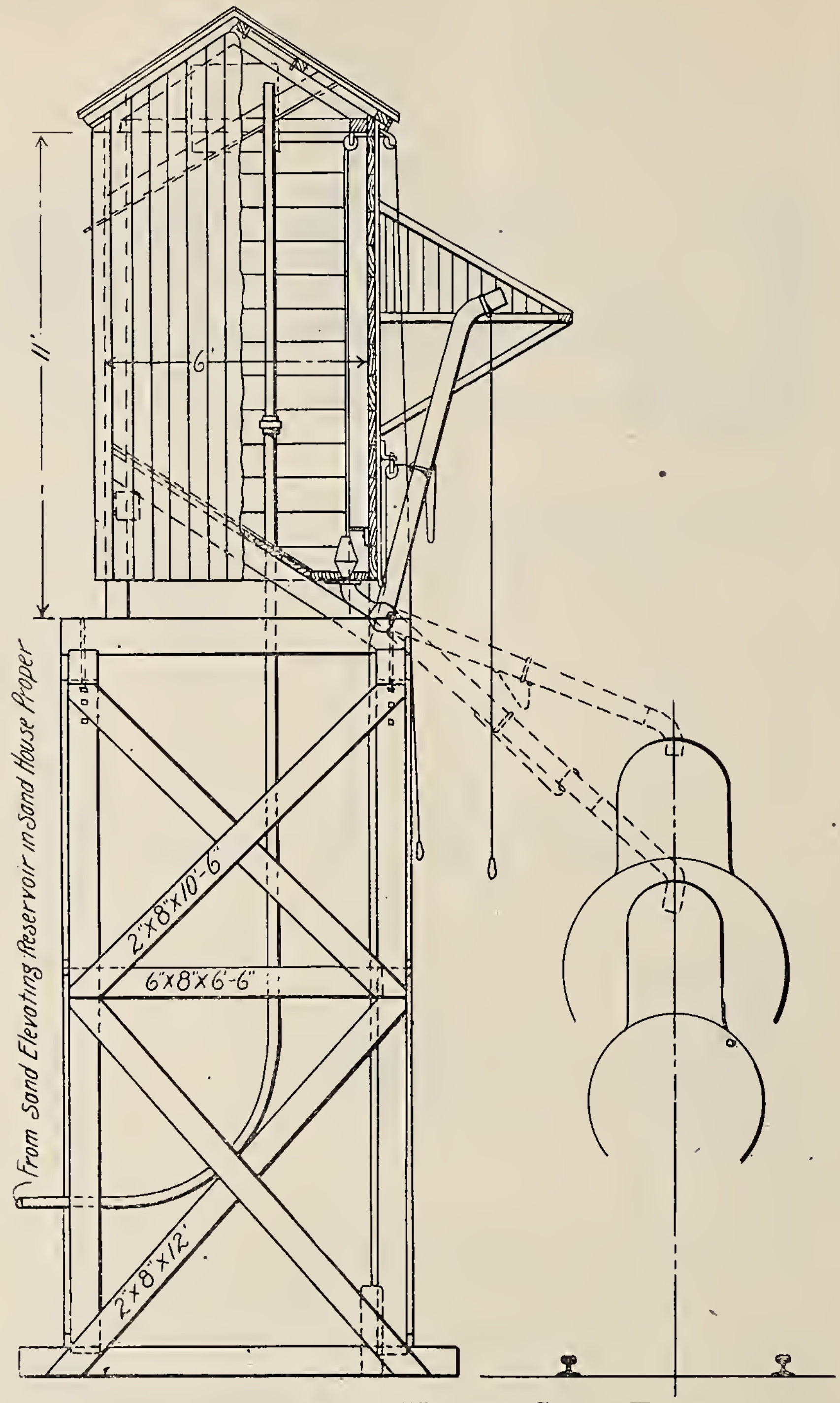


Fig. 14—Hocking Valley Sand Tower.

steam pipes, one slightly above the other. These are laid on a slight angle and the end connected with the sewer. Below the pipes is a 2½x2½ No. 10 wire netting to prevent the wet sand from falling through. This screen is hung on six hangers and connected with a handle for shaking to drop through the dried sand. After dropping through the first netting it strikes another wire netting, which is finer and separates the gravel. Beneath the second netting is the hopper connected with the elevating drum. The elevating drum differs slightly from others in that it has a special primer for starting the sand. A detail of this is shown in Fig. 6. As the pressure is applied to the top of the tank it also puts a jet of air through the nozzle which forces the sand up to the storage bins. The sand valve on the tower is shown in Fig. 5.

We are indebted to Mr. Tracy Lyon, Asst. G. M., for the illustrations and description.

Figure 7 shows the general arrangement of the Wabash Railroad sand handling apparatus. Their stove is shown in Fig. 8 and the spout and sand valve in Fig. 9. In operating the plant sand is shoveled into the storage bins and from the bins into the stove. The dried sand passes through netting A and openings B, Fig. 8, and then through pipe C and valve D into reservoir E, Fig. 7. The air supply passes through separator F and pipes G and H to operating valve J. The first movement of valve J admits air to cylinder K, thus closing valve D and shutting off supply of sand from stove. The second position admits air to cylinder L, which opens valve M and admits air through pipe N to top of reservoir, and through pipes N and O to delivery pipe P, thus forcing sand up pipe P to delivery hopper Q, located in top of sand house. Further movement of valve J closes air valve M and opens sand valve D, thus restoring parts to their initial position. From hopper Q sand is delivered to engines through valve R and spout S shown in Fig. 9. T is an auxiliary hopper kept filled with dried sand to be used when stove is not in operation, the sand being fed through pipe U into reservoir E. T is filled by shutting valve V and opening valve W. X is a pipe to drain water from separator F.

We are indebted to Mr. J. B. Barnes, S. M. P. & M., for the above description and illustrations.

The elevating drum used on the Chicago & Eastern Illinois is shown in Fig. 10. It is constructed of wrought iron, is well braced, and is five feet in diameter and five feet high above the cone-shaped funnel at the bottom, which has an altitude of two feet two inches. The bottom of the tank is connected with a priming nozzle. Sand is admitted through a funnel in the top, which has a screen in it to prevent any gravel or other foreign matter to enter.

We are indebted to Mr. G. W. Smith, S M. P., for the above description and illustration.

The general arrangement of the sand house of the Oregon Short Line is shown in Fig. 11. The wet sand storage bin is located at one end of the building and the steam drier immediately adjoining it. Sand is shoveled in the steam pipes, which dries it and allows it to drop on the floor beneath. It is then shoveled on a wire screen above the storage bin. This bin has an opening into the bucket basin on the outside. To sand a locomotive the bucket shown in Fig. 12 is placed in the bucket basin to be filled, after which the air hoist raises it to the sand box. The bottom of the bucket has a valve which is opened to empty the contents.

We are indebted to Mr. J. F. Dunn, Supt. Mechanical Department, for the above illustrations and description.

The Hocking Valley sand house is shown in Figures 13 and 14. In this the sand is discharged from cars into a large bin 160 ft. in length, 6 ft. 9 in. wide and 8 ft. high. The illustration shows the bin built of wood, but it was found to be more practicable to build it of stone and concrete. It is then delivered to the stoves to be dried after which it is shoveled on the sloping screen. The sand drops into the bin beneath and the pebbles are deposited into a wheelbarrow to be carted away. The bottom of this bin is connected with the elevating drum, which elevates it to the tower shown in Fig. 14. The engines are sanded from this tower through a spout.

We are indebted to Mr. S. S. Stiffey, S. M. P., for the above illustrations and description.

The Thirteenth Annual Convention of the National Master Blacksmiths' Association

THE National Railroad Master Blacksmiths' Association, which will hereafter be known as "International," held their thirteenth annual convention in the city of Cleveland, August 15, 16 and 17, 1905.

The attendance was larger than the previous meeting.

President Thomas F. Keane called the meeting to order at 10 a. m. After the opening prayer Mayor Tom L. Johnson welcomed the guests to the city. President Keane extended the usual president's greeting.

A happy feature of Tuesday evening was the presentation of a beautiful silver service to Mr. James Walker, of the Burlington, at Aurora, Ill., and one to John Buckley, of the Illinois Central, Chicago; thus honoring two of the charter members who have done much toward the success of the organization.

A donation of two hundred dollars was made to the Association by W. W. McLelland, of Denver, Colorado. Mr. McLelland is an ex-blacksmith, having been foreman of the Denver & Rio Grande shops for many years.

Chicago was chosen as the next meeting place and the following officers elected:

President, David B. Swinton, C. P., Montreal; first vice-president, John S. Sullivan, P. C. & St. L. R. R., Columbus, Ohio; second vice-president, G. H. Judy, B. & O. R. R., Pittsburg; chemist, G. H. Williams, B. M. Jones & Co., Boston; secretary and treasurer, A. L. Woodworth, C., H. & D. R. R., Lima, Ohio.

The subjects for next year's consideration are:

1. Thermit welding and cost. George Kelly, Chairman.

2. Making of locomotive frames from scrap to finish, also repairing. How many broken during the year? How often broken in the same place? James Fenwick, Chairman.

3. (Paper.) Best coal to use in smithshop, by John Buckley.

4. Best manner of annealing high speed steel, also of tempering same. George Lindsay, Chairman.

5. Case hardening methods; time taken; specimens of work furnished and kind of material used. G. F. Hinkens, Chairman.

6. Piece work vs. day work. R. A. Mould, Chairman.

7. Tools and formers for bulldozers, steam hammers and forging machines. Thomas F. Keane, Chairman.

8. Classification of work in shop. W. J. Mayer, Chairman.

9. Flue welding. Best methods of flue welding and fuel used. G. H. Judy, Chairman.

10. Frogs and crossings. S. Uren, Chairman.

There will be a paper on subjects for 1907 meeting by G. H. Judy.

Committee on hotel arrangements: John Buckley, John McNally and A. J. O'Leary.

Executive Committee: J. W. Russell, Chairman; John Conners, John Coleman, S. Uren, W. W. McLellan.

*Manipulating Tool Steel, including the High Speed Varieties.**

By R. A. Mould, Omaha, Neb.

THE question before us—manipulating tool steel—is one calling for our most careful consideration and is most important to our craft. While much has been said in our previous conventions, there still underlies many difficulties that come between us and success. It would be a fine thing if I could begin my subject by giving the name of a brand or make of steel which would answer for all kinds of tools, a steel that would harden

*Paper presented before the International Master Blacksmiths' Association.

without trouble, temper evenly, and one free from warp and soft spots which develop during the process of hardening and tempering. However, as we cannot name a carbon steel which will answer for all kinds of tools, to obtain success we must first obtain a steel which is uniform and of the best quality. There is no economy in purchasing steel just because it is cheap, because with cheap steel we have the difficulties and trials that often arise, the result of lost labor and the destruction of an expensive tool. The better quality of steel may cost more in the beginning, but the result will be labor saved, besides its superior lasting qualities and its ability to retain a cutting edge for long periods makes it the cheapest and most satisfactory.

Here I might insert that the manufacturers of carbon steel have been selling it to our railroads solely upon the price, losing sight of quality and the purpose intended. It is high in carbon and often, if not destroyed in the bath while being hardened, would not have the tensile strength to resist the strains applied while at work. Therefore let me again say, cheap steel is most expensive for all tools requiring the labor of finishing, hardening and tempering, and I would suggest a better quality of steel to be used in making taps, rammers, bolt cutters, dies and such tools that require finishing and hardening.

After having selected the grade required for the kind of work I would recommend the striping of the various bars with different colors of paint; then have a card in steel rack with brand and color corresponding to color of paint upon the bars of steel. This will enable the workmen to obtain the desired grade quickly, with a certainty that he has the right grade desired for the work. We can obtain from the steel manufacturer a card recommending the grade of steel as to carbon in order to meet the requirements of the work. I would call the attention of the convention that one of the most important things for our consideration is to lay stress upon the instructions given us by the makers of tool steel themselves. While many of us may have wide experience in the manipulating of high carbon steel, nevertheless, the instructions sent out by the makers have been obtained by the most trying and severe tests, and it is only when we ignore these instructions that we have trouble.

The treatment of high-grade tool steel is a subject often discussed but is one of great importance to steel users and too much cannot be said or written. How often has a piece of steel been condemned as being of inferior quality when the fault lies with ourselves and not upon the steel? The causes of failure in using high-grade steel are numerous. In the first place, steel may be overheated and overworked in forging, as most of our railroad shops heat their steel in forges, and unless the greatest care is taken overheated edges and corners are the result.

Then, while forging it may be overheated: First, by working under a hammer of insufficient weight so that the blows do not penetrate the forging, causing piping or hollow center. Secondly, working the forging too cold while under the hammer causing undue strains. This process, together with improper annealing, is very defective. When the taps, reamers and other tools come to be hardened or tempered the defects arising from the causes already mentioned will then demonstrate themselves and will often result in the destruction of our tools.

In order that our labors may bring success through the working of high-grade steel there are three distinct stages or times of heating—first for forging, second for hardening, and third, for tempering.

The first requisite for a good forging is a clean fire and plenty of fuel so that jets of hot air will not strike the corners of the billet; next, the fire should be regular, giving a uniform heat to the whole part to be forged. It should be keen enough to heat the billet as rapidly as possible and allow a thorough heating. I would suggest the use of a furnace instead of a forge to avoid the defects mentioned before, the overheating of corners. We should avoid high heating so that steel cannot be returned to its refined condition unless we have a heavy steam hammer at our command and sufficient stock in our billet, since heavy forging refines the bars as they slowly cool. After the steel is properly heated it should be forged into shape as rapidly as possible, and just as the red is leaving the parts intended for cutting edges, these parts should be refined by rapid light blows.

The second stage of heating for hardening great care should be used, first to protect the cutting edges and working parts from heating more rapidly than the body of the tool, and, second, the whole to be hardened must be heated uniformly. A regular heat as low as will give required hardness is the best to insure success. Bear in mind that every variation of heat which is great enough to be noticed will result in a variation of grain, and the tool is ruined as a result of inattention to this point. The effect of high heat is to open the grain, and the steel becomes coarse. The effect of irregular heat is irregular grains, strains and cracks.

As soon as a tool is heated it should be thoroughly quenched in plenty of cool bath, water, brine, or oil, such as the case may be. An abundance of cool bath to do the work quickly and uniformly is very necessary to good and safe work. To cool a large tap, reamer, die or cutter, a running stream should be used.

For the third stage of heating the first important requirement is again uniformity, the next time, the more slowly a tool is brought down to its temper the better and safer is the operation. When expensive tools are to be made it is a wise precaution to try small pieces of steel at different tempers so as to find at how low a heat the required hardness can be obtained. The steel shoul be of sufficient carbon and uniformity of quality to insure hardness at the lowest possible heat. The test costs nothing, takes but little time, and often proves a saving of considerable time and expense.

In all car shops conditions have so changed during the last few years until we find carbon steel used only in fine finished tools, for it has long since been replaced by high speed steel. It is here I desire to say to the manufacturers that had they maintained the quality of carbon steel at medium price, where uniformity could have been secured, many places where various varieties of high speed steel have been tried and held up, showing incrased output over carbon steel, could not have been demonstrated, if the best grades of carbon steel had been used.

A recent paper read before the Master Mechanics' convention comparing ten-cent carbon steel with sixty-five-cent high speed steel, showed large saving with increased output by the use of high speed steel in bolt cutter dies. During the last year we have been using high carbon steel for this class of work, cost sixteen to eighteen cents per pound. The result has been most satisfactory and has stopped the use of high speed steel for this purpose. During some tests made from the same grade of carbon steel as to boiler taps and drills an equally good showing has been made. And I believe there are many places where the high speed steel has replaced the carbon steel, but if a better grade of carbon steel had been used the result would have been equally as good and a showing made as to labor, material and an increased output.

The high speed steel has come to stay for the purpose intended, lathe and planer tools, boring mills, cutters, etc., and by its use some of our shops have shown increased output and remarkable reduction of cost and labor upon all classes of lathe and planer work.

There are many varieties upon the market, some will hold the cutting edge but does not have the tendency to resist the strains and breaks one to one and a half inches from cutting edge, causing much expense and loss of time. The steel under high speed we get the best results from is that which we do not bring up to that high fusion heat, but to that point where fusion begins. Therefore the only thing I can add to the working of high speed steel is to carry out the instructions given by the manufacturer and that which comes to the tool worker by experience. A good tool worker can soon learn the kind of steel he is working by the effect of the sledge or steam hammer upon the steel. I would advise the forging of a tool under a good working heat, then allow it to cool before attempting to harden; then by a clean fire and sharp blast, brought to the point of heat as instructions given, and lastly placed in high pressure air.

A most satisfactory showing has been made by the introduction of tool holders, reducing the amount of money in tools. A much smaller bar of steel may be used with excellent results upon the lathe and planer tools, except where special heavy cuts are made upon a planer. Then the steel should be of sufficient size to meet the requirements of class work.

In closing I would say I believe we have gone too far as to speed and have lost sight of a fact more important, and that is feed, the depth and thickness of cut. Furthermore I believe for the good of the machinery and the material being turned or planed that we shall return to a heavier cut and slower speed.

The North McSweyn Cylinder Relief Valve

THE description given below is a device known as the North McSweyn cylinder relief valve. It consists of one cast iron casing A, shown in Fig. 2. This casting is divided into two chambers, an upper and a lower one. The upper chamber has two piston valves, D and D_1, with packing rings, D_3 and D_4. When the engine is working steam these valves are in the position shown in Fig. 2 with D_5 as front end of cylinder. The port B_1 having been closed by the admission of steam through the chuck valve D_6, to which is attached a pipe connected with the supplementary port D_4, shown in Fig. 3, which has 5-16 in. head over the main steam port. The same operation forces valve D back to cap D_7 by means of spring D_8 and rod D_9. This uncovers three rows of ¼ in. holes drilled in spaces 1, 2 and 3 in the steel bushings C and C_1, allowing compression to pass around the spring guide D_{10} into port M, around valve C_4 in lower chamber, and through port X to the atmosphere, the valve C_4 having been placed in this position by throttle pressure admitted at C_5. Card No. 1 was taken with valve in this position.

The relief valve exhausts the steam which operates it at the same time that the main valves exhaust. This forces valve D_1 back against cap C_6 by means of the springs, the valve D remaining in open position until steam is admitted at C_7.

When the engine is drifting C_4 is forced back against cap U by means of the spring S. D and D_1 are forced against caps D_7 and C_6 in the same way. This allows the contents of the cylinder to circulate freely from one end

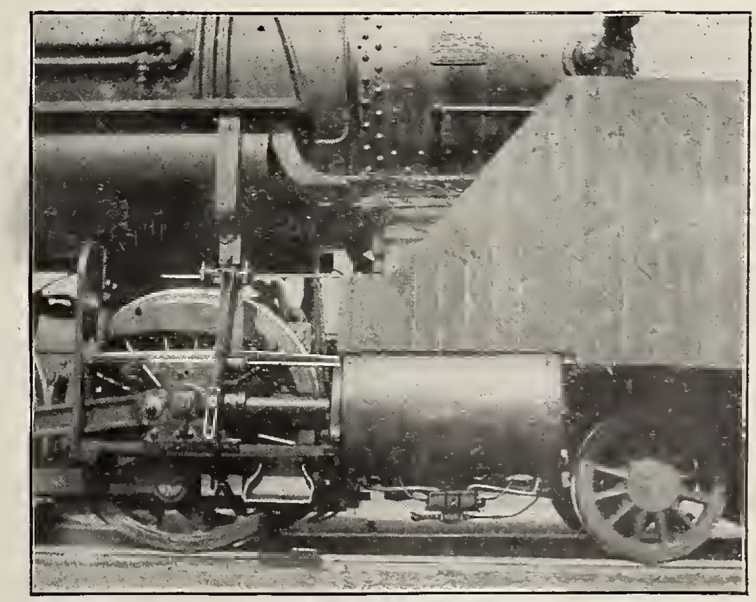


FIG. 1—THE NORTH MCSWEYN RELIEF VALVE APPLIED TO A LOCOMOTIVE.

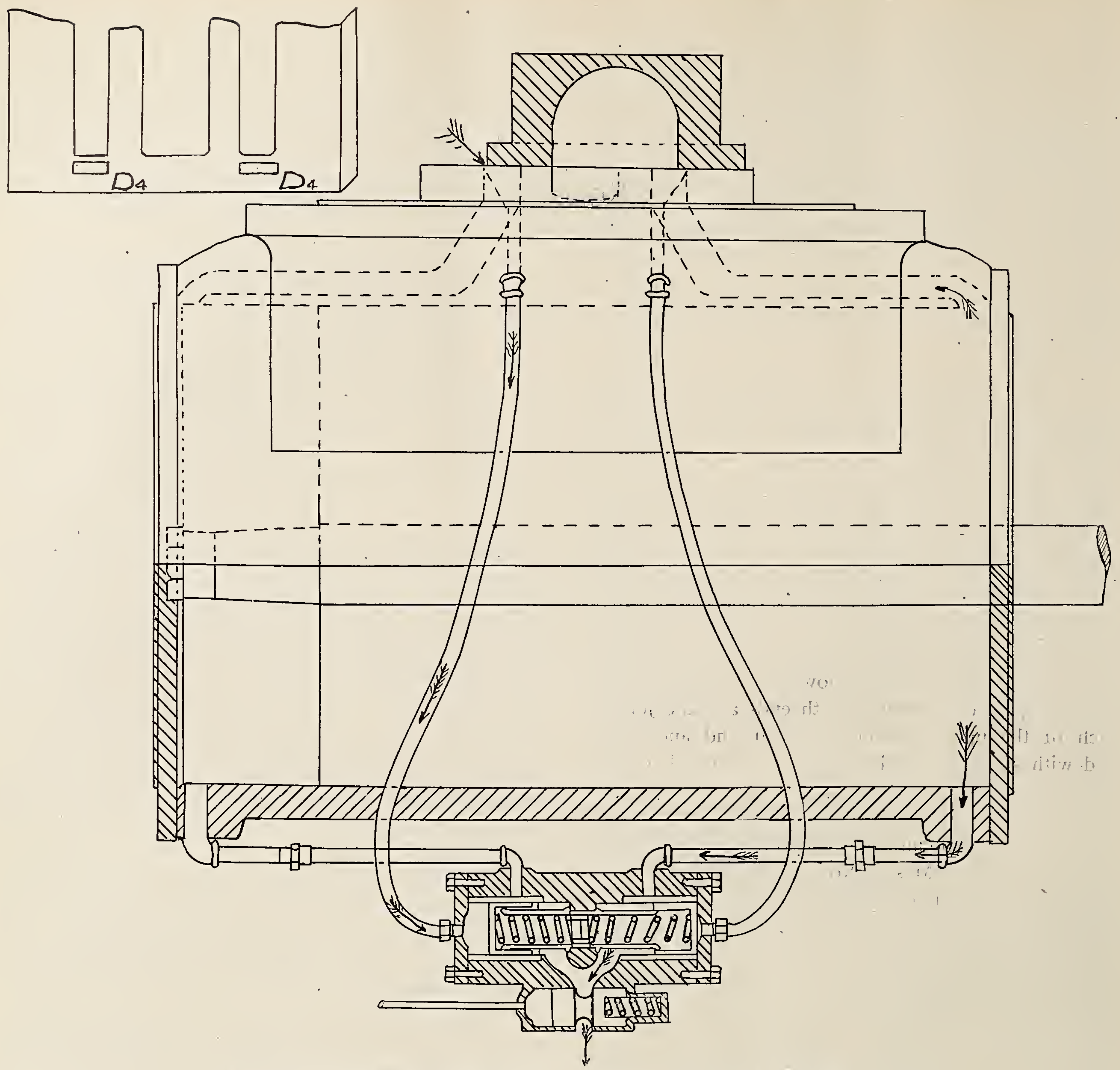


Fig. 3—Diagramatic Application, North McSweyn Relief Valve.

of the cylinder to the other through the valve. Card No. 2 was taken when the valves were in this position. Card No. 3 was taken when the engine was pulling a load of 2,400 tons and the drivers were making 92 r. p. m.

On a test made on a prominent road the device was applied to a piston valve, 22x30, consolidation freight engine weighing 110 tons. The relief valves, cylinder cocks and excess pressure valves were removed and this device applied. The valve applied was designed for a smaller engine, which accounts for the cards showing slight back pressure. If the ports had been made in accordance with the size cylinder this would undoubtedly have been remedied. The test in comparison with a similar engine without relief valves was as follows:

	Similar Engine, No Relief Valve.	Engine Equipped, N. & Mc. Valve.
Average negative h. p.	48	42
Highest negative h. p.	99	51
Lowest negative h. p.	63	29

The construction of the valve is very simple. The body consists of one casting, A, Fig. 2, which is cored out so that it is only necessary to machine the upper

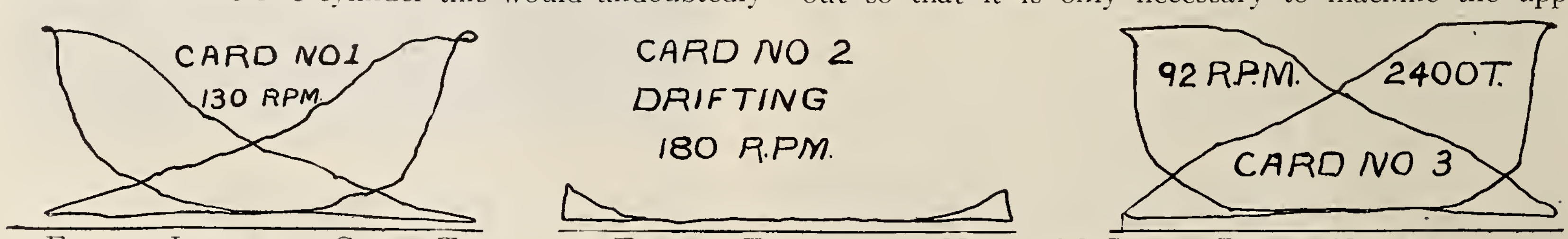


Fig. 4—Indicator Cards Taken on Engine Fitted with North McSweyn Relief Valve

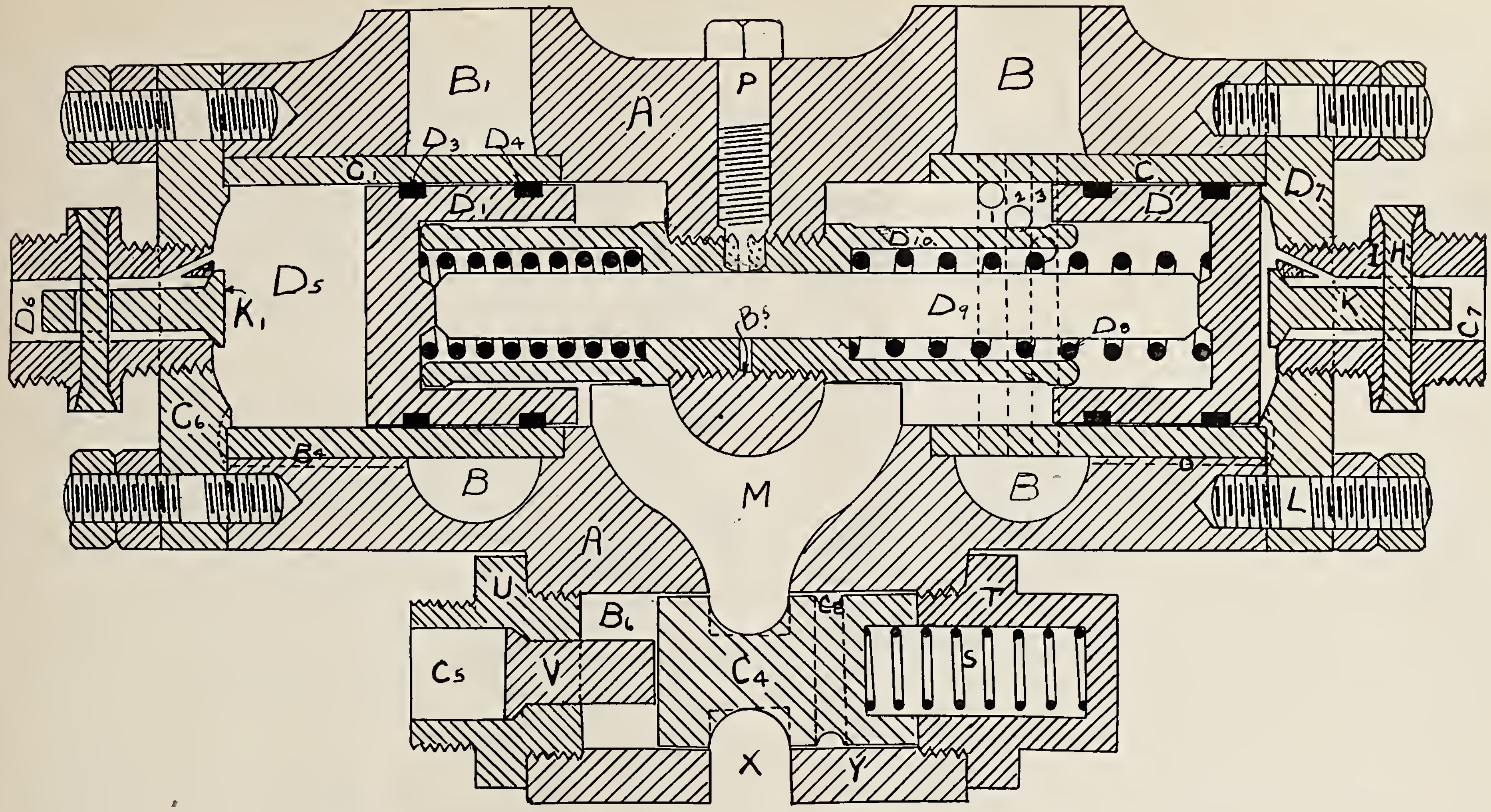


FIG. 2—CROSS SECTION OF THE NORTH McSWEYN RELIEF VALVE.

chamber at B_4 and B_5 and the lower chamber straight through. Caps are screwed in both ends and the joints on each of the upper chambers are ground and caps secured with six ½ in. studs. They are attached to the cylinder cock holes, which makes the attachment very simple. It combines all cylinder valves taking care of the cylinders automatically.

We are indebted to Messrs North and McSweyn, who secured a patent on the device, for the above description and illustrations.

The Traveling Engineers' Association

THE thirteenth annual convention of the Traveling Engineers' Association will be held at Detroit, Mich., commencing September 12th, at 9 a. m. The Cadillac hotel has been selected as headquarters and the convention hall will be in the hotel. The hotel people have made rates to our members and their families as follows:

American Plan.—Rooms without bath, $3.00, $3.50 and $4.00 per day, each person; rooms with bath, $4.00, $4.50 and $5.00 to $10.00 per day, each person.

European Plan.—Rates $2.00 to $6.00 per day, each person.

In order to assure yourself of accommodations at this convention, it will be absolutely necessary for you to engage your rooms in advance, as the Michigan state fair will be held at Detroit the same week that our convention will be there, and the hotels will be pretty well filled up. However, the hotel people at the Cadillac will give the traveling engineers the preference up to a reasonable time before the convention opens, and if reservations are made promptly, the hotel is amply large enough to take care of all of us. Arrangements have been made with the hotel management for small exhibits for the supply men. Arrangements have been made with the Pullman Company for one-half rates for members and their families. To secure these one-half rates, it will be necessary for you to write to the secretary advising space required and between what points it is to be used, when the secretary will notify the Pullman people what you want and the one-half rate orders will be mailed to you direct from the Pullman Company at Chicago. It is believed that this will be more satisfactory to the members than the old way of having to go and look up your return pass after your arrival at Detroit.

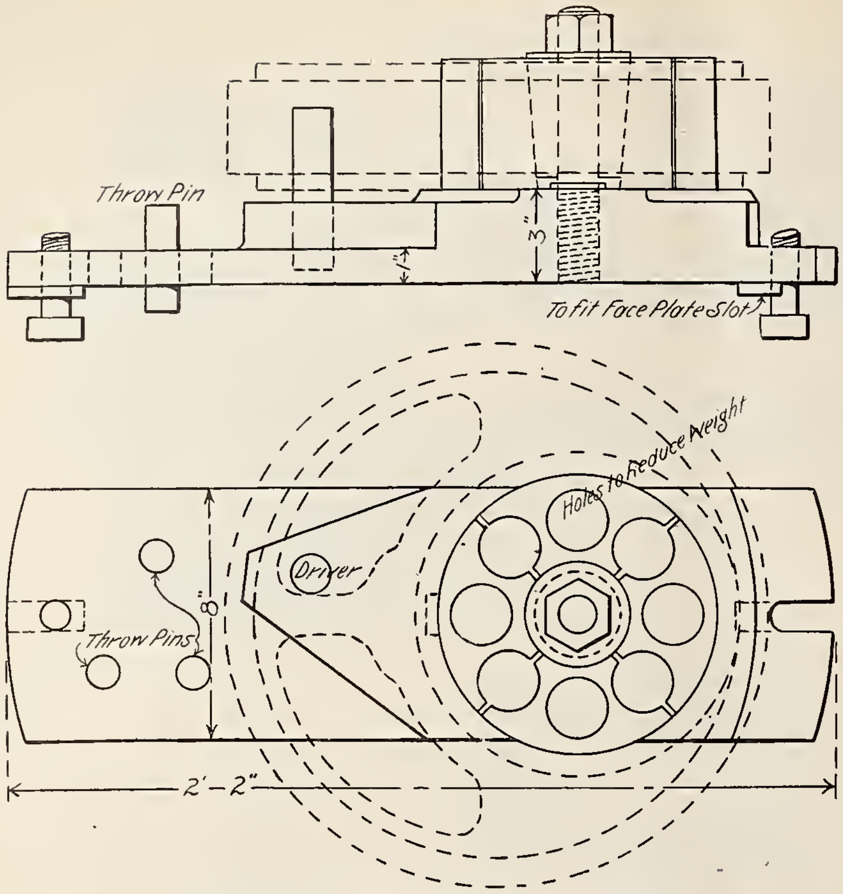
The various committees who have the subjects for discussion and papers to be read at the convention have been hard at work.

Your committee of arrangements is endeavoring to outdo all the others in the way of giving you a nice time in the beautiful city of Detroit, and it is believed that the thirteenth meeting will be the most pleasant and profitable of all.

Yours respectfully,
W. O. THOMPSON,
Secretary.

Chuck for Turning Eccentrics

THE accompanying cuts show a chuck for holding eccentrics for turning. This device can be fastened on the table of a boring mill or on a lathe. It consists of a base and a circular piece of iron, divided into four parts, with a hole in the center for a taper pin. The eccentric is placed on the base and the circular pins placed in the hole. The taper pin is then forced down by means of the nut on top of the bolt, which passes through the pin. This holds it from vibrations and



Chuck for Turning Eccentrics.

lateral motion, while a pin on the rib holds it from turning.

In order to provide for the different throws a number of holes are drilled in the table of the boring mill or face plate of the lathe to correspond with the holes shown in the illustration. These holes are determined by placing finished eccentrics of all different throws in the chuck and centering them, after which they are laid off and drilled. After properly marking the holes all that is necessary for fastening eccentrics is to place the throw pin in the proper hole and clamp the eccentric with one nut.

We are indebted to Mr. Willard Kells and Mr. John Hamm of the Lehigh Valley, for the above illustration and description.

Committee on Location of the Next Meeting Place of the M. M. & M. C. B. Convention

THE location for the next meeting of the Master Car Builders' and Master Mechanics' convention will be determined by the following gentlemen:

Mr. A. E. Mitchell, S. M. P., L. V. R. R. Co., with office at South Bethlehem, Pa.

Mr. G. W. Wildin, Mech. Supt., E. R. R. Co., with office at Meadville, Pa.

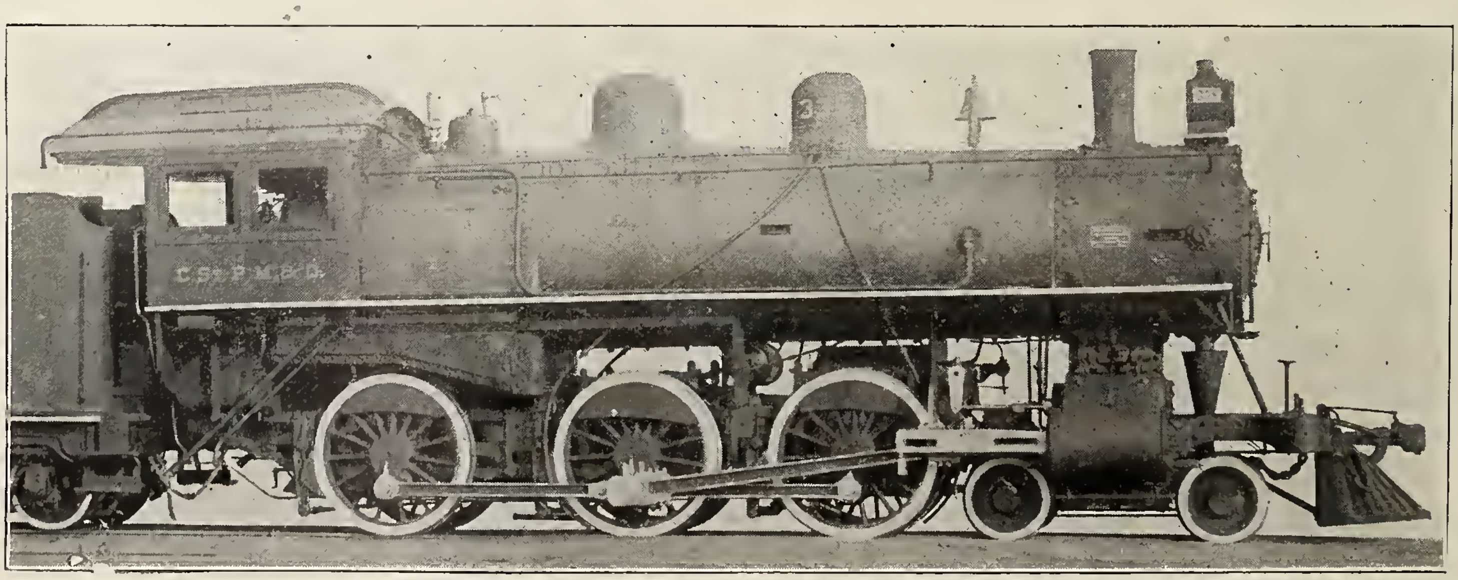
Mr. F. K. Shults, representing the Supply Mens' Association, with office at 95 Liberty street, New York City.

The above mentioned committee have appointed Mr. F. K. Shults as their chairman and all communications should be addressed to him, care Camel Company, 95 Liberty street, New York City.

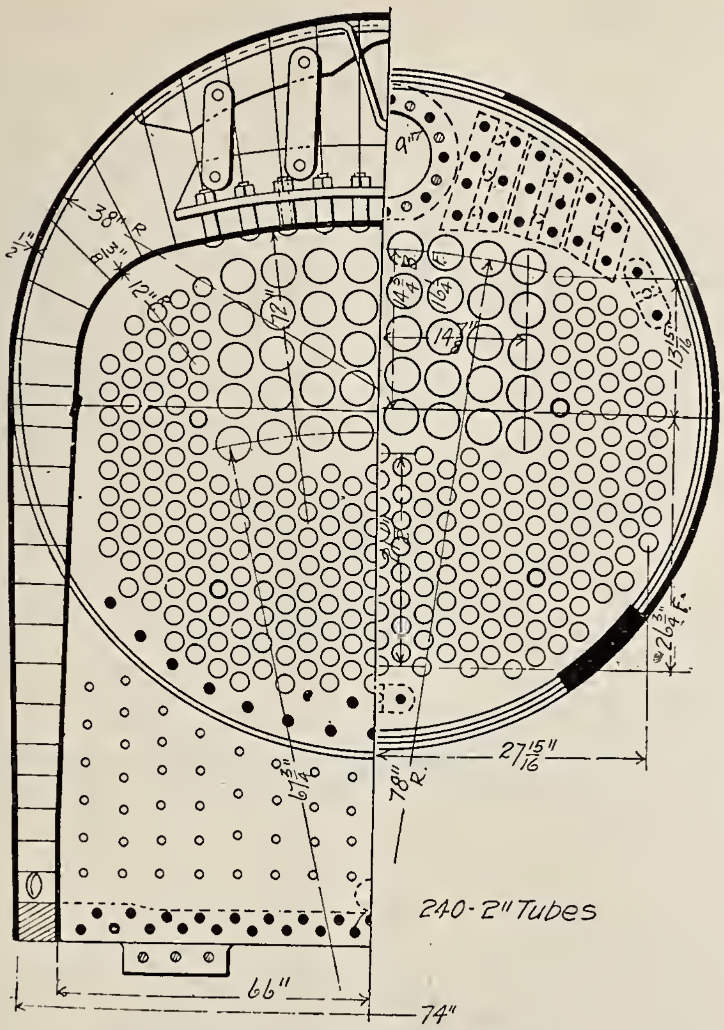
Superheating Ten-Wheel Engine—C., St. P., M. & O. Ry.

IN pursuance of its long established practice of being at the front with devices that give encouragement looking to economy in locomotive operation, the Omaha road placed an oder with the American Locomotive Company for some ten-wheel engines to be fitted with the Cole superheater. These machines are now on the road and giving a performance that is fully up to expectations in all particulars. The ten-wheeler has always been regarded as the best all round type of power for that superintendent of motive power, Ellis, has kept pace with the demand for increased power by designing an engine of this type to meet the requirements of service. In this case he has a modern locomotive, cylindered for the work it has to do; and equipped with the means of keeping the fuel account within reasonable bounds.

The superheater is an improvement over the original ones, having only 255.77 square feet of heating surface, which is furnished by forty 3½ inch tubes, having but a



Superheating Ten-Wheel Engine, C., St. P., M. & O. Ry.



Cross Section of Boiler, C., St. P., M. & O. Ry.

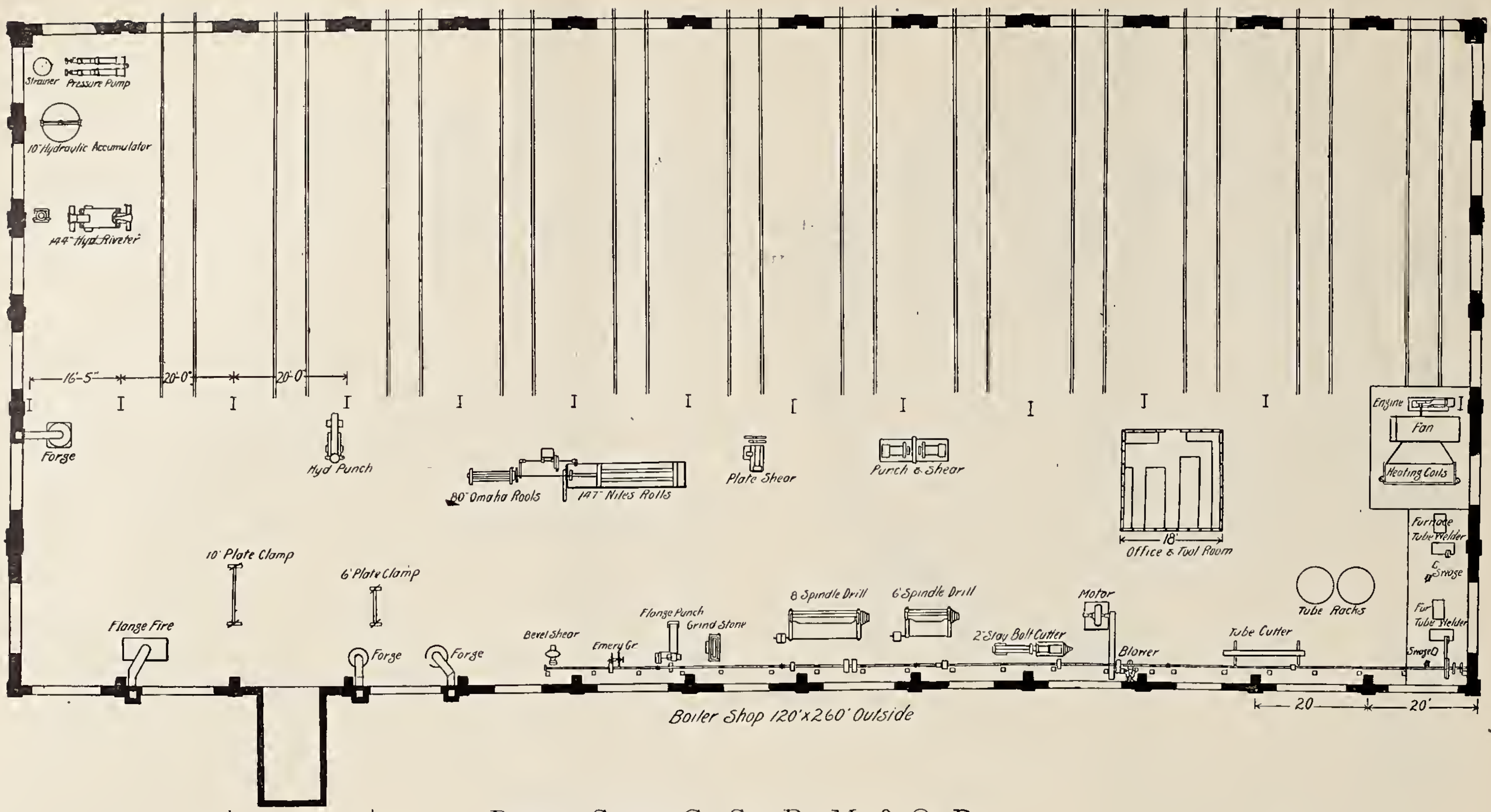
single loop of pipes, which with the firebox and ordinary tube heating surface, gives a total of 2,695.62 square feet. A comparison of these values with some of those put out in the past five years will show a distinct shrinkage in heating surface, which will be located at once in the flues, since that of the firebox remains unchanged except perhaps in some cases a little larger, as it should be to raise the percentage of firebox to flue surface. This is significant of a return to rational work in the design of tube heating surface, and will no doubt be followed to a conclusion of its benefits, especially in its application to the simple engine, since that type of engine is showing an economy over the compound when the latter uses saturated steam.

Prof. Goss in his paper before the Franklin Institute, Philadelphia, on March 2, of this year, made clear a whole lot of interesting things about superheating, and gave the proportion of superheating surface to total heating surface at about one-quarter to one-third. It will be noted that the proportion in this case is less than 10 per cent. In any event, a device that will prevent carrying entrained water over to the cylinders as this does, and also prevents initial condensation, is one to be looked into, no matter what the heating surface ratios. These engines have a tractive power of 31,000 lbs. maximum and an adhesion coefficient of 5.7 which will insure full starting power under all circumstances, but will decrease as tires and cylinders wear. Particulars of interest not presented in the above are given herewith:

Cylinder, type	Simple Piston Valve
Cylinder	Diam. 21 in., stroke, 26 in.
Wheel base, driving	14 ft. 10 in.
Wheel base, rigid	14 ft. 10 in.
Wheel base, total	25 ft. 10 in.
Wheel base, total, engine and tender	57 ft. 7 in.
Weight, in working order	177,000 lbs.
Weight on drivers	129,000 lbs.
Weight, engine and tender	323,600 lbs.
Heating surface, tubes	2,549.89 sq. ft.
Heating surface, firebox	152.73 sq. ft.
Heating surface, total	2,695.62 sq. ft.
Heating surface, superheater	255.77 sq. ft.
Grate area	46.27 sq. ft.
Axles, driving journals, main	9x11½ in.
Axles, others	8½x11½ in.
Axles, engine truck journals	diam. 6 in., length 10 in.
Axles, tender truck journals	diam. 5½ in., length 10 in.
Boiler, O. D. first ring	68⅜ in.
Boiler, working pressure	200 lbs.
Firebox, type	Wide
Firebox, length	102⅛ in.
Firebox width	65¼ in.
Firebox	thickness of crown, ⅜ in.; tube, ½ in.; sides, ⅜ in.; back, ⅜ in.
Firebox, water space	front, 4 in.; sides, 4 and 5⅞ in.; back 4 and 5 in.
Crown staying	Radial
Tubes, superheater	No., 40; diam., 3½ in.
Tubes, boiler	No., 240; diam., 2 in.
Tubes, length	15 ft. 9 in.
Gauge	No. 8 B. W. G. and No. 11 B. W. G.
Boxes, driving	main, cast steel; others, cast steel
Brake pump	9½ in. R. H.
Air reservoir	28½x42 in. and 20½x60 in.
Engine truck	4-wheel swing center bearing
Exhaust pipe	Single nozzles, 5¼, 5½ and 5¾ in.
Piston rod, diam.	3¾ in.
Piston packing	C. I. rings of Rams bottom type
Smoke stack, diam.	14 and 16¼ in.
Smoke stack above rail	14 ft. 11¾ in.
Tender frame	13 in. channels and plates
Tank, style	Water bottom with gravity fuel slides
Tank, capacity	7,500 gals.
Tank, capacity, fuel	12 tons
Valves, type	Piston
Valves	diam., 11 in.; travel, 5¾ in.; steam lap, 1 in.
Valves, ex.	C. L. 1-16
Setting	Line and line full gear F. & B.
Wheels, driving, diam. outside tire	63 in.
Wheels, center diam.	56 in.
Wheels, engine truck, diam.	30 in.
Wheels, tender truck, diam.	36 in.

New Boiler Shop—C., St. P., M. & O. Ry., St. Paul, Minn.

In the course of the extensions and improvements of the shop plants of the Omaha road, the boiler shop was one of the first to receive consideration, since boiler maintenance is one of the most serious problems on that road, which is afflicted, like some other western lines, with "bad water districts," with the resulting havoc to crown and side sheets. To provide for this work and reduce the cost of it to the lowest possible figure, Supt. of Motive Power Ellis has equipped his new shop with the best of modern appliances. The structure is brick with steel trusses and built on a plan that is more than liberal in order to take care of the increased liabilities of future added power.



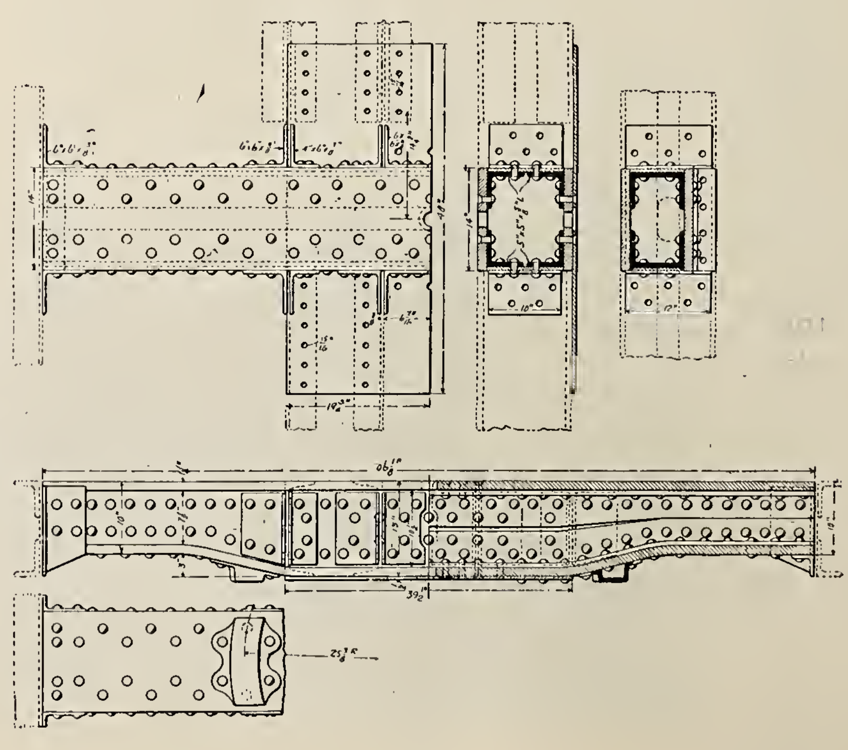
BOILER SHOP, C., ST. P., M. & O. RY.

The shop is 260 feet long and 120 feet wide outside of walls, and has twelve tracks, spaced twenty feet centers, extending to the center of the shop, besides connecting with the transfer table. Over these tracks, running full length of the shop, is a fifty-ton Niles electric crane of 63 feet 11 inch span, carrying two trolleys, and having a wide range of traverse and hoisting speeds. Over the machine side of the shop there is also a Niles electric crane of five tons capacity, with one trolley, and having a span of 47 feet 3 inches. Both of these cranes have head room to take their maximum loads over anything in the shop on their respective sides.

Our illustration shows the tool locations and also the General electric motor drives, the heavy tools having an individual drive, while the lighter ones are group powered from a line shaft driven by a General Electric 35 horsepower motor. A novel and withal a first-class arrangement of drive is shown for the 147-inch and 80-inch rolls, which are placed in line and driven separately or together by a 25-horsepower motor. The adjustable roll on the large machine is geared to the motor so as to raise and lower by power, making a combination of convenience that cannot be over-estimated.

The Barr pressure pumps and Bement-Miles accumulator are located immediately next to the Bement-Miles 144-inch hydraulic motor, leaving a clear working space at the latter tool; the accumulator also furnishing the power for a Bement-Miles punch further down the shop. The tool room and foreman's office are located near one end of the shop. This room is 18 feet square, panelled up about four feet from the floor, and surrounded by wire netting above that point. It is an ideal construction for the purpose, affording an unobstructed view to all parts of the shop. The heating is by the Sturtevant system, with a nine-foot fan and heating coils.

The flue job tools consist of two Hartz tube welders and furnaces, and within reach of these is two vertical wrought iron revolving tube racks and also the tube cutting-off machine. At the opposite end of the shop are the flange furnace and annealing furnace, together with flange clamps. There is little lacking in the lay-out that would expedite labor or cheapen the cost of output, and a reference to the illustration will bear out the suggestion that superlative terms are none too high when referring to this shop. The scrupulous neatness for which the Omaha shops have always been noted is a part of the economic scheme of this unit. A cleaner boiler shop is not in commission anywhere.



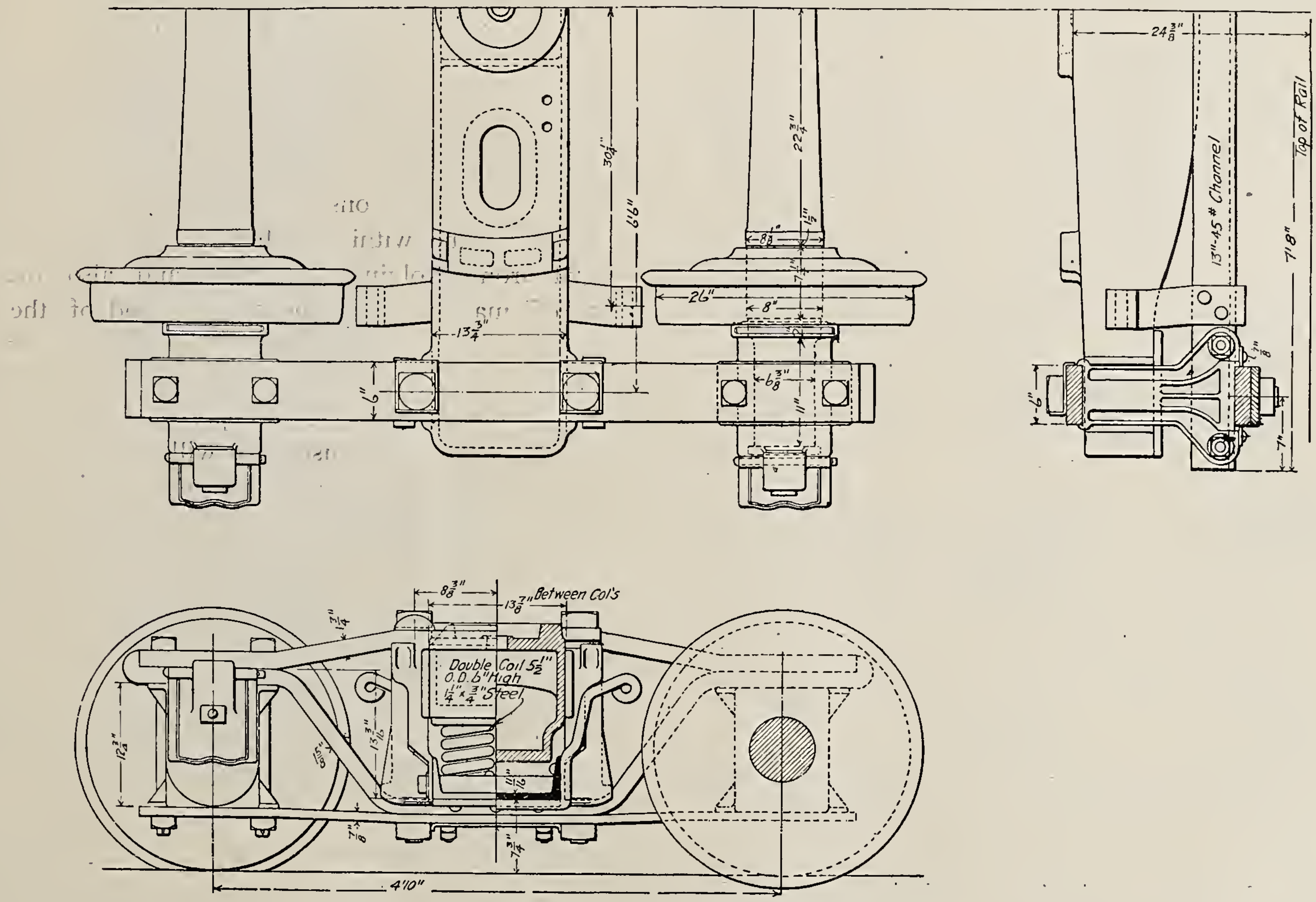
BODY BOLSTER, P. & L. E. 150,000-LB. FLAT CAR.

150,000-lb. Flat Car---Pittsburg & Lake Erie R. R.

TWO new steel flat cars intended for a heavy tonnage of traffic unusual to general freight service, have been designed and built at the McKees Rocks shops of the P. & L. E. road. There are some original features in the manner in which the details have been worked out, showing a close adherence to the object aimed at, of producing a strong car with a reasonable ratio of light weight to load capacity. This would appear to have been accomplished with a weight of 48,000 lbs., or 32 per cent of the load rating. Commercial shapes have been adapted to the requirements, in all important details, in built up forms, by which the desired section modulus was obtained for strength without the usual sacrifice to excessive weight.

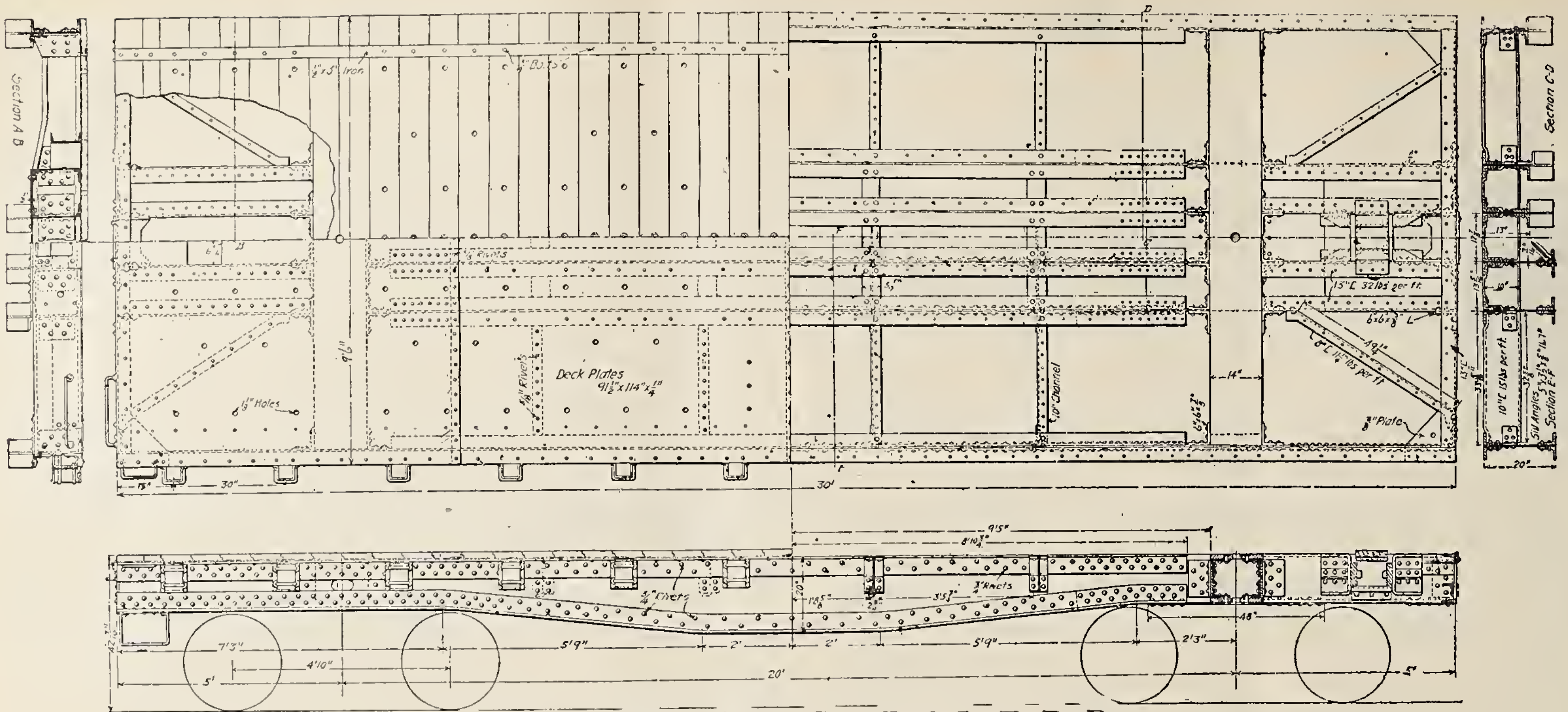
The sills are made of plates with angles riveted to top and bottom, giving an I-beam section. The sill plates are 7-16 inches thick, to which are secured 5 x 3½ x ⅝ inch angles with ¾ inch rivets. The depth of sill at the center of car is 20 inches and 13 inches deep at the junction with body bolster and end sill. The outside sills extend the whole length of car, but the center and intermediate sills are stopped off at the bolsters to which they are joined by riveting to 6 x 6 x ⅜ and 6 x 4 x ⅜ inch angles. In line with these sills are four short sub-sills extending from the bolsters to the 13-inch channel forming the end sill. The side sills are secured in like manner to the ends of the bolster, which is of box section riveted up to top and bottom plates 1¼ inches thick by 14 inches wide, having 5 x 5 x ⅝-inch angles with cover plates for side construction. The depth of bolster is 13⅞ inches at center and 10 inches at the ends, with a straight length at bottom of 39½ inches.

The channel end sills are secured to side sills by strong riveted corners and ⅜-inch gusset plates. Diagonal bracing extends from the outer corners of end sills to the intermediate sills and are securely riveted to both, the braces being made of 8-inch channels. Transverse bracing of sills between bolsters is made of 10-inch channels extending between outside and intermediate sills, while the spaces between intermediate and center sills are filled with malleable castings, the whole forming a continuous bracing across the car at four points.



Truck, P. & L. E. 150,000-lb. Flat Car.

The floor construction consists of ¼-inch plate covering the whole top of car and riveted to sills and bolster, on top of which it the usual ship-lapped wooden decking, which is held in place by wrought iron straps ½ x 3 inches, running full length of car at each side and secured by ¾-inch bolts. The deck is perforated by 1⅛-inch holes to carry off moisture. The truck is of the arch bar type with cast steel bolster, the top bars being 1¾ x 6 inches while the bottom bars are 1⅝ x 6 with a transverse distance from center to center of 6 feet 6 inches. The wheels are steel tired, 26 inches in diameter and journals are 6⅜ x 11 inches.



150,000-lb. Steel Flat Car, P. & L. E. R. R.

There are no abnormal features about the car which is 30 feet long over end sills and 9 feet 6 inches wide over sill flanges. The truck dimensions will, however, read strangely to those having to do with lighter equipment, for they refer to one of the heaviest arch bar trucks ever built. A study of the illustrations will prove of interest, as they represent the most recent development of heavy capacity steel freight cars in which bending movements and section modulii have been carefully calculated.

Westinghouse Compound Pump

By F. H. Parke.

THE new design of Westinghouse compound pump consists of three cylinders placed vertically in tandem. The two lower ones joined by a thin center piece constitute the air end of the pump, and these are surmounted by a center piece and steam cylinder of the regular Westinghouse type, so that in general appearance this new pump, although somewhat longer, is very similar to the regular Westinghouse pump that has been standard in locomotives for air brake systems throughout the country for so many years. The design is very compact and, since the air end only is compound, the additional features required are so similar to the old standard that the same simplicity of operation is assured.

Generally speaking the compounding of the air end is done as follows:

The two air cylinders are of the same diameter, each having a piston suitably connected to the piston rod which is actuated by the steam piston. These two air pistons are further connected by a drum of smaller diameter than the inside diameter of the air cylinders in such a manner that the two pistons and drum form a sort of spool. The center piece between the air cylinders fits closely about the spool and has packing rings to prevent the passage of air from one cylinder to the other past the surface of the drum. The low pressure air is drawn into the top of the upper cylinder and the bottom of the lower cylinder and during compression is forced through suitable valves and passages to the annular volume formed between the spool, air cylinder walls and center piece. The final compression takes place in the annular volume and the air is forced out through the passages and valves in the center piece to the discharge opening. It will thus be observed that in each air cylinder both high and low pressures are single acting, but that these pressures on the air piston as a whole are double acting. The resultant effect, therefore, on the steam piston rod is almost the same as in the simple pump, but the air cylinder surface being twice as great as in the simple pump affords twice the opportunity for radiation of heat, and for that reason the temperature of the air discharge is considerably reduced for locomotive service.

Also by thus compounding the air end a much smaller steam cylinder can be used to operate the pump, thus causing a marked economy in steam consumption.

The present design of pump consists of a steam cylinder 8 inches in diameter by 12 inches stroke, and two air cylinders 11 inches in diameter by 12 inch stroke, while the small diameter of the spool is 8¾ inches. It is made for a capacity similar to that of the standard 11-inch pump, which has been on the market for some years, having air and steam cylinders each 11 inches in diameter by 12 inch stroke. Consequently the compound pump has an 8-inch diameter cylinder instead of an 11-inch, as with the standard and the steam consumption is thereby reduced to about 52 per cent of the latter through this change alone. But by compounding the air end the capacity of the pump is increased about 16 per cent when pumping against 90 pounds air pressure, due to the fact that the low pressure clearance volumes at the end of a compression stroke are filled with air at only about 40 pounds pressure instead of 90 pounds as in the simple pump, and in the former case this pressure reduces to the atmospheric pressure much earlier during the intake stroke than is possible with the standard pump, consequently the volume of air drawn in at each stroke is that much greater. For this reason the saving per cubic foot of air compressed is greater than that shown by the difference in steam cylinder volumes, and from tests made on the compound pump it appears that it requires only about 45 per cent of the steam per cubic foot of free air compressed that is required for the standard 11-inch pump.

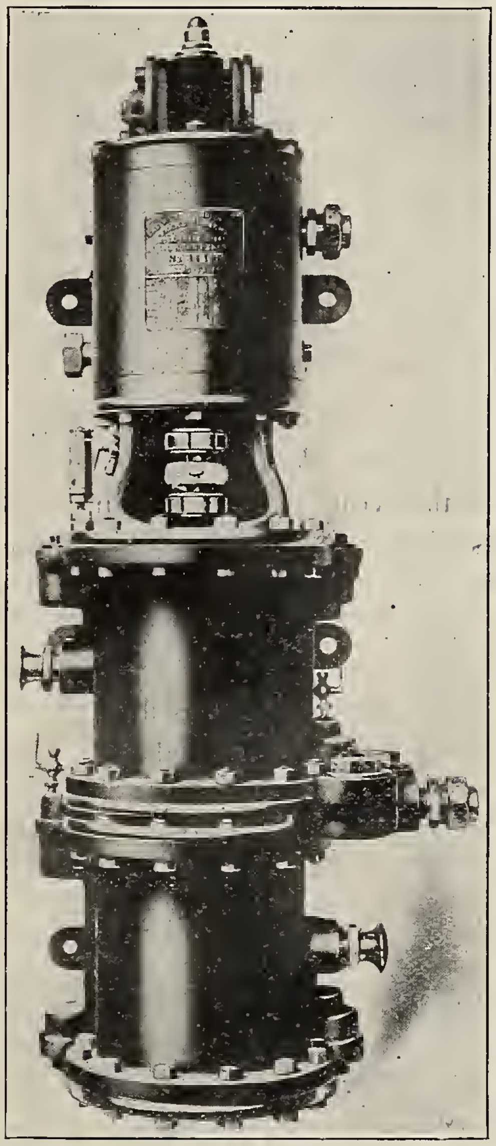
This, of course, is an immense saving of itself. But since the amount of air compressed per stroke is greater, the time required for the pump to operate is thereby diminished and the amount of wear and cost of maintenance are correspondingly decreased.

The air valves, valve seats and valve cages are of the same pattern as those used in the 11 inch pump, while the steam valve mechanism corresponds exactly with that of the 9½-inch pump. Also the piston rings of the two air pistons are similar to the 11-inch pump and the steam piston rings correspond to the old standard 8-inch pump, many of which are still operating on railroads. The steam and air connections are also made up of standard pieces that are now in use on other pumps so that by the introduction of this new compound pump the amount of repair stock required outside of that already needed by railroad shops is very small indeed.

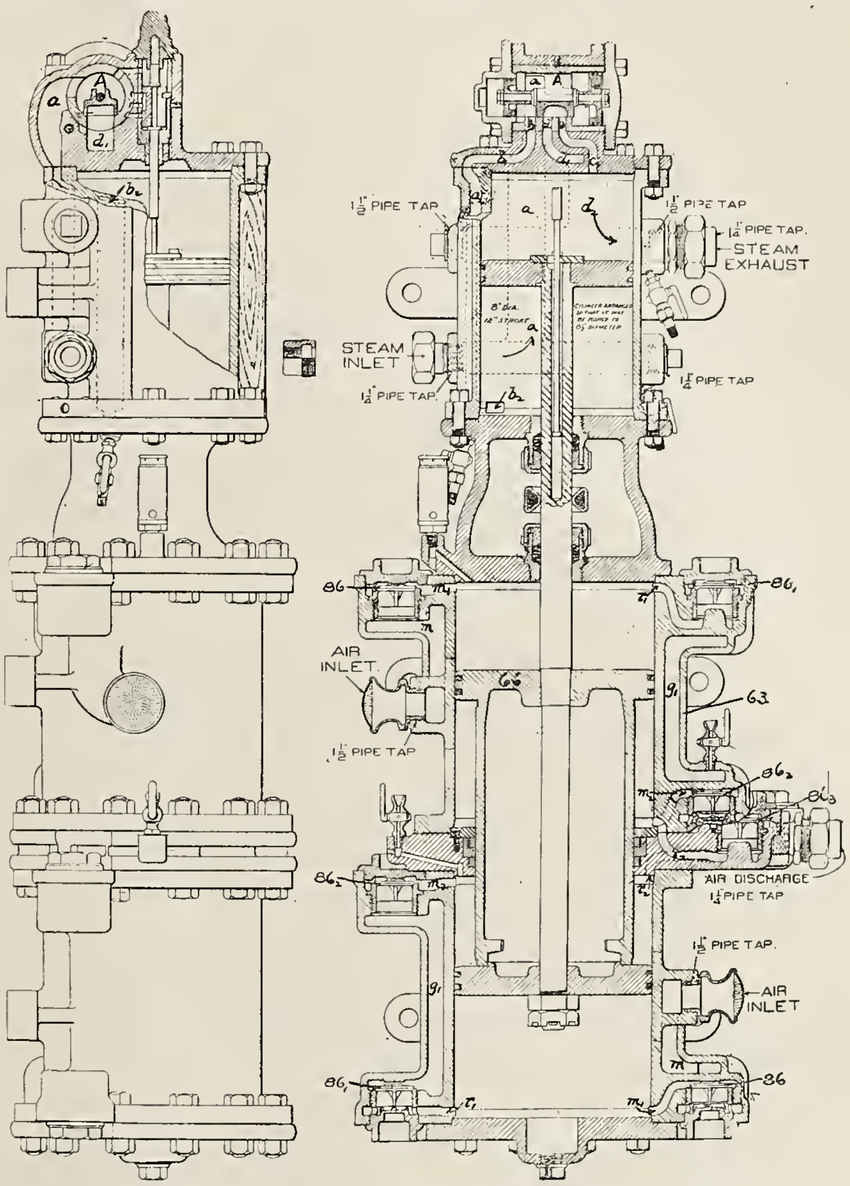
Since the working parts are all modelled after those of the existing standards, the knowledge possessed by repairmen at the present time will serve them in making repairs on the new pump without any extended extra instruction. The rules already issued for operating air pumps will in nearly all cases apply to the new pump, so that its introduction, in almost every way, will cause no trouble or inconvenience to the operating departments.

Although this pump is spoken of as the "New" compound pump, it can hardly be said to be entirely so since the Westinghouse Brake Company, in London, have built such pumps for some years and have them in successful operation both in England and on the continent of Europe. Therefore, the placing of it on the American market is not in the nature of an experiment as far as the design and operation of the pump are concerned. The application of them to American railway practice is, however, new and several of the railroads have already placed them in service on trial.

The greatly increased weight of cars demanding larger brake cylinders, coupled with the greatly increased length of trains, has brought about the expenditure of a much greater quantity of air and naturally the requirement of a larger air pump. It was this fact that brought out the 11-inch pump. With the introduction



Front View, Westinghouse Air Pump.



Cross Section, Westinghouse Air Pump.

and general adoption of the high-speed brake and high-pressure control apparatus, the main reservoir pressure was increased from 90 to 120 pounds. Consequently the work of the pump was greatly increased thereby and the consumption of steam by the air pump has been found to be a considerable factor of importance; and the introduction of an air pump designed to give the greatly increased amount of air, and at the same time require a much less amount of steam, has been made a necessity which both the railroads and the Air Brake Company have for some time past recognized. Such a pump must combine the requirements just outlined with the simplicity of operation and maintenance as well as the absolute reliability now had in the standard pumps. Such a pump the new Westinghouse compound pump is designed to be.

The cuts illustrating this article will give a clear idea of the design and operation of the pump for those who are interested sufficiently to follow it through. Fig. 1 is a front view of the pump showing the general arrangement of same. It will be noticed that the steam cylinder is made both right and left hand so that the steam and exhaust connections can be made on either side, or both on either one side. The lower thin center piece connecting the two air cylinders contains the final discharge valves and orifice. Each air cylinder has a suction strainer through which the air is drawn into its low pressure volume.

Fig. 2 shows a front central section of the pump and a side view partly in outline and partly in section. From this cut the operation of the pump can easily be followed through. Steam enters from the governor at the steam inlet and passes through the port a, a, to the cavity A over the main valve, from thence it goes to either the top or the bottom of the steam cylinder in exactly the same manner as in the present 9½-inch or 11-inch pumps. It is hardly necessary, therefore, to follow this part of the operation through in detail as the operation of the standard Westinghouse pumps is not new.

The operation of the air end, however, will be of much interest. On the down stroke air is drawn in through the upper air inlet on the left hand side of the air cylinder; it passes through the passage m, receiving valve 86 m^1 to the low pressure volume above piston 66. When the piston reaches the lower limit of its stroke and starts upward, this air is compressed until the upper discharge valve 86^1 (on the upper right hand side of the cylinder), is raised, then the air is forced through port r, discharge valve 86^1, passage g^1, receiving valve 86^2 and port m^2 to the annular cavity between the drum portion of piston 66 and the cylinder 63. Since this volume is much smaller than the low pressure volume, the air is being compressed during its passage from the low pressure to the high pressure volumes until, when the piston reaches the upper limit of its stroke, the air in the low pressure clearance passages and high pressure volume has reached the intermediate pressure of approximately 40 pounds.

During the following down stroke this high pressure air is compressed until it raises the final discharge valve 83^3, when it passes through port r^2 and the discharge valve to the discharge orifice in the center piece between the air cylinders.

This same operation occurs in the lower cylinder when the piston goes in the opposite direction from that described above, and as corresponding passages are designated by the same letter the operation can be readily followed through by reading over the description just given.

The air cylinder is lubricated by three oil cups as shown on Fig. 2. The upper end receives its oil from the automatic oil cup placed just to the left on the upper center piece. The piston drum receives its lubrication by the oil from the cup connecting with passage g^1, in the upper air cylinder, and is drawn into the high pressure volume by the air as it goes from the low pressure to the high. The lower end of the air piston is lubricated by the oil cup situated on the left side of the lower center piece. The last two oil cups mentioned are old style air cylinder oil cups, whereas the other, and that in the front view of the pump, Fig. 1, is the new automatic air cylinder oil cup. This cup can readily be used for the upper low-pressure cylinder whenever desired.

It is thus seen that the complication due to compounding by this design is materially reduced, and all parts are made strong and durable and as nearly like standard simple pumps as it is possible to make them. In this way the great reliability that has been so prominent a feature of the Westinghouse pumps is made to apply to this pump also.

*The Westinghouse Single-Phase Railway System**

THE single-phase railway system may be divided into two parts—the generating and distributing system, which includes the generating station, the transmission line, the transformer stations and the trolley line; and the car equipment, which includes the control apparatus, the motors and auxiliary apparatus.

GENERATING AND DISTRIBUTING SYSTEM.

Generators.—Two-phase generators are preferable to single-phase on account of the increased output for a given amount of material. The two phases should be kept separate, and should supply different parts of the road. Of course an insulator must be placed in the trolley wire to separate the two parts of the line thus served. When three-phase machines are already installed, they can be utilized by carrying off three separate single-phase circuits.

*Abstract of article by Clarence Renshaw in Electric Club Journal.

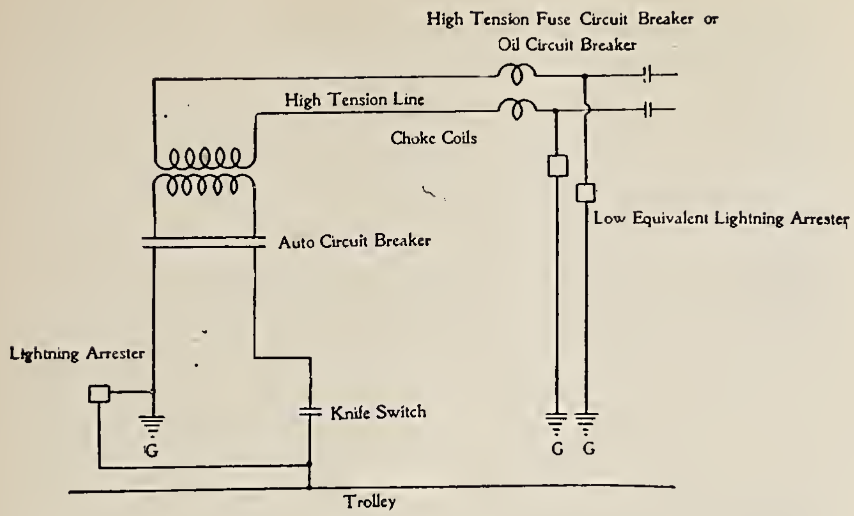


Fig. 1—Connections of Apparatus in Transformer Station.

Frequency.—The Standard frequency of 3,000 alternations, or 25 cycles, has been adopted for single-phase railway work.

Transmission Voltage.—The voltage of the transmission line, which supplies the high-tension side of the transformer stations, may be chosen in the same manner as any high-tension transmission line, with reference to the distance of transmission and the general local conditions.

Transformer Stations.—Power will be supplied to the trolley through transformer stations located along the line. Each station need contain only a single transformer unit, since the stations will be placed so close together that in case of accident to one of them the adjacent ones can supply sufficient power to enable the cars to still operate over the portion of the line ordinarily fed by the damaged transformer station.

In general, with a trolley voltage of 1,000 a car equipment no larger than four 100 h. p. motors and with a schedule such that no more than two cars will at any one time be located between two adjacent transformer stations, the transformer stations may be placed from about six to eight miles apart without requiring any 1000 volt conductors other than the trolley wire and the track rails.

There will be no moving machinery in these transformer stations, and therefore constant attendance will be unnecessary. As transformers require only a comparatively small space, the transformer station buildings may be small and comparatively cheap.

Figure 1 gives a general idea of the connections of the apparatus in a transformer station containing the following apparatus:

One oil-insulated self-cooling transformer.

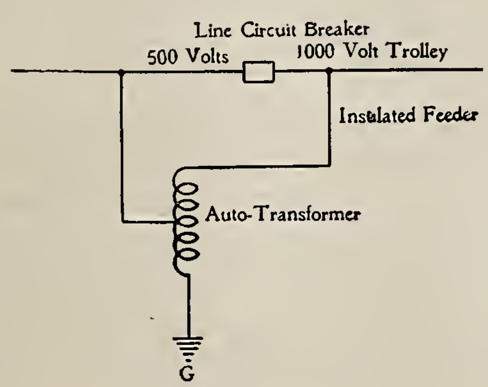


Fig. 3.

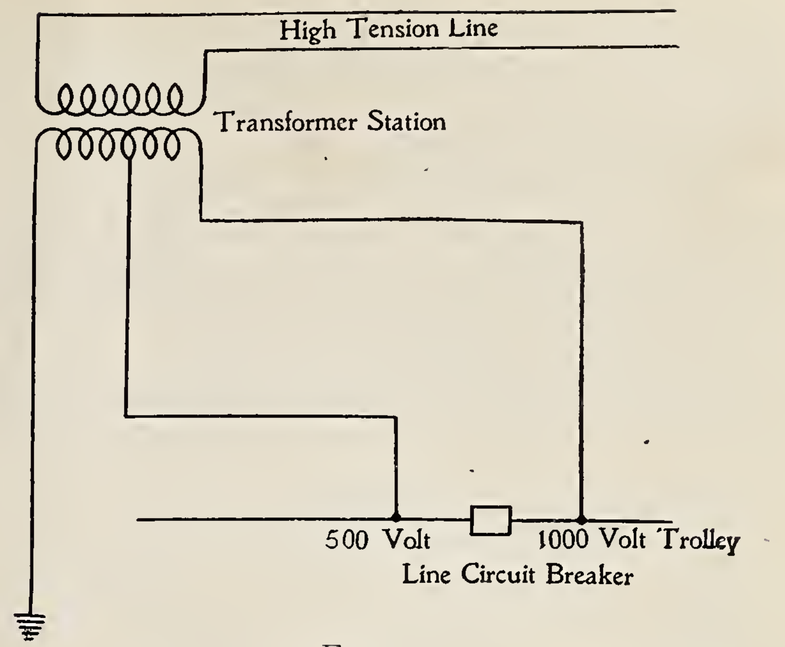


Fig. 2.

Two high-tension fuse circuit breakers with the necessary barriers.

Two low-equivalent lighting arresters for protecting the high tension transmission lines.

Two choke coils for use with lightning arresters.

One automatic oil circuit-breaker in the low-tension circuit between the transformer and the trolley, so arranged as to open only on a continued short-circuit, or a fuse and a switch.

Two knife switches to disconnect the circuit-breaker from the trolley, to enable the inspector or repairs to be made.

One low tension lighting arrester.

Trolley Voltage.—The voltage which may be used on the trolley is limited in general by the insulating material which is available. A high-voltage trolley will require different line material from the present standards. Line material for 1,000 volts can be readily obtained in the market at present, and it is not known that such material for any higher voltage is now on the market. Hence approximately 1,000 volts is, in general, the maximum allowable at present, and this is considered as standard.

An equipment can readily be arranged to operate at two different trolley voltages so that, for instance, a high-voltage trolley may be used in open country and a lower-voltage trolley in towns or cities. This arrangement can be provided for by means of a low voltage tap

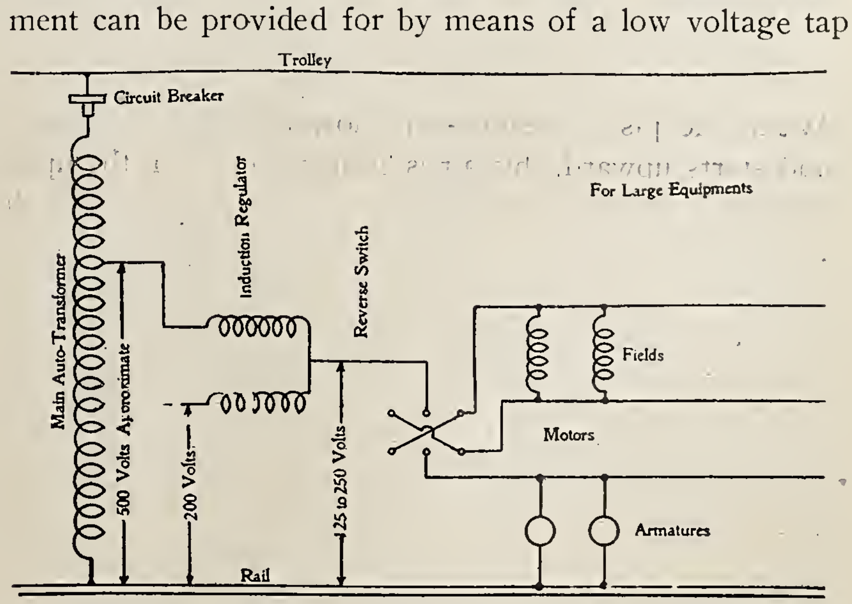


Fig. 5.

on the high tension side of the main auto-transformer on the car, and a double throw switch, so that the wire from the trolley can be connected to either one of the two taps on the main auto-transformer.

Figures 2 and 3 show how low-voltage sections of trolley may be supplied. If the low voltage section is adjacent to a transformer station is fed by the high-tension transmission line, an extra tap from the low tension side of the transformer will suffice.

Where it is necessary to pass over tracks already occupied by cars using direct current, an additional trolley wire may be placed alongside of the direct-current trolley wire to carry the alternating current. The voltage of this alternating-current trolley may then be made approximately the same as that of the direct-current trolley.

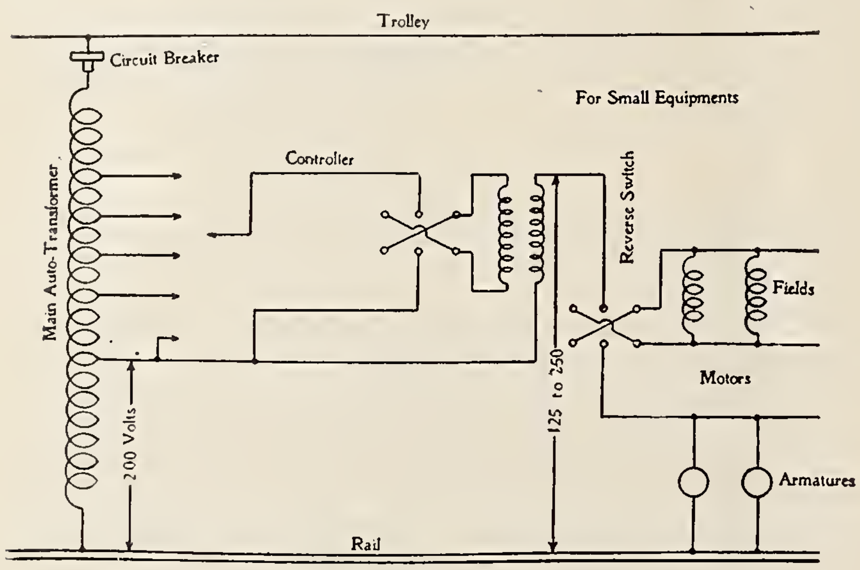


Fig. 4.

Should a direct current car place its trolley on the alternating-current wire, the inductive resistance of the motors would prevent sufficient current from flowing to damage them and the error would be quickly evident from the fact that the car would not operate. Should the trolley of an alternating-current car be placed on the direct-current wire, a large current would instantly tend to flow through the transformer, but this would open the circuit-breaker at once and damage would thus be prevented.

CAR EQUIPMENT.

The essential details of car equipment are shown in Figs. 4 and 5. Starting from the trolley, these include the circuit-breaker, main auto-transformer, inductive regulator, reverse switch, motor cut-out switch, and motors. Lightning transformer, lightning arrester, lamps, sockets, wiring, etc., are also included.

Induction Regulator Control.—Any standard equipment for use on cars where compressed air is available can be supplied with induction regulator control. When this is used the regulator, reverse switch and circuit breaker will be operated by compressed air from the brake system of the car, and controlled by means of a master switch through electro-magnetic valves. These valves will be similar in general to those used on direct-current unit-switch control and on the signaling systems of various railroads.

Action of Induction Regulator.—The action of the induction regulator may be easily understood by reference to Figs. 6 and 7. The regulator is essentially a transformer with the primary core and winding movable with respect to the secondary. With the primary, as in Fig. 6, the maximum voltage is generated in the secondary of the regulator, and it opposes the voltage of the main auto-transformer. With the primary 180 degrees from this position the voltage of the regulator will aid that of the auto-transformer. With the primary of the regulator in the position shown by Fig. 7 the voltage of the secondary is zero, so that it neither aids nor opposes the voltage of the auto-transformer.

The car is started with the voltage of the regulator at maximum, and opposing that of the auto-transformer.

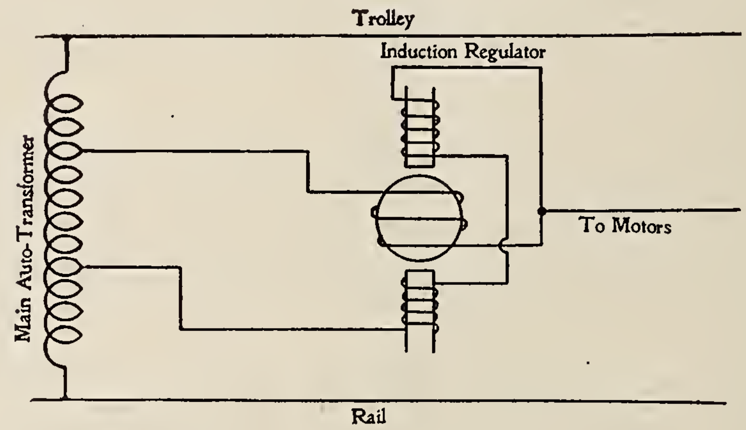


Fig. 6.

The regulator is then moved gradually until the position is reached where its voltage is a maximum and aids that of the auto-transformer. This is then the full speed position.

Train Control.—The induction regulator control can be readily adopted for multiple-unit train operation, with slight additions in the way of apparatus and wiring.

Hand Control.—For small equipments hand control may be used. This will consist of platform controllers, similar in general to the present direct-current controllers. With the hand control, as now proposed, the motors will be connected successively to different taps on the main auto-transformer, as shown in Fig. 4. The voltage applied to the motor thus depends on the position of the contract point D. This control will have a definite number of steps similar to the direct-current control, but the motors can be run continuously on any step, and there be no rheostatic losses.

Motor Voltage.—As may be seen from Figs. 4 and 5, the motor voltage is entirely independent of the trolley voltage. A standard motor voltage of 250 has been adopted for single-phase railway motors, regardless of the trolley voltage used.

Lights and Air Compressor.—In general, the lights in the car will be supplied by a small auxiliary transformer, reducing the trolley voltage to approximately 50 volts. If electric heaters are desired, these may be operated from the main auto-transformer. The air compressor for supplying brakes and operating the induction regulator will be operated by a series alternating-current motor, taking current from the lighting transformer.

Arrangement of Motors.—As a rule, the motors will be connected permanently in paralled, both in two and four-motor equipments. The use of voltage control makes series-parallel connections unnecessary, and inadvisable.

The fields of all of the motors will also be connected permanently in parallel, substantially, as shown in Figs. 4 and 5, thus allowing a simple reverse switch. Such an arrangement is permissible with alternating current, although not with direct current, since with the former the currents automatically adjust themselves to give equal field strength in each motor.

Weights of Equipment.—In general, the motors will weigh approximately the same as direct-current motors of the same capacity. In general, also, the regulator and transformer for a four-motor equipment will together weigh approximately the same as a single motor.

A complete equipment, including all apparatus, will weigh approximately 15 per cent more than a direct-current equipment of the same capacity.

Since the weight of an equipment usually forms only about one-fourth of the total weight of car, equipment, and load, however, and alternating-current car should in general exceed the weight of a direct-current car by less than 5 per cent.

Trolleys.—For single cars run at speeds not over 60 miles an hour and with trolley voltage of approximately

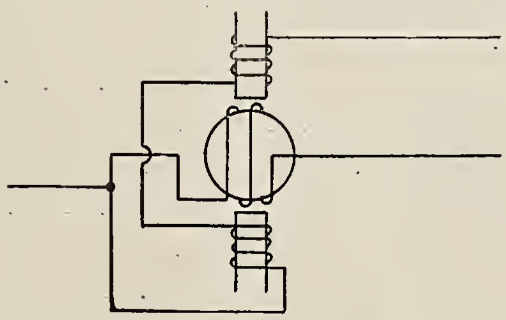


Fig. 7.

1,000 it is proposed at present to use standard direct-current trolleys, except that an insulating base will be provided. Protection in handling the trolley rope will be afforded by insulators between the rope and the trolley, and by having a grounded metallic end on the part of the rope which is handled.

For very high speeds, or where cars are to be run in trains at all times, a form of bow-trolley will be used.

Motors.—Motors of 50, 75, 100 and 150 h. p. are being built, and are considered standard sizes.

In general, the external appearance of the motors will be similar to that of direct-current motors. The construction, however, will be slightly different. The entire magnetic part of the field will be laminated, the field being built up of annular punchings, with poles projecting radially inward. The punchings will be held together in a steel frame. The motors will thus be of the box type, the armature being put in or taken out through the ends.

The field coils will be of copper strap of large cross section, and there will be but few turns per coil.

The armatures will, in general, be similar in all essentials to the armatures of direct-current railway motors.

The illustrations and curves of the No. 91 railway motor herewith given represent the first commercial design of these single-phase motors. Motors now being built will have substantiallly the same appearance as the No. 91 motor, but will represent an advance both in performance and in mechanical design.

The horse-power ratings which are given to these motors correspond, in general, to the nominal horse-power ratings which are given to direct-current railway motors —that is, it is the load which the motors will carry at rated voltage for one hour with a rise in temperature of ap-

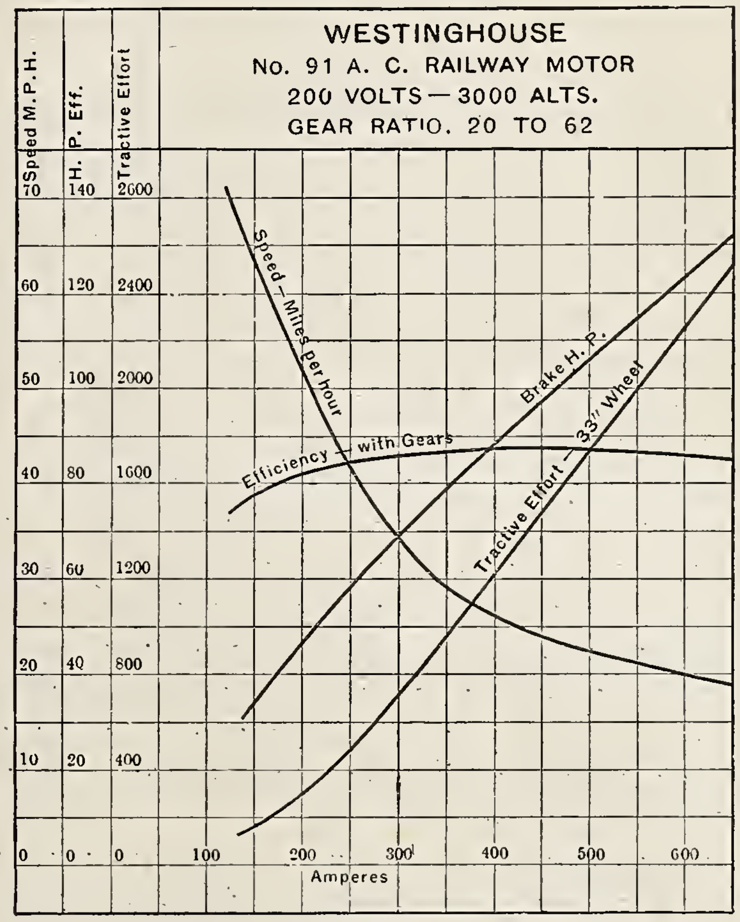


Fig. 8.

proximately 25 degs. C. in the windings. The temperature is measured by thermometers.

In general, these motors will carry continuously from 45 to 50 per cent of their full-load current at the reduced average voltage which would be placed upon them in actual service, with a rise in temperature of approximately 60 degs. C.

As the armature may be momentarily short-circuited without damage to the motor, there should be no tendency to flash across between brushes, or from the brushes to the frame of the motor.

Power Factor.—The apparent input of an alternating-current motor may be divided into two components at right angles to each other. One of these is called the energy component and the other the inductive component. The energy component represents the power input to the motor, and includes not only the useful input which appears as output at the shaft of the motor, but also the losses. The relation between these components is such that the sum of their squares is equal to the square of the total apparent input.

The power factor of a motor is the ratio of the energy component to the total apparent input, and since it is merely the ratio of two quantities, the power-factor alone gives no idea of the value of either quantity. In judging whether the performance of a given motor is good or bad, a knowledge of the power-factor alone is thus of little value. The important considerations in any given case are the actual magnitudes of the energy and the inductive components and the proportion of the former which represents useful energy, and in order to determine this, further information is necessary. If the apparent input, for instance, is known in addition to the power-factor, then the value of the energy and inductive components can be readily found. If the efficiency is also known the useful energy may then be found from the total energy.

Many engineers hold the idea that high power-factor in a motor is desirable under all circumstances, just as a high efficiency is desirable. This idea is mistaken and misleading. The effects which are ordinarily attributed to a low power-factor are really due to a large inductive component. If the value of this inductive component is kept the same for any given output, and the power-factor raised by increasing the energy component, the general conditions will be worse rather than better. If two motors, for instance, have the same inductive component with a given output, but the efficiency of the first is less than that of the second, then the energy component of the first will be greater than that of the second, and consequently the power-factor of the first will be greater than that of the second. In this case the motor with the higher power-factor is the poorer of the two, since it has the same inductive element and at the same time requires a greater actual input.

In the alternating-current railway motor the inductive component depends on the current. Since approximately the same current is required to produce a given torque, whether the motor is merely at the point of starting or whether it is running at full speed, the inductive component will be practically the same for a given torque, whether the motor is starting or whether it is running at full speed. When the motor is running at full speed, however, there is a large output, and consequently a large energy component, thus giving a high power-factor. At the moment of starting there is no output, and the only energy component in the motor is that due to its losses. If the internal losses are low (which will be the case with an efficient motor), then the power-factor of the motor when starting will also be low.

Since the alternating-current railway motor has a high power-factor at full load (approximately 90 per cent), it is evident that the value of the inductive component under these circumstances must be relatively small. It has already been noted that when this motor is starting with full-load torque the inductive component is the same as at full load. Since there is no power developed when starting (due to the fact that the speed is zero), the only energy component which there can be is that due to the losses. A motor of low efficiency, therefore, would show a fairly high power-factor under these circumstances, since it would have a fairly large energy component. The fact that the power-factor under these circumstances is not high, thus shows that the losses are not high; that is, that the motor is an efficient one.

In considering the matter of power-factor when starting, the alternating-current railway motor must be carefully distinguished from the induction motor. In an induction motor, to produce full load torque at the start, there must be an expenditure of full-load energy in the secondary circuit, and for other starting torques a proportionate amount of energy is required. In an induction motor, therefore, the energy component at starting is in general taken as an indication of the torque, although a large expenditure of energy does not necessarily mean a large torque.

In induction motors, as in all alternating-current motors, it is desirable to keep the inductive component as small as possible, and since a large energy component is necessary to produce a large torque at starting, a high power-factor when starting with large torque is in general taken to mean a low inductive component, and consequently a favorable condition. A high power-factor at the start in an induction motor, however, does not necessarily mean a low inductive component, and hence does not necessarily mean a favorable condition.

In starting any alternating-current motor, it is impossible to avoid the presence of an inductive component. In starting an inductive motor, however, an energy component proportionate to the torque developed is also required in addition to this inductive component. In the alternating-current railway motor, however, the torque developed depends on current only, and the development of a given torque does not require the expenditure of any given amount of energy. The inductive component or wattless current has the same effect in producing torque as an energy current of the same amount. In the alternating-current railway motor, therefore, since the inductive component will be present in any case, it is desirable to utilize this current for producing as much of the necessary torque as possible, thus keeping the energy current (and the energy), for a given torque as small as possible—that is, with a given inductive component it is desirable to reduce the power-factor at starting to as low a value as possible, since this means that the losses will then have as low a value as possible.

The fact that a low power-factor at starting represents an advantageous condition rather than a disadvantageous one with the alternating-current motor may be seen in another way. In order to produce a given torque, a certain current is necessary. With a direct-current car, practically the same current per motor would be required to produce a given torque as with the alternating-current car, provided the conditions of gear ratio, etc., are the same. In the direct-current car, however, the product of the current and volts would represent the energy taken from the circuit. In the alternating-current car the product of current and volts would be approximately the same as that for the direct-current car, but this product would represent only apparent energy and not real energy. Since the power-factor in the case of the alternating-current car would be low, usually from about 30 to 40 per cent, the real energy supplied to the alternating-current car would be only this percentage of that supplied to the direct-current car for producing the same torque.

There has been a tendency on the part of engineers who have not fully understood this point to criticize the fact that the alternating-current railway motor has a low power factor when starting. It will be seen from the above, however, that this low power-factor when starting represents a favorable condition instead of an unfavorable one. It is evident that a certain current is necessary to produce a good starting torque, and if this current can be obtained without a corresponding expenditure of energy, so much the better.

Personals

Mr. E. M. Lake has been appointed superintendent of machinery of the Camp & Hinter Lumber Co. at Lumberton, Miss.

Mr. Henry F. Smith has been appointed general car foreman of the Lake Shore & Michigan Southern at Collinwood, O.

Mr. F. W. Williams has resigned as master mechanic of the Delaware, Lackawanna & Western at Buffalo, N. Y.

Mr. Charles T. Noyes has been appointed superintendent of shops of the Southern Pacific at Sacramento, Cal.

Mr. Paul Grove and Mr. J. Davis have been appointed assistant master mechanics of the Pennsylvania at Altoona, Pa.

Mr. John Lange has resigned as master car builder of the Wabash at Moberly, Mo., on account of ill-health.

Mr. I. R. Wells has been appointed storekeeper of the Wabash at Moberly, Mo., in place of Mr. H. M. Burrell, assigned to other duties.

Mr. D. D. Briggs, master mechanic of the Alabama Mineral division of the Louisville & Nashville, has been transferred to Boyles, Ala., as assistant master mechanic.

Mr. Edgar Shellabarger, heretofore general foreman of the East Broad Top Railroad, has been appointed master mechanic at Orbisonia, Pa., effective on August 1.

Mr. C. H. Seabrook, general foreman of the shops of the St. Louis & Southwestern at Pine Bluff, Ark., has been appointed master mechanic at that point.

Mr. W. J. Graham has been appointed locomotive inspector of the New York Central & Hudson River, with headquarters at the Brooks Works of the American Locomotive Co., at Dunkirk, N. Y.

Mr. R. P. Schilling has resigned as master mechanic of the Delaware, Lackawanna & Western at Utica, N. Y., the shops at that point having been abolished.

Mr. E. E. Crysler has been appointed master mechanic of the Cincinnati, Hamilton & Dayton at Indianapolis, Ind., in place of Mr. J. W. Connaty, resigned. Mr. Crysler heretofore has been general foreman of the Hicks Locomotive Works.

Mr. H. P. Callendar, heretofore general foreman of the New York, New Haven & Hartford at New Haven, Conn., has been appointed division master mechanic at Roxbury, Mass., to succeed Mr. F. M. Twombly, resigned.

Mr. Thomas J. Tonge, heretofore roundhouse foreman of the Atchison, Topeka & Santa Fe Coast Lines at Winslow, Ariz., has been appointed master mechanic of the Zuni Mountain Railway at Thoreau, N. M.

The office of the master car builder of the Lake Shore & Michigan Southern at Collinwood, O., has been discontinued and the jurisdiction of Mr. S. K. Dickerson, master mechanic, and Mr. M. D. Farney, superintendent of shops, has been extended over such territory as was previously under the jurisdiction of Mr. G. N. Dow, who has been appointed general mechanical inspector, with headquarters at Cleveland, O., effective on Aug. 1.

Mr. B. F. Ackerman, having resigned as road foreman of engines and cars of the International & Great Northern, that position being abolished, Mr. E. G. Bryant, division foreman, has been appointed master mechanic of the Fort Worth division at Mart, Texas. Mr. C. M. McLain, division foreman at Taylor, Tex., has been appointed master mechanic of the San Antonio division, with office at Taylor, and the offices of division foreman at Mart and Taylor, Tex., have been abolished.

Mr. G. Willius, Jr., assistant mechanical engineer of the Great Northern, has been appointed mechanical engineer, with headquarters at St. Paul, Minn., to succeed Mr. R. D. Hawkins.

Mr. I. W. Kurtz has resigned as master mechanic of the Lake Erie & Western at Peru, Ind. Mr. J. W. Mitten, master mechanic at Fort Wayne, Ind., has been transferred to Muncie, Ind., in a similar capacity. Mr. C. H. Mashey has been appointed to succeed Mr. Mitten, as master mechanic at Fort Wayne.

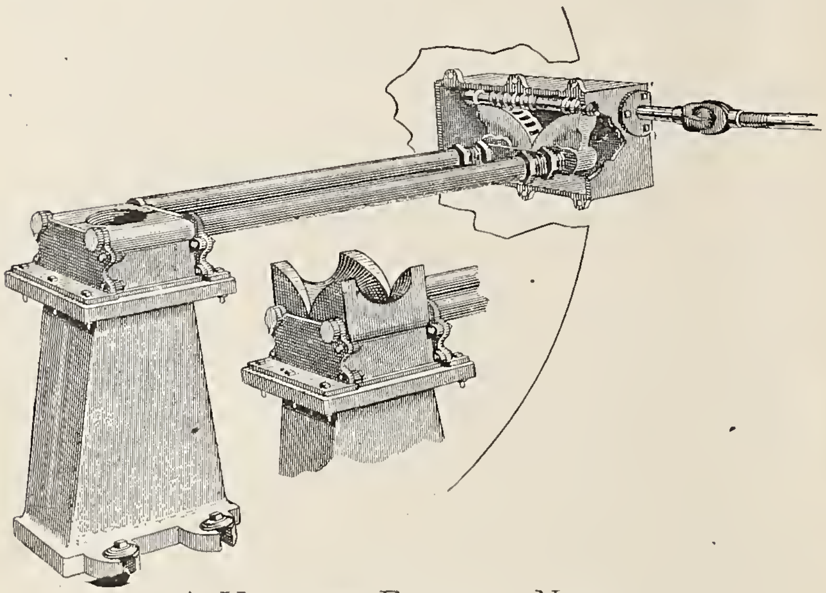
Mr. A. G. Trumbull, mechanical engineer of the Erie, has been appointed assistant mechanical superintendent, with office at Meadville, Pa., to succeed Mr. H. B. Hunt, resigned. Mr. G. O. Hammond has been appointed mechanical engineer, with headquarters at Meadville, in place of Mr. Trumbull, effective on August 1.

Mr. T. E. Adams, heretofore general master mechanic of the St. Louis Southwestern, with office at Pine Bluff, Ark., has been appointed superintendent of motive power, in charge of all rolling stock, locomotives and machinery, and the former office has been abolished, effective on July 15.

The following changes are announced on the Baltimore & Ohio: Mr. A. P. Prendergast is appointed assistant master mechanic of the Mt. Clare shops. Mr. T. R. Stewart is appointed master mechanic in charge of the Philadelphia, Baltimore and Shenandoah divisions, with headquarters at Riverside, vice Mr. Prendergast promoted. Mr. J. Kirkpatrick is appointed master mechanic with headquarters at Cumberland, Md., vice Mr. Stewart transferred. Mr. J. B. Elliott is appointed master mechanic with headquarters at Newcastle Junction, Pa., vice Mr. Kirkpatrick transferred.

A Variable Exhaust Nozzle

The question of varying the opening of an exhaust nozzle to suit the changing conditions of exhaust from a maximum amount at full stroke, to the decreased volume at shorter points of cut-off, has been the subject of much thought to those interested in the improvement of locomotive details, and to an extent perhaps second only to that of the valve motion itself. The scheme illustrated herewith is a simple one, and is operated from the cab manually, or may be made automatic in performance, by connection with the reverse lever. The change of opening in the nozzle is effected by means of two separate nozzle castings which revolve through an angle of 90 degrees, on trunnions, and presenting the greatest opening for the passage of steam to the stock when raised, while the greatest restriction to the opening is had when the upper surface of the adjustable castings are in a horizontal plane, as shown in the respective views. The operating mechanism consists of a rod extending from each half of the nozzle (and by which the latter is turned on its trunnions) to the outside of the smokebox, and has at the outer end a segment of a gear into which meshes respectively a right and left hand worm on the shaft which extends back



A Variable Exhaust Nozzle.

to the cab. The latter shaft has a universal joint, making it easy to manipulate at any angle, and the worm and gear mechanism is encased in a cast iron box which is secured to the side of the smokebox. The purpose of the nozzle is to give a full opening equal to the area of the exhaust pipe, or to reduce it to the limit when necessary, and thus enter the lists as a factor in fuel saving, this, according to the Reliance Iron Works, St. Paul, Minn., who are the manufacturers, has been proven to be a satisfactory feature in service on the Great Northern Ry.

No. 146 Band Rip and Resaw

The combination of a band rip saw and a band resaw will certainly be recognized by experienced operators as most desirable and convenient, having all the advantages of two machines and yet occupying the floor space of one. While the combination is new, the mechanism for both operations embodies the features that have been so successful for both single tools. The machine has three patents, and it soon repays its cost.

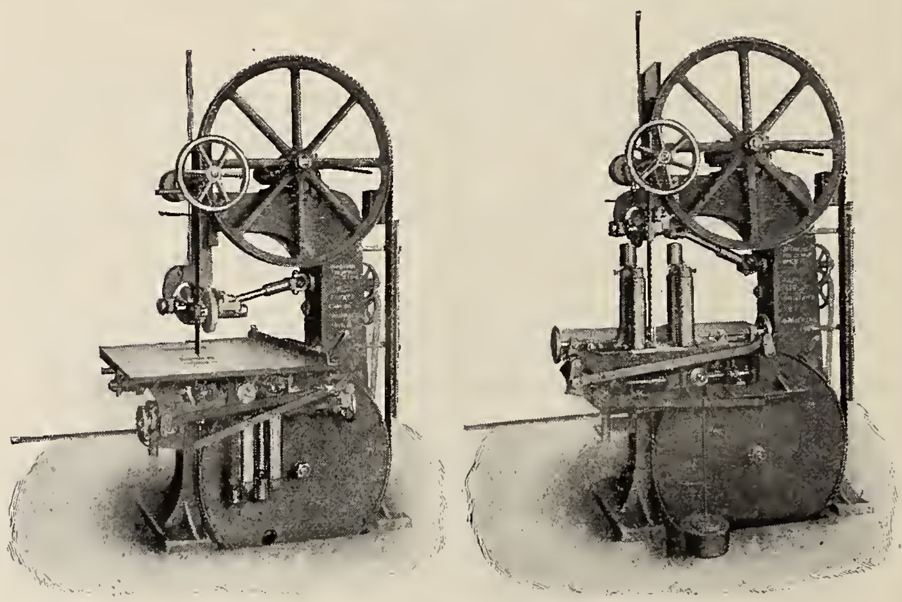
The upper wheel is free from vibration, and saws of varying length may be used. It is fitted with patent knife edge straining device, always giving an even tension to the blade, thus prolonging its life. The lower wheel is solid (or webbed) lessening vibration, circulation of dust, and preventing any over-running. The wheels are 42 inches in diameter and carry a 3-inch blade.

The table is mounted on a rocker bearing, permitting it to be angled 15 degrees for bevel sawing, and is made in two parts. The front part carrying the resaw rolls is instantly reversible, and the lower side when reversed forms a perfectly clear table for ripping, and upon which are friction rolls to facilitate the feed.

The resawing rolls are arranged to self center, or by moving the lever pin one set of rolls can be made rigid to saw from one side of board. Boards up to 18 inches wide may be resawed, and the rolls open to saw to the center of 8 inches. The feed rolls for ripping are carried on an adjustable dovetail slide fitted onto the upper bearing arm, and the distance between the feed in and feed out ones is short, to permit feeding short stock. The machine can be almost instantly changed from a rip saw to a resaw, or vice versa, and by one man.

The fence is a new eccentric locking type and can be moved back to permit sawing up to 24 inches wide. The saw guides are new and improved, and are placed close to cut of saw.

The feed is regulated by variable speed frictions operated



No. 146 Band Rip and Resaw.

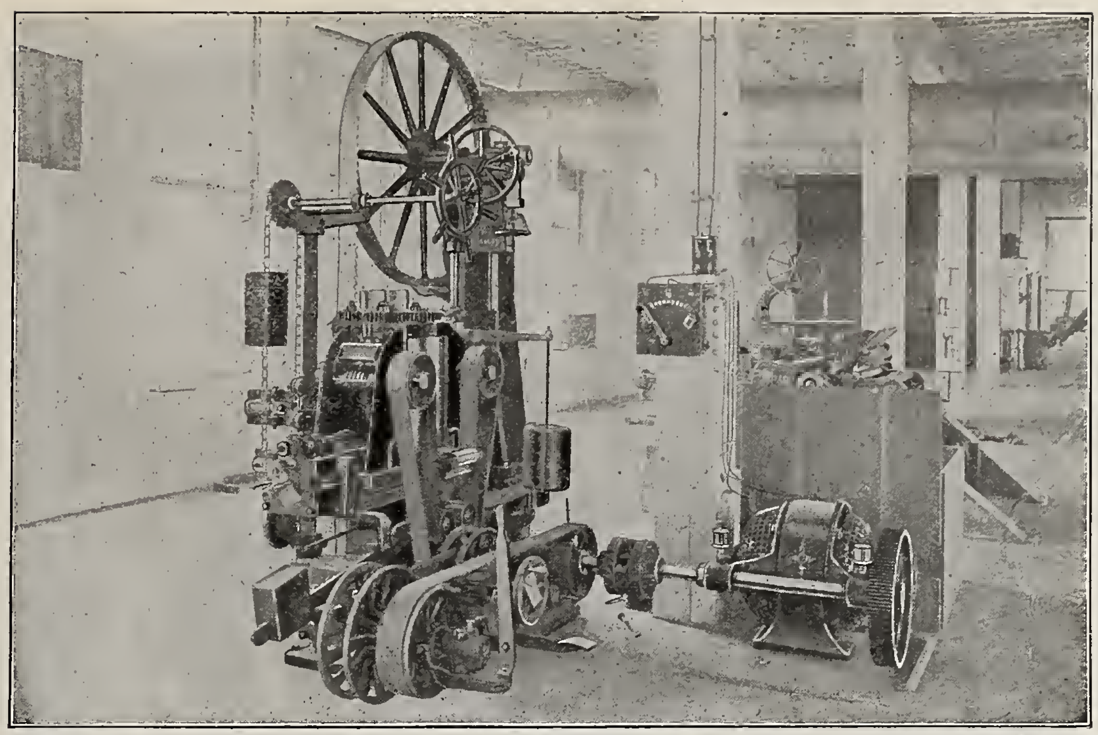
by lever convenient to operator. For resawing it may be varied from 10 to 50 feet per minute, and for ripping from 30 to 140 feet. A brake mechanism is furnished to instantly

Further particulars can be had from the makers, J. A. Fay & Egan Company, of No. 145 to 166 W. Front street, Cincinnati, Ohio. Also ask for catalogue or books on band saws and sanders.

stop machine.

The Bohn Refrigerator Car

The system of refrigeration known as the Bohn Air Syphon is named for its inventor, of the White Enamel Refrigerator Company, St. Paul, Minn. It has long been a household word with housewives, and is one of the most valued adjuncts of hotels and restaurants as well as dining cars. It has demonstrated its value in transportation of perishable freight and is largely used in refrigerator car service. The principle involved in this system is simply that of a cooling or ice chamber at the end of the car, from which communication is had with the body of the car by means of a slatted partition and galvanized wire netting, between which is a group of curved galvanized iron sheets placed vertically, with the straight portion pointing downward toward the ice box. These sheets are termed air syphons, because of their action in causing the flow of air from the load section of the car into the cooling chamber, the air entering these syphons from all points and becoming cooled. The air on cooling, descends into the ice chamber and carries with it the warmed strata of air, which on combining with the cool air, still tends downward



American Band Resaws.

and displaces the warm air, thus causing a circulation which is automatic and continuous.

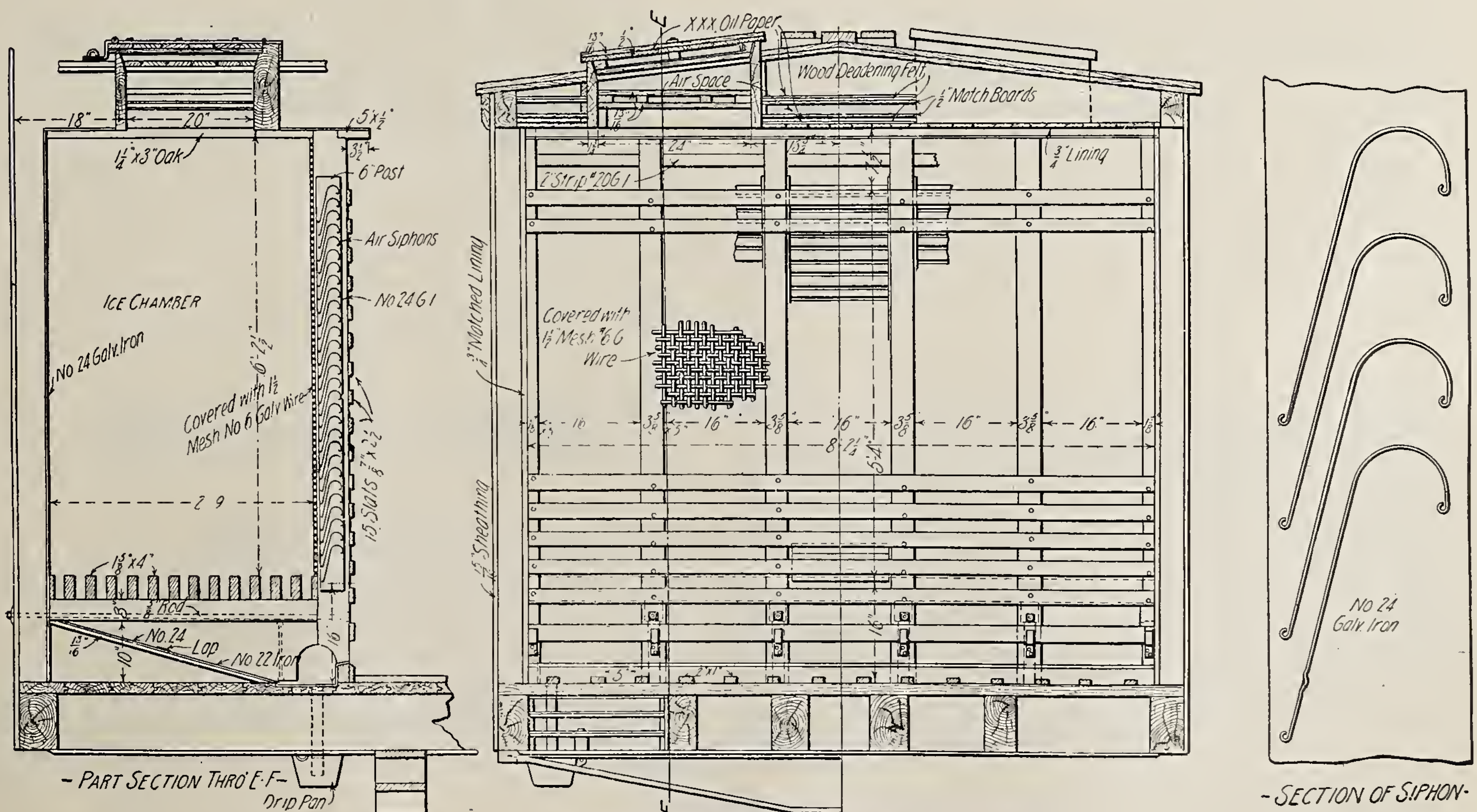
The car thus equipped may be made into a ventilator car by opening the hatches at the end, when the entering air is deflected against the inclined sides of the plates, starting a circulation which is kept up while the hatches are open. Our illustration represents the ice end of a refrigerator car and also an enlarged end view of the syphon sheets. There are no railroads in this country that have not had this refrigerating system in service in some department, and it bids fair now to be as important a part of the freight equipment as it is of the passenger department. The plant which builds this system of refrigeration is one of the most extensive and best equipped in the manufacturing field, covering 23 acres with shops that are never idle.

48-inch and 54-inch Band Resaws

These machines embody all the conveniences and attachments for any kind of resawing in hard or soft wood and have ample power both on the blade and in the feed works.

The frame is cast hollow with cross struts and heavy foot flanges, and it has a broad base which when properly set, does not permit vibration of the machine when running, even on a light floor. The shafts are of hammered crucible steel with mechanical oiling attachments and return channels.

The wheels are of a form and dimensions which have been found correct in experience, and both are "dished" so as to extend over the boxes, thereby bringing the strain of the blade directly on the bearings. The lower wheel is very heavy, with a solid central web, and the upper one is as light as possible, consistent with strength.



Bohn Refrigerator Car.

Vacuum Cleaner in Operation.

The feed works on powerfully driven by belts and adjustable expansion cones, which vary the feed from 14 to 120 lineal feet per minute, and the arrangement is the most simple possible, every adjustable part being within easy reach of the operator at his post. The rolls are driven by spur gears and polished steel worms running in oil with ball and bearings, and the motion is perfectly smooth and noiseless, even at the fastest speeds.

Six feed rolls carry the stock to the saw, all of which are driven by gearing. The right-hand rollers are rigid in their boxes, but the left-hand set is elastic, so as to grasp uneven stock and hold it firmly up against the rigid rolls, thus making a powerful feed even on very unequally sawed lumber. The rolls and their housings tilt to an angle to saw clapboards, and the blade runs within 1 inch of the center of the last feed rolls; thus very short and very crooked stock may be sawed. All the rolls are adjustable to the blade and wheels in case of wear.

The self-centering attachment is so arranged that by slacking a set screw and adjusting a collar the right-hand rolls become rigid, but may be adjusted to thickness by the lower screw and hand crank. The straining of the blade is accomplished by a balance lever with weights which may be changed according to the work and width of the saw.

The guides have large hardened steel rear or safety rollers and independent bronze side guides which are adjustable by screws. The lower guide forms a work table for the lumber passing through and the upper arm is counter balanced and adjusted vertically by a large pilot wheel or by a lever and bar overhead as desired, thus the guide can be instantaneously shifted as the lumber varies in width.

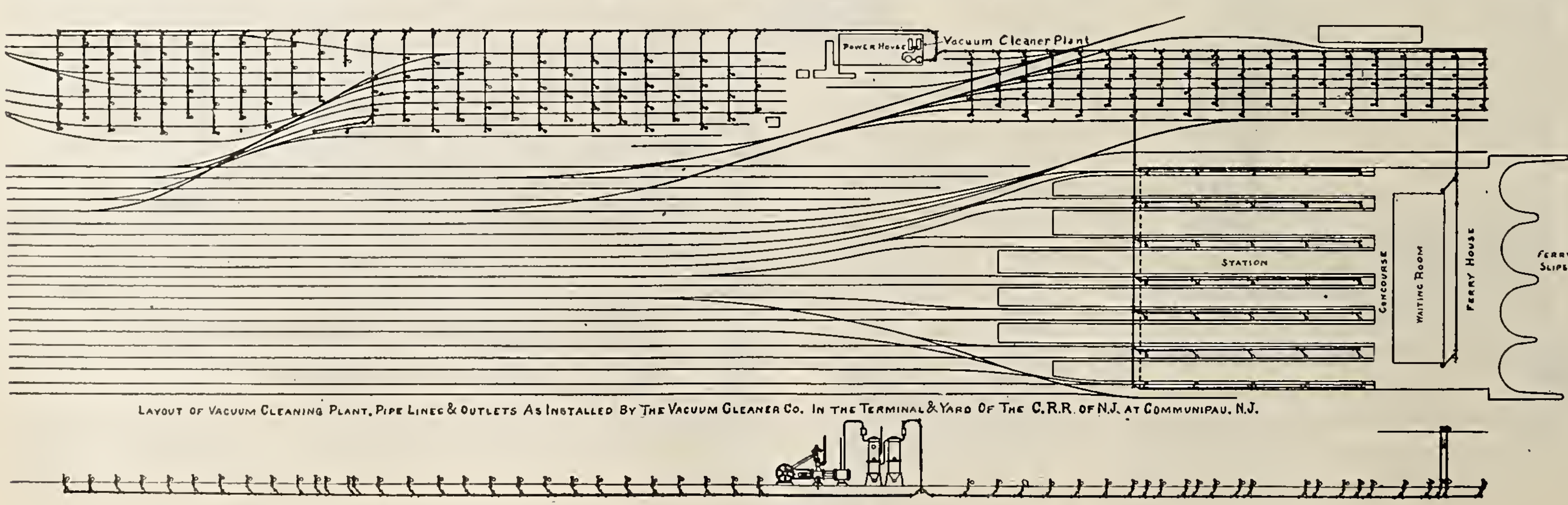
Cleaners are provided on both wheels, and a box is attached to the lower wheel guard, which can be kept filled with oily waste to soften the gum which collects on the surface of the wheel.

The illustration of the machine reproduced herewith shows the machine direct connected to a motor but they are also made to drive with belt.

This machine as illustrated and described is manufactured by the American Wood Working Machinery Co. of New York.

Vacuum Cleaning

One of the greatest revolutions in car cleaning has been worked out by means of the vacuum system of renovating, in which dust and dirt is removed from carpets, seats and woodwork, and is taken out of the car entirely, so quickly, thoroughly and cheaply as to cause one to marvel at the remarkable difference in results between the new way and the brush and beating methods which simply remove the dirt pest to settle again in a changed location. The vacuum system



Layout of Vacuum Cleaning Plant in the Terminal Yard of the C. R. R. of N. J.

has an adjustable appetite for the elements that contribute to unsanitary conditions, and is therefore a remorseless remover of anything loose that get within range of the renovator nozzle—carpets or rugs, furniture, seats of cane, leather or plush, are all brought to a condition of original cleanliness by means of the vacuum maintained at the pumps.

The system as laid out and in operation on many of the prominent lines consists briefly of vacuum pumps installed conveniently near the scene of operations, and which are conneeted to a system of piping arranged to cover all points in a coach yard where passenger train ears are placed at the end of a run. The pipes are placed underground and have air hose connections at convenient intervals, to which are connected the hose used in a car. On the end of the hose. and handled by the operator is a renovator nozzle, which is of cast brass and has a slot about 6 ins. long by 1-16 in. wide through which the dust is drawn. All dirt drawn into the pipe is passed to the dust separators where it is deposited in water, whieh is chemically treated, if need be, for the destruction of disease germs. There are two of these separators, one of which relieves the air of nearly all dirt, the second one removing any impurities left by the first, and both are cleaned at regular intervals. Such a cleaning plant is illustrated herewith in plan showing the lay out in the yards of the Central R. R. of New Jersey at the Communipan, N. J., terminal. The halftone of a Pullman car tells all there is to the manual point of the cleaning.

The vacuum pumps in this plant are cross eompound and of such a capacity as to maintain a vacuum in the pipe system, which is equivalent to a length of about three miles; the piping varying from 2 to 5 inches in diameter. The faeility with which the cleaning is done enables the complete passenger equipment of the eompany, including parlor ears, to be eleaned every day, in actually half the time the work was ever done before by any method, and so much better that eomparison of results would be ridiculous. It is simply a question of holding the nozzle over the place to be eleaned. Vacuum does the rest.

The Vacuum Cleaner Company, New York, are now putting in one of their improved plants at the new terminal of the Delaware, Lackawanna & Western road at Hoboken, N. J., to take care of the equipment of that road, as well as the Pullman cars entering the terminal. This plant will have provision made for 750 cars, and will be one of the largest yet operated by the vacuum system for car cleaning. The manifold applieation of this method for effeetually eliminating dirt from articles in which from necessity we are obliged to be in contaet with, are in evidence every day, in the handsome automobile plants in use about New York City, whieh are found in the office districts as well as in the residence sections. It reads almost like a fairy tale to see in type the statement that residences are now cleaned by vacuum, but that is what is being done by these portable cleaners of which there are fifty now in commission. The business of the Vacuum Cleaner Company, whieh is a successor to the Kenney System, is a phenomenal one for the short time that it has been in process of development.

Notes of the Month

Mr. Frederick Schuchman, president and general manager of the Homestead Valve Manufacturing Company, died on Tuesday, July 25, at Homestead, Pa.

Mr. Chas. Parsons, well known in the pneumatic tool business, is now associated with the Independent Pneumatic Tool Company and will travel out of Chicago.

Mr. R. S. Cooper, formerly a representative of the Rand Drill Company, at Pittsburg, has been appointed manager of the New York office of the Independent Pneumatic Tool Company.

William T. Simpson, formerly with Detroit Lubricating Company, and more recently with the American Locomotive Equipment Company, has accepted a position with S. F. Bowser & Company, of Fort Wayne, Ind., manufacturers of the Bowser oil storage systems and oil house equipments.

The Joseph Dixon Crueible Company, of Jersey City, N. J., have issued a neat little pamphlet on "Air Brake Lubrication." It describes in full the use of graphite air brake and triple valve grease and special graphite as applied to this important industry.

The Cleveland Twist Drill Company, Cleveland, Ohio, have issued a neat sixteen-page catalogue on tools for turret lathes and screw machines. This illustrates and describes fully all their different makes of drills, reamers and tool holders for this elass of work. Each elass is accompanied by a table of dimensions together with prices.

Since the Independent Pneumatic Tool Company of Chicago have aequired the Aurora Automatic Machinery Company they have received an unusually large number of orders for "Thor" piston air drills, reversible wood boring, reaming, tapping and flue rolling machines, and pneumatie chipping, calking, beading and riveting hammers from railroads, foundries, ship yards, boiler shops and other industrial works.

In an artistically prepared catalogue entitled "Morgan Continuous Gas Producer" much information of value is presented to all who are interested in the most economical manner of generating and applying heat. The details of tests made by Robt. W. Hunt & Co., showing an average effieieney of 92 per eent, are given and the points of the producer that made possible this remarkable efficiency are set forth in the 6x9 50 pages with embossed cover and numerous illustrations. This catalogue will be cheerfully furnished by the Morgan Construction Company, 40 Exehange Place, New York City.

Mr. L. E. Thomas, formerly with the United Engineering & Foundry Co., of Pittsburg, has aecepted the general management of the Birdsboro Steel Foundry & Maehine Co., taking charge from August 1. Mr. Thomas is well known to the trade and was tendered the position of assistant general manager of the Republic Iron & Steel Co., whose engineering work on their new rail mill at Youngstown was in his charge, a month prior to his aecepting his present position. Another piece of engineering work, ably condueted by Mr. Thomas, was that of the eonstruction of the Ohio plant of the Carnegie Steel Co.

John F. Allen, 370-372 Gerard avenue, New York City, manufacturer of the "Allen" riveting machines, reports their July sales as follows: Jeffrey Manufacturing Company, Columbus, O.; Thompson Iron Works, Philadelphia, Pa.; Owego Bridge Company, Owego, N. Y.; Manning, Maxwell & Moore, New York; Levering & Garrigues Company, Dunnellon, N. J.; Morava Construction Company, Chieago, Ill.; New Castle Bridge Company, Indianapolis, Ind.; Interstate Engineering Company, Bedford, O.; American Car & Foundry Company, Wilmington, Del.; Cheboygan Boiler Works, Cheboygan, Mich.; American Car & Foundry Company, Jeffersonville, Ind.

The Central R. R. of New Jersey is keeping to the front with improvements and betterments, among the most notable of which is the recent ferry service to 23rd street, taking passengers almost direct to the shopping and theater districts. A new station house of brick and stone is under construction at Cranford, N. J., to cost about $25,000. The same attention is given to concrete construction that other roads have bestowed on the new wonder in structural operations. Culverts are put in with it to the exclusion of other material. A specially fine piece of reinforced concrete engineering is the viaduct of 30 foot span, going in at Philipsburg, in which sidewalks are provided for by wide portals at each side.

The latest trade paper reported is the Practical Machinist, of Atlanta, Ga., a substantial looking monthly, devoted exclusively to iron and steel working, machine construction and repairing, particularly in the South. The journal was established in the spring of the present year by The Machinist Publishing Company, at the head of which is Mr. J. A. Rasbury, well known from his connection with "Dixie", as business manager, for several years. That the South has made a wonderful advance in the last few years in manufacturing and that this journal will be one of the factors in a still further advance is well evidenced by the substantial progress it has made in such a short time, as indicated by the August issue.

At the annual meeting of the stockholders of the Locomotive Appliance Company, which was held at their offices, Old Colony Building, Chicago, Ill., August 10 last, the following directors were elected for the ensuing year: J .H. McConnell, Pittsburg, Pa.; E. B. Lathrop, Frank W. Furry, Ira C. Hubbell, J. B. Allfree, Willis C. Squire, J. J. McCarthy, Chicago, Ill.; W. J. McBride, Clarence H. Howard, B. F. Hobart, C. A. Thompson, St. Louis, Mo. All of the above were re-elected except Dr. G. W. Cale, Jr., who resigned and Mr. J. H. McConnell was elected in his place. Mr. McConnell was formerly connected with the Union Pacific for a number of years, and more recently manager of the American Locomotive Company, Pittsburg works.

The balse rail rounder finds solid comfort when he strikes the Chicago Great Western, which has an equipment second to none. The night trains between Minneapolis and Chicago speak for themselves to the general traveling public, but to the railroad man who is on the inside as to the cost of the magnificant palaces making up these trains, and who views the case from the standpoint of dollars alone, it appeals as a master stroke, and especially to one from the effete east, which is popularly but wrongly supposed to give the traveler the best value for his money. These trains consist of nine cars, namely: baggage, buffet, four sleepers and three chair cars. They are electric lighted from the headlight to the rear car, and are truly trains de luxe in every detail of their make-up.

The Lackawanna Railroad is planning to replace its passenger terminal in Hoboken, which was destroyed by fire on August 7, and the officials state no efforts will now be spared to do this with the least possible delay. Until the new building is ready temporary waiting-rooms, dining room and other necessary facilities will be provided. Plans for the new terminal call for a vast ferry and railroad structure with sixteen tracks and six ferry slips. The buildings will be absolutely fireproof. Their construction will be of steel and concrete throughout. The main waiting room will be 150 feet square and 54 feet high with enormous windows on all sides. The restaurant will be on the main floor, over-looking the water with a view up and down the river, and a wide balcony projecting from the restaurant for dining out of doors in sumer. Passengers from boats to train will not be compelled to pass through the main waiting-room but may use the forty-foot concourse leading to the tracks. The exterior of the building will be 600 feet long on the river side with a central tower 225 feet high. This tower will be electrically illuminated at night and its lighted clock faces will be one of the noticeable sights of the harbor.

Technical Publications

Practical Perpective, a Practical Explanation of the Only Practical Perspective Isometric is the title of a work by Frank Richards, associate editor "American Machinist," and Fred H. Colvin. Every mechanic, no matter what his line of business, is called upon at some time to read and interpret drawings, and often to make sketches to convey a mechanical idea. Facility in such work is of course only acquired by an acquaintance with correct principles and practice, and that is just what is made clear by the authors of this little book on Isometric drawing in a plain elucidation of the needed science of the subject by Mr. Richards, while the practical application of the principles to different industrial callings are furnished by Mr. Colvin, on Isometrically ruled paper. This little educational work is put out by the Derry-Collard Company, New York, at 50 cents. It is 5½x8 inches, bound in flexible linen, and has 56 pages of valuable material.

Railroad Paint Shop

Edited by
CHARLES E. COPP
General Foreman Painter B. & M. Ry.

Devoted to the Interest of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

With this issue we record with regret the resignation of Mr. Charles E. Copp as editor of the Railroad Paint Shop. Our relationship has been so pleasant and satisfactory that we only consent to the change with the understanding as suggested in his "valedicitory" that we shall from time to time have the pleasure of giving to our readers something from his pen. It is only fitting that we should emphasize, at this time, the value of his work in connection with this and other publications, and also the great service which he has been to his fellow members in the Master Car and Locomotive Painters' Association.

Bruce V. Crandall.

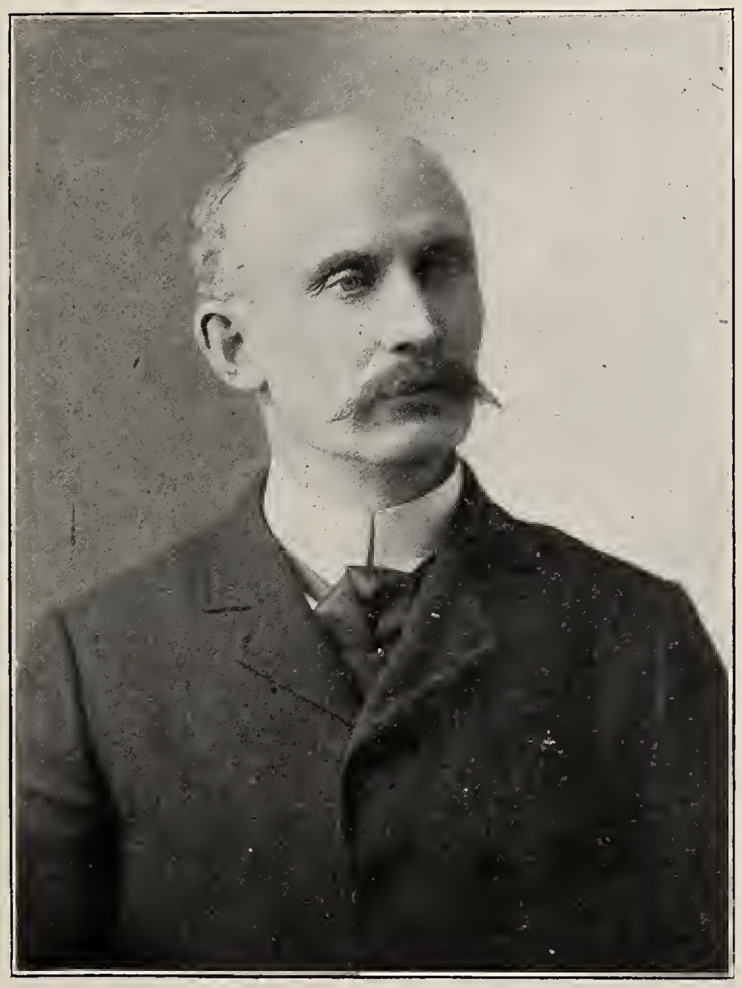
Valedictory

The time has now come when it seems best to say good bye to my readers as editor of "Railroad Paint Shop." The same being the official organ of the Master Car and Locomotive Painters' Association, of which I am a member, and has been adopted as such from year to year, possibly somewhat on my account, at its annual conventions in September, I feel that I must keep faith with the association, as I ever have tried to do in the past, and make known my intentions in this issue so that they may act clearly with reference to it.

Lacking one month, it has now been four years since this paper became the official organ of the association and I began my work in it. It is twelve years since I began a similar engagement in the Railroad Car Journal, of New York, which a year later became the official organ of the association, and finally merged into the Railroad Digest, so that it is exactly eleven years, with this issue, that I have had the honor and the pleasure of conducting, in the midst of my railroad duties, the official organ of the M. C. & L. P. A. If I had received such a "sentence" in the first place I should have felt like saying, "You might as well make it for life, judge." Still it has been largely a labor of love. It has brought me in contact with my fellows and the railway mechanical world generally and has been instructive and broadening to me, if not to them. It will seem strange for a time to lay down my pen, but I feel that I must now do it, though from force of habit, like the gyrations of the old clay-pit-horse when turned out to pasture, I may take it again before I hardly know it.

I want to leave "a clean sheet"; therefore, I want to apologize to any I may have offended. Accept the love of an earnest heart in place of your criticism of his weak head, please; he has meant well. However, my contact with the rank and file has been most pleasant. I have tried to elevate the craft and impart and receive all the information about the difficult business of railway equipment painting—that I knew how. I leave the results with you, my indulgent publishers and readers, and bid you affectionate adieu and Godspeed.

Charles E. Copp.



CHAS. E. COPP.

P. S.—In the absence of any other picture at present with which to embellish these columns this month we will inflict our own and step before the curtain and make our best bow to a long-suffering audience.—C. E. C.

The Car and Locomotive Painter of Today

The car and locomotive painter of today is no more like his predecessor of thirty-five years ago than cheese is like chalk. The times have so changed, and with them the requirements of rolling stock, that unless the young men of those days who are old men of today have changed with the times and adapted themselves to them they have become back numbers, who have either been relegated to the shelf by progressive mechanical departments or endured and suffered to remain by those less progressive. In most cases, however, young men susceptive of new ideas have had to be employed and the old turned to one side, so hard it is to "teach old horses new tricks." But this has not always been the case, we are glad to state; there are some old men today who do not need Prof. Osler's chloroform—men who were at the head of the car painting business in all its glory of surface, color and ornament thirty-five years ago, and as old men they are there today doing nobly, and why? Because they have progressed—they have not only kept up with the march of ideas but they have been in the front ranks—they have led the column. Like the soldier of the Civil war, with knapsack, hardtack and canteen, they have learned to adapt themselves to circumstances without a grumble and do their bidding and their duty and work for the interests of the roads employing them rather than for self glory in any way.

There has been a sort of natural evolution in everything professional and mechanical; and car painting is no exception, in which the executive and mechanical officers have taken an important hand as well as the painter himself. Of course they have not mixed the painter's paint for him (though in some instances they have selected the finishing color), nor spread his varnish, but they have furnished him with new ideas in many ways and we would by no means be selfish enough to arrogate to ourselves all the praise of progress; to them belongs a due share. Not that a car is painted any better than it was forty years ago—probably not so well—not so durable anyway. Materials are not so good, nor so pure, we believe. But more "horse sense" is put into the appearance of a car or locomotive from a business standpoint today anyway. Who would stand now for the Van Amberg chariots of those days? Not that some of the georgeous things were not tastefully embellished and most attractive, but it would be entirely out of the question from a business or financial standpoint. And the irreconcilable who cannot turn his back on those what he terms "good old days" and turn his face toward the horizon of business progress may as well "take to the woods," or go to farming. Today rolling stock is wanted—and we have to have lots of it—that is substantial, neat, plain and durable. They want rolling stock that will safely and comfortably transport people from one to three thousand miles in a satisfactory manner. They do not want the "rolling chromos" and gaudy cages any more. They want good rolling stock built and maintained at the lowest cost. Transportation by electrics and competition in every way has shoved down profits to a large degree, not to mention increased cost of operation in many ways. Quick-action power brakes are of more account than posies and pansies painted on the car; also direct steam heat than quirks and scrolls. Plainness and richness is associated with taste and comfort today, and this is what the best people want rather than gaudiness and cheapness.

The foreman painter then of today is he who is noted for his executive ability, or "push," in other words, in getting out a lot of plain work from a small force of men rather than for his artistic tastes in decoration, though in some instances there is still an opportunity to exhibit a little of that to good advantage. But the man to receive the laurel wreath of praise today by his mechanical superiors is he who, regardless of age or personal beauty, can turn out the greatest number of cars from his shops per month with the least number of men; and a car is a car on paper. So my ambitious reader, if you want to be "on a bust" in the hall of fame see to it that you score high in the number of cars you can turn out of your shop painted and varnished in the company's adopted plain style. The time is passed when the neighbors and friends will flock to your shop to see your work of art. Car and locomotive painting today is a cold business proposition; and he who can grasp it with the most mathematical precision and comprehension is the smartest fellow. This is the way he is looked up to and this only. He has long ceased to be a wonder of the world as an artist, because there is no place for his art in the first place; and, secondly, because art education has become so wide-spread that, ten to one, the average school boy or girl knows more about it than does he with his limited opportunities of former days, when he had to go to work to earn his own living.

The car painter of today should be a chemist rather than an artist, and know all about pigments and oils; and able possibly to take a paint or a varnish all to pieces and tell the dealer and the buyer what is in it, and keep everlastingly at it until they are ashamed to send him anything but the best materials. He should impress them with the fact that, whatever there may be in friendship, the materials that come to him must stand on their own merits. He should be discreet, square and upright and not slop over and be tricky and crooked.

Up-to-Date Demands In Protective Paints

Editor, Railroad Paint Shop:

The question of good protective paints is being agitated more and more by the great army of painters and interested workmen, as well as by chemists, engineers and all manufacturers of paint.

There seems to be no end to new discoveries in paint and varnish making. New oils and pigments are brought before the public every year, new discoveries and combinations of vehicle and pigment are exposed and tested in view of finding some valuable mixture that is superior to anything now in use.

Our technical journals and magazines are literally crammed with coined names of new discoveries of paint products. There seems to be no end to the vast resources of the earth's minerals and oils for protective purposes and it is well there should not be; it is needed more than it ever was before. The increased demand for almost impossibilities in the way of protection for structural work of both wood and iron, and of stone, concrete and brick, is causing chemists and paint students quite a little intelligent thought.

The old bogy of oil being the life of paint is placed in the background and in its stead the proper combination of oils and pigments has taken its place, to be specially prepared for different kinds of work. The "all-oil-only" idea is passing: something else is necessary to keep the elements from wearing away the surface, hence the manipulation of oils and the proper selection of gums and pigments is meeting the demands of the times, in other words, is filling the bill. The reasons are obvious.

The growth of cities and the development of the country with the increased improvements of structural work in the way of buildings, factories, railroads, mining machinery, in different sections of the country demand special paints for protection. For instance, carbonate of lead will not do for white paint in cities where there is an great amount of sulphur; some paint pigments will not wear well exposed to the salt sea air. This is the case with some varnishes. The alkali from the dust and sand in some of our western states play havoc with some of the paints and varnishes. The extremes of cold and heat also have more to do with the checking of some varnishes than anything else. In some sections of the country the sulphur and other fumes turn all light-tinted paints yellow and black. In this case it is not so much the fault of the oil, as it is the pigment. It is a question whether carbonate of lead is the best material for use in these localities. However, it is agitating the practical minds to that extent that other products are pushing to the front as better adapted for both durability of color and permanence of pigment as a protective. It has been proven time and again that tests made in different sections of the country will give different results in weathering the elements, hence the need of intelligent study of the peculiar demands from different parts of the country. This applies more to the medium and vehicle than the pigment. An elastic oil or varnish is better for making paints and varnishes used in cold climates than quick and hard drying material, and, vice-versa, hard drying varnishes are not so liable to soften and become tacky in warm latitudes. Contraction and expansion are more severe in the North, while sunlight and moisture are the destroying elements in the South. Common paints exposed to the constant moisture, dampness and salt air, soon give way, which proves more and more the need of specially prepared products for this special demand.

All metals, and especially iron and steel, draw moisture like a magnet, hence the need of proper manipulation of oils, gums and dryers for this special purpose. The same principle applied for protecting wood will not do for metal; one drinks in the oil, or liquid, mixture, literally saturating the fibers to a certain depth, giving the surface an advantage of toughened wood and oil, while the nature of the other deters it from entering, and it lays right on the surface and has nothto strengthen it, but must stand the wear and tear of the elements by itself. This is proven by the greater amount of paint used on wood, which is at least thirty per cent more than metal, if not more. The former has a foundation mixtrue of wood, sappy moisture and oil, the pigment remaining on top, while the latter has nothing but the oil and pigment and needs more coating to seal it against rust than wood does to protect it against decay; however, in practice the universal idea is right the opposite; iron, steel or metal of any kind is never given as many coatings as wooden structures. The predominant practice is usually two coats and never more than three coats on all new wood-work, and in car and carriage work more, and then protected by three or four coats of varnish on top as a finishing surface.

Of all the constructing materials that we have in use, or have any knowledge of, iron is the quickest and most susceptible of decay. Then why should it not be the better protected? The reason that it is easier covered and hidden from view, even with one coat of paint, is no reason that it is fully and properly protected. One coat of paint, no matter how heavily applied, will not protect metal; the sharp points and cones are invariably free from any body of paint after the one coating settles down and flows together, no matter whether it is made of oil or gums, and it takes several coats to protect and cover them completely. This is not the case with a wooden surface. If there is any fiber sticking up it becomes thoroughly saturated through and through and becomes thoroughly water-proof, if properly coated, and when the paint becomes dry they are easily surfaced or sanded down, leveling up the surface and making it more compact, or if only one coat is given the protection is more ample to resist the elements against decay than one coat would be on iron to protect it against rust. Why metals are so slightingly treated, when it needs so much more in the number of coatings to properly protect it, it is a question that thoughtful painters want to agitate more and more and take a more decided stand upon than ever.

It is the painter's place to know these things, and if he is not putting forth his knowledge in practice, he surely is not giving ample proof of his ability. The evidence of this fact is seen all around us. Skyscrapers are reared in every city with only two coats of cheap mineral paint on the structural iron, and many times only one when they should have at least four, if not more. The most that could be given them would not be too much, as this class of work will never have the chance to be coated again, and as the life of the average good paint is about two years and then the moisture begins its destructive work, and often sooner. It is not necessary to state that the rust will eat through one coat quicker than it will two; that is known by all, but if the metal is thoroughly sealed up there is no need of the rust starting at all. The qeustion lies then with the number of coats necessary and the quality of paint used to seal the work.

With the above-named class of work it is becoming a serious and only one answerable problem with architects, but with all outside work where painting should be done every two years it should be as serious with every known master painter.

The same principle applies to car work, only mcre so. It is poor economy to keep on lessening the number of coats and expect the work to hold up. If the paint is used for a protection, make a good job of the protection and give at least enough coats to keep the wood from decaying and the iron from rusting. This will solve a great many troublesome paint questions and lessen the worry of railroad magnates about the bad looking equipment, if they will heed it.

Very respectfully,

Chas. E. Koons.

From the Frozen North

Commander Peary has just sarted to discover the North Pole again. Whether this has had anything to do with it or not we do not know, but the old veteran Warner Bailey, away up north at Concord, N. H., has thrawed out in advance of him and sends us his annual communication on the signs of the time and things in general. There is something in the air that he sniffs toward convention time that makes him restless until his bones ache and he is in pain all over until he delivers his message to "the boys." Being "the father of his country" with respect to the Master Car and Locomotive Painters Association, and its second president, naturally he looks at things from a different angle than most of those do who have scarcely gotten rid of the "down" on their upper lip, and have just emerged from "college." We print his communication in its entirety, and take pleasure in doing so, feeling that no one will be offended with his strictures, as he is a man of few words and far between. Here is his communication

To the Editor, "Railroad Paint Shop":

In looking over the list of subjects to be read at our next convention I see one that must be of especial interest to us all, an essay on "The Car and Locomotive Painter of Today."

No doubt it will bring to mind the time when most of us were striving to master the mysteries of mixing and applying paints; when we all tried to see how well we could do our work, having in view the lasting qualities, rather than how quick we could do it.

How changed now! When everyone tries to outdo everyone else, losing sight of the wearing qualities altogether.

I am pleased to see Brother Clark is assigned to write up this subject, as I know he will do it justice with his well-known eloquence and skill.

When I think of the good old times when we had the good, cold-pressed linseed oil, and contrast them with some of the substitutes of today, I feel like hanging the manufacturers to the nearest lamp-post.

I can read of impure beer with pleasure almost, and smile at glucose in jellies; but of all the frauds of substitution that of paints is one of the meanest and most heartless.

Think of the substitutes for linseed oil. We have corn oil, porgy oil, cotton-seed oil, lucreal oil, and last, but not least, we have snipe's oil. These may possibly be good substitutes for the old linseed, but I am not aware of it yet. I have lately seen a vehicle for mixing freight car paint that was sixty-five per cent benzine, the remaining thirty-five per cent being North Carolina gum—better known as rosin.

Think of some of the things that we are using in place of japan, shellac and thinners. Snotting-lac, alcolac, grain-a-lac, and others under various names. And then the thinners we have are mostly benzine—wholly, or in part.

Then the floratine, permanere, lacqueret, porcelite, lacozate' tochesedo, and several others. Such names as adelite, absorene, phenoid, auresco, neolith, mindora, antoxide, dulline, flatback and a score of others. A fellow will need to know the Creek and Latin languages to comprehend all this.

Painting today is quite different from theology. In theology they never learn anything new or forget anything old. On the contrary we are expected to forget everything old and swallow every new idea without a protest, no matter how absurd it may be. I sometimes think it is much better not to know so much than to be like the orthodox preacher and know so many things that are not so.

I hope to live long enough to see the time when this temptation to fraud on the part of paint manufacturers will be very much lessened. By some of them you would be made to believe that their goods would collect your bad debts, make rain, change the color of your hair, get you elected to office, and triumph over your enemies.

Hope to see you at the Cleveland convention.

Good bye.

W. BAILEY.

Shop Management

How best to organize, equip, man and maintain a passenger paint shop of a given capacity and upwards on either day or a piece-work basis, efficiency and economy considered, is a question that should appeal to the live foreman painter of today, especially if his company has outgrown the old ramshackle shops and has built large, new ones and are about to install them. Mechanical superintendents today are not looking for dreamers, or long-haired artists, nor for men who must know the mysteries of paint and varnish making, for requisite materials are bought all prepared. What they want is a live man with short hair and long brains, a man of business or executive ability; a kind of organizer, or general, who knows men when he sees them and how to arrange them and set them to work, and who can lead them on to success, and who can push things when things go hard; one who is not easily discouraged, but makes the best of bad circumstances over which he has no control; one who surmounts obstacles instead of being crushed by them; one, like Gen. Grant, who never admits defeat but plugs on to victory. Managers today are looking for numerical results from the shops, instead of artistic features, though they want good work. They want to know how many cars per month of a given capacity at day or piece-work with a given number of men a shop ought to turn out, taking them as they come good and bad, and any shop ought to turn out about two and one-half times its capacity; and they will not be put off by generalizing and guess-work; they want it right on the dot in cold figures.

Now to arrive at and accomplish all this one's shop should be equipped with all the modern conveniences. Do not figure the old, dark, ramshackle shop against the new, light and modern one with everything to do with and put it on a par with it, for you will be sadly left if you do. The shop should be so constructed as to have an abundance of room, and of natural light by day; and then have electric lights to use when artificial light is needed. It should have the best devised permanent staging, and be equipped with gas and compressed air for burning off. The drainage should also be good, having a granolithic floor, or its equivalent, and with a plenty of water at good pressure. Also a handy stock-room manned in proportion to the shop's crew. All these things and many more of lesser consequence that will suggest themselves should be had.

Assuming that this is the state of things and that a man has some voice, if not the full selection of men and materials, as he ought to have to do his work, he may then first man his shop with the requisite number of the various classes in order to turn out the required number of cars. Here is where good calculation will come in so that $2 men will not be doing $1.50 men's work. Here is where the company too often misses it, especially where day work is the practice. Politics or friendship somehow gets in too many men at a high rate who do work that cheaper men can as well perform until they become proficient in a still better sphere; for in a well-managed shop promotion should be the order, according to ability and faithfulness. The foreman should calculate how many of this class and how many of that are necessary to turn out a car or so many cars per day of a certain class of work, and then reserve so many for a given number of heavy jobs coming along that are understood; providing, of course, the requisite number to handle all the loose stuff at the sinks and in the varnish room. If he will do all this intelligently and know whereof he speaks and where he stands he will be an up-to-date car painter of today who is looked up to by the general officer as a worthy member of his staff, but hardly otherwise. He must also maintain this state of things right along by good order and discipline in his shop so that whoever comes in at any time finds nothing to criticise. To do this a steady pressure must be felt from the office. Sudden spurts and spasmodic scenes and sensations in the effort to correct abuses are not like maintaining good order and discipline steadily right along; the one is demoralizing while the other is organic and successful.

Notes and Comments

On account of the falling off in work at the Muskegon, Pere Marquette shops, Foreman Painter F. C. Macomber has been transferred to the Ionia shops, succeeding R. J. Zebbell, resigned.

Mr. H. N. Turner, who about eight months ago notified us of his severing his connection with the Acme White Lead & Color Works, Detroit, and going with a kindred concern, now acquaints us with another change, and that is the resuming of his old position as Eastern representative in the Railroad Department of the Acme White Lead & Color Works, and hopes to have the pleasure of renewing old acquaintances again at the Cleveland convention.

The following changes in the personnel of the B. & M. car department have been made since our last issue:

Mr. A. J. Staples, heretofore foreman of passenger car repairs at the Somerville shops, has been appointed general foreman of the Salem shops, vice S. R. Arey, resigned.

Mr. Wm. B. Getchell, heretofore foreman painter at the Somerville shops has been transferred to the Salem shop in the same capacity, effective Aug. 26.

Mr. James K. Beede, heretofore assistant foreman painter at the Somerville shops, has been transferred to the Laurence shops, to succeed William Praddex, assigned to other duties, effective Aug. 14.

Some of these changes contemplated have been hastened by the abandonment and destruction of the Somerville shops, the paint shop of which is now down flat.

We corrected the blunder in our last issue where the Fitchburg shops of the B. & M. were inscribed underneath "A View of the Readville Shops," but we cannot forbear inserting the following amusing note from Associate Lord, dated Aug. 1:

Editor, Railroad Paint Shop:

Sunday being a rainy day I seated myself in my easy chair to peruse the Railway Master Mechanic for July, it having just come. The second article was "A Visit to the Readville Shops." You say in your communication you noted "an entirely new thing" on that visit; it was "an electrical illuminated sign across the end of a car," etc. Then, again, "if the Boston merchants should happen to get a drop too much over in 'Gotham' they could tell which their train is more readily."

After reading the piece through I looked at the "View of the Readville Shops," and it struck me at once that some one must have been over in "Gotham" when they tried to pass off a pitcure of the B. & M. car shops at Fitchburg for the N. Y., N. H. & H. shops at Readville. We can hardly believe this of the editor of the Railway Paint Shop. Please explain.

Yours truly,

G. W. Lord,

Foreman Painter B. & M. Shops, Fitchburg, Mass.

We clip the following interesting account of the origin of the letter "J" from the Army and Navy Journal, which will be information to some, doubtless, whose business it is to paint letters:

"Many have noticed that in the United States army, as well as in the regiments of the National Guard, the letter "J" is omitted in the designation of the companies, the letters jumping from "I" to "K". The reason is often given as the dislike a man has to being in the "Jay" company, but that is not the case.

The letter "J" was introduced in the English alphabet about 1630. Before that the sound had been represented by the letter "I", which was thus made to do double duty. The same was the case in the written language, and in the last century "I" and "J" were written exactly the same. About 1850, however, the innovation was made of writing "J" with the bottom loop below the line.

"The confusion which would have resulted in military records was the reason for not using the letter "J", and the system has never been changed. The same rule applies, perhaps, to the non-use of the letter "J" in lettering the rows of seats in some theaters."—New York Sun.

"The 999."

"The love and admiration of the average boy for the locomotive was prettily illustrated a few evenings ago. A seven-year-old boy had been to a Sunday school concert with his parents, and listened to some of the beautiful songs that Bliss and Sankey used to sing, such as 'Too Late,' 'Let the Lower Lights be Burning,' 'It is Well With My Soul,' 'Hold the Fort,' 'Pull for the Shore,' and 'The Ninety-and-Nine.' The last made a deep and lasting impression. George H. Daniels, an old friend of the family, visited them the following night, and the youngster, running to him, exclaimed: 'Oh, Mr. Daniels, I heard 'em sing your everlasting song last night!' 'Indeed!' said the dean of passenger agents; 'What was the name of it?' 'The 999,' replied the boy, thinking of the most advertised engine in the world, that which gave fame to the Empire State Express. Best thing Daniels has heard in ten years.—From 'On the Tip of the Tongue.' New York 'Press.'***"

The editor of these columns is a good deal like this boy, for when he goes to church and the parson announces the number of the hymn to be sung, at once the B. & M. car of that number, and its condition, comes into the mind's eye in spite of himself, and this is no joke either.

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO
Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago
TELEPHONE - - MAIN 3185

Eastern Office: Room 714, 132 Nassau Street, New York City.
Telephone: - - 3524 John

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.
Communications on any topic suitable to our columns are solicited.
Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.
In remitting make all checks payable to the Bruce V. Crandall Company.
Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent

Vol. XXIX. CHICAGO, OCTOBER, 1905. No. 10.

Contents.

A Drawing Office Need

THERE are many occasions in drawing office routine when the need is felt for something other than a lead pencil in determining the area of an irregular figure, like, say an indicator card, a section of T-rail, or again the area of a flue sheet or back sheet in calculating the heating surface of a firebox, and many other cases that constantly present themselves. A polar planimeter or a coffin averaging instrument is of course the recognized means for arriving at results quickly and accurately, but all drawing offices are not equipped with those useful and necessary aids to the comfort of the Knights of the drawing table, and the only way left to them then, is to calculate the area of intricate shapes—a laborious and barbarous time-robbing operation at best. An inexpensive and efficient means of doing such work is explained on another page of this issue, in the description of the construction and operation of the Hatchet planimeter, which is very easily made and as easily manipulated, by any one. It is the best exposé of this little instrument we have seen.

Efficiency of Machine Tools

TO improve the efficiency of machine tools has been one of the liveliest problems dealt with by the builder of high grade tools, by reason of the pressure due to the introduction of the electric drive, which has overturned all precedents known to the tool designer and presented conditions absolutely new. The results are seen in the strong and rigid construction of the new machines that do things when manned by talent that possesses the skill only acquired by experience in the business; and right here is the controlling element of efficiency in machine tools. A machine, however well designed to pull a cut against the resistances set up by high speeds and coarse feeds, is practically an inert mass of metal without the guiding mentality of an expert in its manipulation. The personal equation is not of secondary importance with the work of the best tool designers.

The so-called handy man found in every shop is very frequently placed in charge of a high priced tool, the output of which is an accurate measure of the ability of the operator, which is in too many cases far below a favorable showing for the machine. This should, of course, not be charged to the tool, but it is likely to be, and the reputation of the builder is not improved in the estimation of some shop manager, while he alone is responsible for the low efficiency of the tool by reason of failure to have it operated up to its maximum. A high class tool can be made to give results commensurate with the price put into it, only when operated by the best skill obtainable. Anything less than that simply reduces the efficiency of the tool to a point where it is no longer a factor worth consideration in modern shop practice.

Superheated Steam for Locomotives

THE present outlook concerning superheating of steam in locomotive service seems to portend an extensive application of the principle to American power as well as that abroad, where the subject until recently had received the most attention. This statement is prompted by the recent orders for locomotives with superheaters, which have been filled by the American Locomotive Company and equipped with their system for the following railroads: Canadian Pacific, New York Central, Erie, Delaware, Lackawanna & Western, Chicago, St. Paul, Minneapolis & Omaha, Minneapolis, St. Paul & Sault Ste. Marie, Chicago, Rock Island & Pacific and Chicago, Burlington & Quincy. It is seen that these orders include a wide range of territory, and comprise systems noted for progressive managing officers.

There is no doubt that to Dr. Goss is largely due the favorable attitude of many of the roads now using this device, since he was among the first to call attention not only to the theoretical advantages of superheating, but also to the actual economies to be had in practice. In his comprehensive paper read before the Franklin Institute, Philadelphia, in March of this year, he called attention to the fact that by the introduction of superheat, the design of the locomotive boiler had undergone a radical change, and problems had presented themselves that had until lately been thought incapable of solution, and also referred to the fact that the principles involved, and the possibility of success, had stirred investigators to original thought.

These principles the author took pains to explain in his inimtable clear style for the information of those who had not kept pace with the rapid development of superheating practice, making plain the fact that temperature of superheat was a most vital factor in the success of its use, showing that when steam is superheated even to a temperature somewhat higher than that of the water from which it is formed, the temperature and pressure of the steam on admission to the cylinder, gradually falls until the temperature is no higher than that of the surrounding walls of the cylinder, with the result that condensation takes place, and the water in the cylinders at a certain part of the stroke begins to re-evaporate, and while admitted as steam, in the interval between these events, condensation occurs.

Attention was also called to the fact that the loss due to condensation in a compound engine is but one-half, and that of a triple expansion engine but one-third that of a simple engine. The gain coming with superheat is now well understood, as is also the amount of superheat necessary to prevent initial condensation, which affords good evidence that progress is being made in the study of this important subject, for it is but a few years since a prominent authority on steam took a pronounced stand against following up a question that promised so little to the steam user as superheating.

MR. R. H. BOWRON,

GENERAL MANAGER, C. H. & D.

Mr. R. H. Bowron, superintendent of the Northern and Southern divisions of the Cincinnati, Hamilton & Dayton, has been appointed general manager, with headquarters at Cincinnati, O., to succeed Mr. J. A. Edson, resigned. Mr. Bowron began railway work in 1877 as a telegraph operator, and from 1884 to February, 1887, was clerk with the Alabama Great Southern and Mobile & Ohio. He was then superintendent of the Chattanooga Union until January, 1892, and from April, 1892, to April, 1893, was engaged on preliminary work for a projected line. In October, 1894, he went to the Montana Central as chief clerk to the general superintendent, and from September, 1895, to December, 1896, was trainmaster of the same road. During the latter year he was appointed superintendent of the Montana division of the Great Northern, and in July, 1897, was transferred to the superintendency of the Wilmar and Breckenridge divisions. In December, 1898, he was appointed superintendent of the Cascade division of the Great Northern, but resigned in October, 1899, to become superintendent of the St. Louis Southwestern. He was appointed general superintendent of the latter in March, 1900, which position he held until May 1, 1902. He was made division superintendent of the Denver & Rio Grande at Pueblo, Colo., in July, 1903, and resigned in December, 1904, to go to the Cincinnati, Hamilton & Dayton as superintendent of the Northern and Southern divisions.

While the foreign investigators in this line have been most persistent and have pressed forward under various discouragements, the developments brought out by both Schmidt and Pielock have been improved upon by the American Locomotive Company, whose system is simpler, by reason of which a greater efficiency is said to be obtained with a lesser complication in number and construction of tubes.

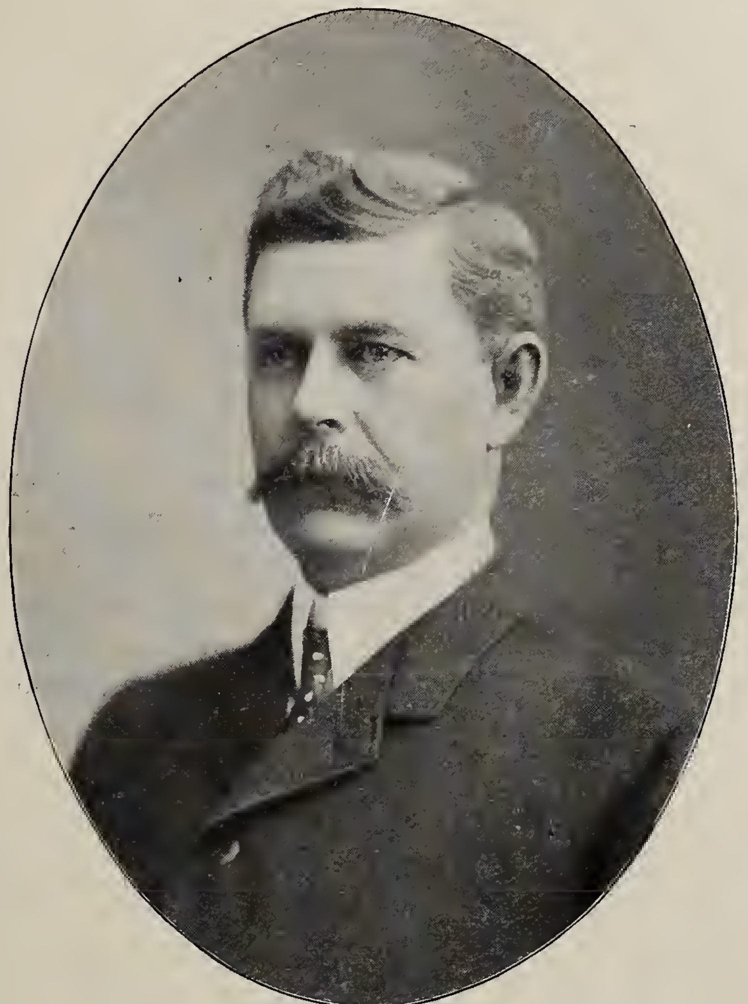
Dr. Goss had found (as noted in his paper) in his tests of superheating, an efficiency of 1.02 pounds of coal per horse power hour, while results have been obtained in Germany showing an economy of 25 per cent by superheat over saturated steam. Late experiments with superheat on simple engines have shown an economy over compound engines using saturated steam; this fact, however, does not seem to have the effect expected, of relegating the compound to disuse, since they are still being built, their friends arguing wisely that if the condensation in a compound is but one-half that in a simple engine when both use saturated steam, it follows logically that superheating of steam should place the compound on a plane of economy unattainable by the simple machine. Compounds have recently been built in order to show what saving is possible in combination with superheat. The results will be watched for with interest, since these engines are equipped with the improved device referred to, which has a superheating surface of about ten per cent of the total heating surface, as against from 0.25 to 0.33 in the older types.

The Traveling Engineers' Association Convention.

THE thirteenth annual convention of the Traveling Engineers' Association was opened at the Hotel Cadillac, Detroit, September 12, at 10 a. m., with President J. D. Benjamin in the chair. There were over 300 members present with a total of about 500 members and their guests.

In his opening address President Benjamin spoke in part as follows:

"We have questions coming before the convention that are of great importance to the railway world and I believe we are better fitted to handle these questions than anyone else in the railway service, as we are daily coming in contact, not only with the subjects at hand, but with the men who are constantly rubbing up against the different conditions as they exist from day to day. We therefore, must not only watch the power in our charge to see that it is properly cared for, but we must co-operate with the enginemen and the officers in charge so as to get the maximum results out of every mile made by the locomotive. In doing this we also assist in reducing the cost of transportation to the lowest possible amount. Nothing requires more careful thought and closer co-operation between ourselves and the officers of the transportation department than this one question. With the modern power of to-day we are called upon to face difficulties which did not exist in the smaller locomotive of a few years ago. We should face them bravely and with a determination to meet and surmount all conditions that have been brought into operation by the introduction of the larger class of engines which are being operated on nearly every railroad in the country at the present time.



J. D. Benjamin, President T. E. A.

In the past few years many new devices have been introduced with which to make the locomotive more perfect, none of which is superheated steam. In the application of superheated steam there is a possible development of greater efficiency in the locomotive and the performance of these engines are being watched by the officers of the different railroads. The application of the mechanical stoker is, I believe, also a step in the right direction while this invention may yet be in its infancy. I am of the opinion there are great prospects for its future development, and with it we will be able to maintain the maximum steam pressure with less exertion on the part of the fireman and at the same time effect a greater fuel economy. We have a very interesting subject by Mr. C. A. Kraft, to which I would direct your attention.

The papers presented at the convention were of an unusually high order and brought out some interesting discussions. The first paper presented was

The Third Man in the Locomotive.

The committee is of the opinion that neither the men nor the company would be benefited on the whole by having the third man. They were all of the opinion that two engineers on one engine would be equal to none, and a second fireman is not needed.

A few years ago a fireman was required to clean his own fires, hoe out the ash-pan, spark the front end, and when he arrived at the terminal his labors had just begun, for he had the engine to clean inside and out, also brass to scour; while at the present he has been relieved of the cleaning almost entirely and with the modern locomotive he has been relieved of the duty of cleaning fires, ash-pan and sparking front end.

On the modern locomotive there is not enough room for the third man and he would get as tired getting out of the way of the other two as if he actually did the work. There would also be more chance for disagreement as to which one did the most work which would make it unpleasant for all concerned. The hardship of a fireman at the present day, in the opinion of the committee, is not what it is pictured. He has very little to do except to put coal into the firebox.

The second fireman would also make promotion slower than at present, which would make it detrimental to the service. The committee is of the opinion that if the divisions are too long they should be shortened instead of putting more men on the engine.

They were borne out in their views by roads that have tried the experiment.

Grease as a Lubricant.

The committee appointed to consider this subject looked at it from the standpoint of getting the locomotive over the road without delays to trains from hot bearings.

From information received, and from tests made, it was found that grease as a lubricant on any but driving journals, main and connecting rod pins, is not economical or safe practice. It was the committee's opinion that oil is a more natural and better lubricant for locomotive bearings than grease, but changing conditions incident to modern railroad methods, the pooling of engines, etc., has led to the use of grease in driving journals and rod pins on all types of locomotives and classes of service. Owing to the fact that grease cannot be squeezed out from between the bearing surfaces as readily as oil when bearings are run at high temperatures, due to mechanical defects or other causes, it tends to reduce engine failures. However, it offers more resistance to motion than does a fluid lubricant of lower viscosity. The friction of standing or moving locomotive bearings is much less when lubrication by oil than when plastic grease is used, a greater force being required to start and maintain motion. For this reason the committee is of the opinion that grease should not be used on any bearings other than driving journals or crank pins because the parts mentioned are the most difficult to maintain, due to the following reasons:

First—Driving journal bearings are exposed to high temperatures radiating from the fire-box and ash-pan.

Second—Careless methods of handling engines by ash-pit men, permitting locomotives to stand over hot coals in pit after fire has been drawn, and neglect to dampen ashes to prevent dust from collecting on bearings.

Third—The design of the modern locomotive is such that the driving box cellar is difficult to remove and reapply. This leads to indifferent, careless methods by those assigned to box packing. Again frequent changes are made in the force assigned to that duty, without sufficient instructions being given.

Fourth—Waste settling from the journal due to the jarring of the locomotive while in motion, and the poor quality of waste furnished for box packing.

Fifth—Neglect in putting movable plates on cellars to prevent packing from working out between bearing and top of cellar, due to wear of driving box brasses, poor fitting cellar bolts, and lost motion in cellar bolt holes.

Sixth—When cellars are properly fitted to journals and maintained it excludes dirt and ashes, and prevents contamination of the lubricant.

The committee found that driving boxes which proved satisfactory with grease as a lubricant had no groove in crown of brass, but grooves are located on the sides. These grooves are located about 4¼ inches from the center, being ½ inch wide and ⅝ inch deep, extending to within ½ inch of each end of the brass. The brass is held in the box by three brass plugs extending through the oil holes, in addition to the usual fit of brass in the box. The clearance of the brasses on each side of the journal is very important. The brass should be cut back not less than ¾ inch from the bottom of the bearing, and should have no rough edges. This is to prevent the scraping off of the lubricant, yet it has been found to be bad practice to give the main driving box brass too much clearance, as in doing so it has been found that the brass soon wears larger than the journal, which causes a disagreeable pound while in motion and often loosens the brass in the box.

Best results are obtained if the perforated plate has a good fit to the journal. Care should be taken so as not to have the follower plate too tight or too loose in the cellar. One-sixteenth inch clearance on sides and ends gives good service. The material used in the perforated plate is satisfactory when it is 1-16-inch steel plate, holes ⅛ inch diameter, staggered and spaced ¼ inch apart.

When the engineer's report or inspection shows that the bearings are running at an abnormal temperature, if the indications show unequal height it denotes that the follower plate is cocked in the cellar. Instead of removing the hand hole plate and crowding more grease in, the cellar should be removed and the following inspection made:

First—Note if the perforated plate has proper fit on the bearing; same can be determined by the luster of the plate when it has touched the journal.

Second—Note if the perforated plate has dropped away from the edges of the cellar.

Third—Note if grease next to the perforated plate has carbonized or burnt. If found in that condition it should be removed and the cellar repacked.

Fourth—Note if holes in the perforated plate are open; if found plugged the plate should be removed, taken to some steam connection, and blown out clean. A small pair of tongs is a convenient method of handling and prevents burning of the hands. Great care should be exercised to prevent bending or distorting the plate when handled.

Fifth—When the temperature has been sufficient to melt the grease it frequently runs between the walls of the cellar and the follower plate and forms a wedge sufficient to counteract the tension of the spring. In every instance this should be thoroughly cleaned, to insure the grease being forced to the bearing by the spring tension.

What Devices for and Arrangement of Engines and Tenders Will Lighten the Work of the Engineer and Firemen?

The committee is of the opinion that anything that will contribute to the comfort of the men on the locomotive will have the same effect as reducing their labors. The next important point was the keeping of the locomotives.

The committee is of the opinion that there should be a regular engineer and fireman for each engine if possible and the practice of pooling engines discouraged whenever it is not absolutely necessary on account of shortage of power.

Engines should be thoroughly cleaned after each trip. On large locomotives it is unreasonable to expect the fireman to do very much cleaning in addition to shoveling all the coal necessary. For this reason the committee thinks the fireman should be relieved of all cleaning on large engines with the exception of the cab. He should also be required to keep the boxes of the tender, where supplies are kept, in good condition.

The engineer on large consolidation engines should be relieved of the care of the wedges, as it is almost impossible for a large man to get under one of them when they are out on the road, owing to the small space that he has between the drivers.

There should be suitable rest houses provided at terminals with wash-room, lounging-room and sleeping-room, so that men could take advantage of the time between runs to rest up and be in better condition for the return trip.

The cab roof should be so arranged as to prevent water from running down over the sides of the cab on the crew. It should also be provided with a small swing window on each side to protect the eyes of the engineer or fireman when looking ahead in a storm.

All injector valves should be within easy reach of the engineer or fireman; preferably both injectors on the right side of the engine. The brake valve and throttle lever should be within easy reach of the engineer when looking out of the side cab window. The reverse lever should be located where the engineer could throw it to either extreme without being obliged to get off the seat box. The whistle lever should be within easy reach of the engineer without him being required to stand up to sound the whistle. There should be a hose attachment on the branch pipe of at least one injector to enable the fireman to keep the coal wet and prevent the dust from flying around in the cab. The oil can tray over the fire door should be shaped properly, so as to shade the eyes of the engineer when the door is open. The lubricator should be located far enough from the roof of the cab to give good clearance to the oil can when it is is being filled.

Lubricator feed valves should have a gauge of some kind to enable the engineer to set the feed without counting the drops. The front cab windows should be large enough to permit a man to pass through and should be of a good quality of glass so that an object ahead may be seen clearly. There should be a window located on each side of the cab so that the top of stack can be seen at all times. The grate shaking rigging should be located in the deck of the cab when the grates can be shaken at any time while the engine is running. The steam and air gauges should be placed where the engineer can see them at a glance in daytime or at night. All cab lights should be so arranged as to throw light on gauges and water glass. The engine should be provided with pneumatic bell ringers and sanders.

The tender of a coal burning locomotive should have hoppers of sufficient pitch that the motion of the engine will keep coal within easy reach. The manhole on top of tank should be oblong in order to take water without stopping at exact spot.

On oil-burning locomotives the handles of blower, heater, atomizer and firing valves should be on left side of the cab, where they will not obstruct the room between boiler-head and cab and within easy reach of the fireman on the seat box. Valves for controlling flow of steam to heater box, direct or indirect heater, or to blow dirt out of burner and valve to drain water out of oil tank, should be placed so they can be operated from either the deck of tender or engine. Provision should be made so that brick or any other obstacle that may form in front of the burner can be removed from engine deck.

Levers to side, front or back dampers should be within easy reach of the fireman. One of the best labor-saving devices is the pneumatic fire-door opener. Where ashpans have to be cleaned along the road they should be made with drop bottoms which could be operated from the cab.

Pneumatic Track Sanders.

Some of the defects found in sanders are as follows:

First—Air operating the sanders should be dry and not taken direct from the main reservoir.

Second—Leaks in delivery pipes, unions, sand boxes, nipples when screened into sand traps. Through these the efficiency of the sander is lost in not being able to accumulate pressure in the delivery pipes sufficient to blow out any obstructions.

Third—The quality of sand and the drying and cleaning of same must be given attention. A good quality of well screened dry quartz sand should be used, as sand having dirt in it will bake in the box, traps and pipes and result in stopping them up.

The committee is opposed to all inside sanding apparatus. Sand traps and operating devices should be outside of the box, so as to be easily accessible for cleaning and repairing. Any stoppage with the inside sander requires at least two hours to make repairs on account of having to remove the sand from the box, etc.

The committee finds that about fifty per cent of the failures are due to split and loose pipes; pipes not pointing to the rails, either tending to deliver sand inside or outside of the rail. Thirty per cent due to coal, cinders, waste and other material getting into sand boxes. Ten per cent to defective boxes, allowing sand to become wet, and about ten per cent caused by the sander itself, which is caused by sand working by the check valve in air nozle and plugging it up.

The paper then describes a number of different makes of sanders.

Bell Ringers.

Bell ringers should be adjusted to throw the bell to an angle of sixty degrees, which is easily accomplished by means of an adjusting rod on governor bolt.

When the bell is not working the operating valve in cab should be closed, as packing rings in the bell ringer may leak, allowing the pressure to escape, which is equivalent to a leak in the main reservoir.

This paper was closed with describing a ringer that can be adjusted to use pressure in proportion to the power required.

The Latest Makes of Lubricators, Their Operation and Maintenance.

In presenting this paper Mr. Conger stated that the present lubricators work on the same principal as those of earlier years, namely, that of hydrostatic pressure from a water reservoir located above the oil reservoir which forces the oil out of the oil reservoir past a regulating valve, from which it flows through a chamber with glass sides where the drop of oil is visible, and pipes or passages to equalize the steam pressures in all parts of the cup. He then called attention to the fact that there were many points of difference in the construction of the modern cup which should be understood in order to operate them correctly. In cups made some years ago chokes were used at the openings when the oil passed out of the cup into the oil pipes to keep the steam pressures equalized in the cup.

One prominent maker still retains the choke at this opening and in addition uses a steam chest oil plug with a restricted opening where the oil pipe connects to the steam chest. The choke at the cup that previous to 1899 had an opening through it .046 inch diameter, now has an opening .055 inch diameter. The opening in the steam chest oil plug should be not less than 3-32 nor longer than ⅛ inch. The air pump choke is made with the same sized opening as the one used for the oil pipes leading to the steam chests.

Other makers have located the choke at the steam chest end of the oil pipes; in most cases it is movable or has a variable opening, and consists of a valve that can move on its seat. The use of a choke at the steam chest end of the oil pipes has the effect of maintaining the same pressure in the oil pipes that there is in the cup, whether the engine is shut off and drifting or working steam. This makes the oil pipes a part of the cup as far as the equalization of the steam pressures therein is concerned. With the use of a choke at the steam chest end, whether it is fixed or variable, steam passing through it when the engine is shut off is likely to enlarge the opening, so that they should be examined at intervals.

The old difficulty of the choke getting stopped by foreign matter, such as small particles of coal or waste, is rarely met with. The most radical change in the late design of lubricator is in the shapes and location of the sight-feed and register glasses. The many accidents with the old style of tube glass was responsible for this change. The manufacturers met this difficulty by re-designing the cups and putting in a thick flat or disc glass. With the flat glasses there is not so good a view of the drop of oil as it passes up away from the oil nozzle or feed nipples as with the glass tube. The tube let light in from all sides making it easier to see the drop, besides being able to see it from any direction. With the flat glasses making the two opposite sides of the single feed chamber, the light can come in from only one way towards the observer, so that the drop of oil is only visible when the light shines directly through the chamber. This is no serious objection as long as the glasses stay clean, but it is reported that in many cases the flat glass gets dirty or gummed up on the inside.

With a sight-feed lubricator there is a tendency for the gumming matter in it to attach itself to the sight feed nipple. Observers say that the deposit of gum is more marked when the oil and water are kept at a high temperature. The remedy for cleaning out the gum is a strong solution of lye. If the glasses get gummy put a small piece of strong yellow soap or a piece of soda ash as large as a small bean in the sight-feed chamber.

As it has been proved by tests that a drop of oil passing up through a tube filled with hot water travels at a rate of thirty feet per minute. The necessity of having a good view of the drop in a good light will emphasize the necessity of clean glasses.

In some cases the glass gets rough on its inside face next the water or oil in the cup, so that it affects the passage of light. In some cases the register glasses in the oil reservoir seem to suffer the most, in others the glasses at the sight-feed opening. The manufacturers are at work now locating the trouble and will no doubt be able to inform us as to the cause and remedy.

One of the gratifying improvements generally adopted in the later make of cups is the reduced number of screwed joints and separate parts used. The old cups with separate feed arms contained so many screwed joints that they had a good many chances to leak when put into service.

The later makes of the bulls-eye type have less than half as many parts and most of these parts are so designed that screwing them up to a solid tight joint does not throw them out of line with the other attachments. They are made with better seats at the joints and coarser screw threads so there is less liability of getting them cross-threaded when put back after removal for repairs or cleaning. In general there is a tendency to simplify and make all parts to suit the hard service they now receive on locomotives.

The later makes of cups have much larger steam pipes or equalizing tubes. Most of them are ⅜ inch inside diameter for the cylinder feeds. Larger equalizing tubes are no doubt necessary to maintain full boiler pressure in the oil pipes clear to the steam chest and this requires a larger steam supply pipe from the boiler. Three-quarter inch pipe is now generally used. The supply of steam should not come from a tunnel but from the steam dome direct, so it will be dry at boiler pressure.

In order to operate a lubricator it must first have the entire cup in all its parts clean and free from any foreign substance that will clog up any of the openings or lodge on the seats of the valves and prevent them being tight. The glands and packing around the valve stems must be in such shape that neither steam, water or oil can leap past. This also applies to the glasses, their packing rings or gaskets and the cases that hold the glasses. Do not have any sharp bends or pockets in any of the pipes to trap the water or oil. Keep the spare glasses and gaskets where they will not get damaged. Keep the oil in a covered vessel to prevent coal or particles of waste from getting into it. If the cup is dirty on the inside, blow it out with steam before filling. Fill the oil reservoir full of oil, and in case there is not enough oil, finish out with clean water. Turn the steam at the boiler full on to the cup and be sure the water valve between the condenser and the oil tank is open. The sight-feed chambers should fill up with clear water and the condenser should be full of water before the oil feeds are started. Regulate the supply of oil by the regulating valves.

To clean out the sight-feed nozzles, close the water valve tight, close all the valves under the nozzle except the one that needs cleaning out; then open the drain valve of the oil tank; the contents of the sight-feed chamber followed by steam from the equalizing tube will pass through the nozzle into the oil tank and clean it out. When the sight-feed chamber needs blowing out, close the oil regulating valve and open the drain valve connected to that chamber, blow it out thoroughly and let it fill up again with clear water. Blowing out the sight-feed chamber will not always clean off the glasses. In such a case if the steam can be shut off from that glass, the glass can be removed and cleaned with soap.

To clean out the air pump choke, shut off steam from the cup at the boiler to the cup and the engine, close the water valve and the oil regulating valves to the steam chests. With the oil valve to the pump open when the drain valves to the air pump and sight-feed chamber are open, steam will come back from the pump and blow through the choke.

The Mechanical Stoker.

Mr. C. A. Kraft presented the following paper on stokers:

The Victor Locomotive Stoker is a successor to the Kincaid Locomotive Stoker, which occupied the attention of those interested in railway matters a few years ago. The Kincaid Stoker originated with Mr. John Kincaid, for many years a locomotive engineer on the Chesapeake & Ohio Railway. Its valuable features were quickly recognized by mechanical men and a number of these stokers were placed in operation by several railways.

From a mechanical standpoint, and a standpoint of efficiency, no exception can be taken to the stoker. The difficulties encountered have been almost wholly those bound to be met in the introduction of any new device on a railroad. Prejudice was found in marked degree in this case. It was proven beyond all question that to send one of two stokers to a railway company and have them used by firemen unacquainted with the stoker was neither fair to the Company or to the men operating it. The best machine will not act as desired in the hands of a man who probably had never seen it prior to taking his place on the engine for the run.

An analysis of the Kincaid Stoker shows its failure was due to prejudice or ignorance on the part of the operator rather than to the machine itself. Appreciating this, a number of Cincinnati business men secured control of the Kincaid Stoker, and under the title of "The Victor Stoker Company" have made many changes in the policy heretofore pursued, and a few changes in the mechanism of the stoker itself. Acting upon the principle that the stoker only needs intelligence in the operation, the new company equipped the passenger engines on one division of the Big Four Railway, running between Cincinnati and Chicago, thus insuring to the stoker a man who is acquainted with it.

These stokers have been in operation since Jan. 1, 1905, attached to locomotives with wide fire-boxes and to locomotives with long fire-boxes, used on all classes of passenger service. The result of this work has proven beyond all question that the stoker will do its work efficiently and economically, and that the fireman having once become acquainted with the stoker and recognizing its labor-saving features, becomes its enthusiastic supporter.

Coal is distributed uniformly over the widest type of fire-boxes, with an entire absence of any blow-holes, and the evenness of temperature secured has had a very marked effect on the cost of repairs to the locomotives. The stoker itself does not come in contact with the fire, and as it is strong and simply made the cost of maintenance is very slight. The continuous feeding of coal has a very marked effect upon the amount consumed. Run-of-mine coal is used, but it has been found that a good grade of slack will secure even better results, owing to the principle of feeding coal in small quantities widely distributed. Absence of dense volumes of black smoke is also very noticeable.

An engine coming into a terminal with clean fires, such as are possible with this machine, is not called upon to go to the cinder-pit and dump its fires, but is backed into the roundhouse, where she holds steam for hours, until she is ready to go on her return run.

In the fastest and heaviest runs made, it is found that the steam gauge shows a variation of not exceeding five pounds under ordinary conditions. Practical tests showing the capacity of the stoker have proven that it will feed, under normal conditions, a total of 18,000 pounds of run-of-mine coal per hour. With an unlimited coal-feeding capacity, therefore, and with such mechanism as will allow the fireman to regulate the stoker to existing conditions, the duties of the fireman are very much lessened and he has far more time to give attention to the running of the engine. It brings the fireman to the end of his day's work in a fresh condition, ready for extra duty should a call be made upon him.

By relieving the fireman of the back-breaking, blistering work, railroads are enabled to secure men of more than ordinary intelligence to do the work of firemen, and thus be provided with a high grade of men from whom to promote to engineers.

The stoker consists of the following essential parts, viz.:

First—A main cylinder and a trough in which reciprocates a piston and plunger which, with a variable stroke, throws the coal to the different parts of the fire-box. This variable stroke is given to the plunger by means of a rotary valve to the rear end of the cylinder, and three choke plugs—one for each of the said steam ports.

Second—A small controlling engine. It has been found desirable to place the controlling engine on the boiler head on the fireman's side. This removes the liability of condensation and consequent dryness of engine parts when placed on and below the stoker itself. The steam for the operation of this engine is taken directly from the dome.

Third—A hopper with two spiral conveyors journaled in the bottom of the hopper-pan. The conveyors carry the coal to the front of the hopper onto the apron of the plunger, which, upon the return of the plunger, falls by gravity in front of it, giving a regular and uniform speed. The speed of the conveyors can be increased or diminished by giving more or less steam, as may be required, to the controlling engine. This also increases the number of strokes made by the plunger, but does not affect its velocity or in any manner affect the distribution of coal in the fire-box, the latter being governed by the three choke plugs.

Fourth—A small steam chest containing a rotary valve which regulates the number of strokes made by the plunger. The position of the stoker forming this valve chest is cast in one piece with the main cylinder and has three separate steam ports leading to the rear end of the cylinder for the admission of steam behind the plunger or piston. These steam ports terminate in one common port before entering the rear end of the cylinder; the steam, after reaching this common port, communicates with the rear end of the cylinder, first through a small preliminary port at the end of the cylinder (which also acts in the form of compression by retarding the exhaust on the last portion of the return stroke), and after the piston has advanced a short distance it uncovers the main port, which also leads from the common port, giving free passage to the steam.

A choke plug is placed in each of the steam ports between the valve-sleeve and the common port.

The function of the three choke plugs is to vary the amount of steam reaching the rear end of the cylinder through the various ports and thereby giving a variable stroke to the plunger. The valve operates in a rotary manner, each of the ports stopping fully open in front of its corresponding steam passage in regular succession. Beginning with No. 3 (the port nearest the rear of the stoker), the steam, after leaving this valve, passes through port No. 3 into the common port and the rear end of the cylinder. By choking down this steam port until it is almost closed we get a very light stroke of the plunger, distributing the coal over the grate near the fire-door. The other two operate in the same manner, each taking its respective turn.

They are adjusted so that more steam is admitted on the second stroke than on the third, thus distributing coal over the portion of the grate, and more on the first than on the second, thereby scattering coal over the front end of the grate. By this adjustment of the choke plugs any range of distribution can be obtained that may be desired.

The rotary valve and cylinder are provided with suitable live-steam exhaust ports for the return of the plunger and the exhaust steam from each end of the cylinder. In the front end of the main cylinder is a very small live-steam port, connected directly with the live-steam supply, and its function is to return the plunger after its forward stroke, and also to add volume to the steam retained after the piston has passed over the forward exhaust port, thus giving the desired compression to prevent the piston striking the front cylinder-head. By means of a valve this port can be enlarged to give increased compression necessary when expelling water from condensed steam in starting the stoker when it is cold.

Fifth—The furnace door. Each machine is supplied with a furnace door made to fit the standard door frame of the locomotive to which the stoker is to be attached. The door has an opening to receive the stoker through and is provided with suitable brackets for holding the machine in position.

Cast upon its inner side are curved lugs, which serve the purpose of hinges for a deflector for spreading each charge of coal over the width of the fire-box. The end of this deflector can be raised, if necessary, to aid in the distribution of coal by means of a set-screw directly under its center. It also has a small vertical sliding door for inspecting the fire, and the deflector can be turned up vertically and held in place by a latch to close the opening when the stoker is removed.

Mr. Angus Sinclair says: "My impression of the locomotive stoker is that it is certainly as efficient now as the injector was when we commenced using it, just as efficient as the balance valve was when it was introduced, and as was the case with many other things that might be mentioned if one should think of them all. It is getting to be nowadays that the capacity of the locomotive is the capacity of the fireman to maintain steam. When that capacity has been reached, it is only the part of engineering to get something better, something that will be furnished by power instead of human muscle."

Smoke—When using the stoker the smoke is very much lighter in color, indicating, of course, more thorough consumption of the gasses. The darkest coler, when the stoker is used, is not more than brown, while most of the time the emission from the stack shows pure steam.

Reducing the Work of the Fireman—When the stoker is used the fireman has to raise the coal from the level of the coal-bin of the tender into the hopper of the stoker, a distance of about thirty inches. This is more of a raise than when firing directly into the furnace, but it must be remembered that when the stoker is used the fireman is not required to throw the coal at all. With the coal conveyor in service the labor of raising the coal into the hopper will be entirely dispensed with, and the work of the fireman becomes simply that of an expert in charge of an efficient machine.

Saving in Repairs to Fire-Box—There is no doubt but that with the stoker in use very much less trouble with leaky flues will be found on account of maintaining a more even heat in the fire-box. The sheets of the fire-box will last longer for the same reason. It has been proven that corrugation in fire-boxes is due largely to the changes in the temperature.

Regular Steam Pressure—Where the stoker is used the steam may be kept absolutely constant. This is due to the regularity with which the coal is placed upon the grates, the evenness with which it is placed, and also the fact that the furnace door being closed the furnace is not cooled by the inrush of air.

Service in Which the Stoker will Prove Most Valuable—It is my opinion that on the ordinary American type of engine there is no necessity whatever for the stoker, as the fireman has to be kept on the engine of course and the work is not such that an ordinary man cannot execute with ease. But with the long fire-box type of engine on a long run over a division comparatively free from grades, where the engine is loaded to its maximum capacity all the time, is where we believe the stoker will be found valuable, as a machine will not tire and consequently will enable the engine to carry the maximum pressure all the time and get the full benefit of the tractive power of the engine over a long continuous trip. This cannot be done with the hand-firing method on the type of engine mentioned above where the runs exceed seventy-five miles in length.

We have used the stoker on our large engines, with the fire-box 121 x 41⅝ inches, and used run-of-mine coal over a hundred-mile division, and the engine steamed as well over the last ten miles as it did the first, and went into the terminal with about eight inches of fire on the grate and out again without the engine going over the ash-pit. All that was necessary with this engine at the end of the first thirty miles out of the second terminal was to shake the grates two or three times and the fire was almost as clean as when out of the first terminal. This engine really made two hundred miles without having her fire cleaned and steamed perfectly.

We also tried the stoker on our large engines, fire-box 90 x 75 inches, with the same results and same kind of coal. We at first thought we would have trouble with the square fire-box in keeping the coal in the back corners. By raising the deflector in front this inconvenience was overcome.

There is only one thing necessary to make the mechanical stoker a success, and that is for the railway companies that adopt them to require each and every engineman and fireman to familiarize themselves with the construction of the machine and pass an examination the same as on the air pump; then I will guarantee the mechanical stoker to point in the right direction to economy and a labor-saving device for the firemen, and that the age of flues and fire-box sheets will be legthened by the use of the stoker.

Slide Valve vs. Piston Valve.

Mr. L. S. Allen read an individual paper on the merits of the two kinds of valves.

There are two kinds of piston valves: inside and outside admission. These are modified, some being solid and some hollow. It is this modification that brings about the difference of opinion as to their respective merits.

A great many broken frames and cylinders have been attributed to the piston valve. Mr. Allen firmly believes that if the trouble were looked into more carefully that weak points of construction would be found.

There are about four essential points to be considered in the piston valve over the slide valve, namely—cost, maintenance, steam distribution, and fuel economy.

Cost—There seems to be no question that the first cost of the piston valve is less than the slide valve on simple engines, and where four-cylinder types of engines are used, it takes the place of two valves and reduces the motion to that of a simple engine.

Maintenance—With the piston valve we get a better balance of the valve, which makes it easier to handle and decreases the wear and tear on the motion work. With the increased size of engines and steam pressure, the ordinary D balance valve increases in size proportionately, and while we may balance a slide valve in the same ratio as the valves on smaller engines, the difference in the unbalanced surface increases with the size of the engine and this increases the wear on the valve, link motion and eccentric straps, and increases the work necessary on the part of the engineer to handle the engine. This being a fact, I have experienced a great deal of trouble keeping the valves on our slide valve engines square, while on the other hand we do not experience trouble of this kind with the piston valve until after the engine has been out of the shop for a long while and the parts become badly worn. With the use of the inside admission piston valve we do away with the metallic valve stem packing, which means a great saving, as we only have the exhaust pressure on the packing side, and the fibrous packing answers the purpose and lasts a long while.

With the slide valve on large power we can hardly exceed 25,000 miles before the valves need facing, and ofttimes sooner than that. When this has to be done, it means the loss of the use of the engine for a day at least with a cost of $12.00 to $14.00 for labor, while with the piston valve if the rings are broken or need attention the valve can be removed, new rings applied in from thirty to forty minutes, and the engine is ready for service again. No doubt the question will be asked, "Do the bushings ever wear?" To this I will say, "Yes," but I have never seen a bushing that will not run from shopping to shopping, and they generally run 200,000 miles without reboring, which is nearly always done while the engine is in the back shop.

Another advantage of the piston valve over the slide valve is the accessibility to its parts. When an engine needs its valves reset after running some time, the port marks on the valve stem become obscured, and possibly the man who is about to do the work has a different tram or wants to get different marks on the stem. With the slide valve engine the machinist has to use the block and tackle and raise the covers of the steam chest before he can make his new marks, while with the piston valve he simply has to remove two plugs on each end of the chest leading directly to the edge of the steam port. This means a saving of time, and time is valuable in a busy shop or roundhouse.

How often is it that an engineman will come in and report a blow in the valve! After the machinist has used his block and tackle, raised the cover, examined the valve and then finds nothing wrong, an hour's time has been wasted. Finding nothing wrong on that side of the engine he will undoubtedly go to the other side for the trouble and spend as much time again in raising the other cover. Were it a piston valve these examinations could be made in an hour's time by a machinist and helper.

It is claimed by many that what we gain in the maintenance of the piston valve we lose through the leakage of the packing rings. No doubt, there are some leaks through the packing rings in the valve as they or the bushing become worn; but, on the other hand, how many times are slide valves slightly cut and allowed to run in this condition until they wear themselves smooth again? And while they are wearing themselves smooth the engineer will double the amount of oil to the valves and cylinders to prevent the lever from driving him out of the cab.

Another thing in favor of the piston valve is that there are no steam chests to break or gaskets to leak, and all the oil used goes directly to the valve and cylinder.

It has been claimed by some that the piston valve engines ride very hard, that it is impossible to keep them from pounding, and that they shake themselves to pieces.

There may be several causes for a hard riding engine. In some cases that I have known, hard riding engines charged to piston valves proved to be badly counterbalanced.

Engines set with too much lead will ride hard, or if set too late will cause them to pound.

Again, the cylinder and valve may be poorly designed. If it has too little clearance, with a slide valve when compression takes place the valves can rise from the seat and thus relieve compression; but with the piston valve there is no such relief, and this will cause the piston valve engine to ride hard and may do damage unless proper means are provided for relief.

On the other hand, too much cylinder and valve clearance will cause an engine to pound through not having sufficient compression to balance the reciprocating parts, assuming that the cylinder and valve clearance are right. Then a faulty design of piston valve will invariably cause trouble. The inside admission solid valve acts as a piston for each exhaust and takes up the slack in the valve motion, and increases the lead; this is very hard on valve gears and makes the engine ride hard.

The difference of pressure on the two ends of this type of valve often amounts to over a ton, for the moment after exhaust takes place the outside admission solid valve becomes unbalanced on the admission side as the steam enters the cylinder, and the high pressure at the opposite end takes up the slack and decreases the lead as the valve gear wears.

In the outside admission hollow valve the area of the valve stem unbalances this type to the extent of about 600 pounds at a 200-pound boiler pressure, and always in the same direction which causes the engine to go lame as the gear wears.

Now with the inside admission hollow valve these defects are absent and the valve is so well balanced that it works easily and requires less power from the cylinder to operate than the slide valve. Tests made by the C. B. & Q. Railroad demonstrated that the relative frictional resistance was only about half as much in a piston as in the slide valve.

It is also claimed that the piston valve engine will not run as fast as the slide valve engines. If this is true it is because of faulty design; for an engine intended for fast running the cylinder and valve clearance should be greater than for slow, heavy work. The faster the service the greater should be the cylinder and valve clearance.

Of inside admission piston valves there are two classes, viz.: the solid and built-up types.

The solid valves use snap rings, which must of necessity be light section. When steam gets under these rings of light section it causes them to expand into the ports, and unless the corners are well rounded it may cause them to catch and break the valves or rings, or both.

On the built-up type the rings may have a heavier cross section and the body of the valve may be cut away so that L-shaped rings may be used, which gives a better admission of steam. Then in case it does break it is only necessary to renew the part that is broken instead of the entire valve.

It has also been said that the piston valve engine will not steam as well as the slide valve engine. I can see no reason why this should be so, as it has never been the experience of the writer to find this a fact.

In regard to the lubrication of the piston valve it has been my experience to find the piston valve much easier to lubricate than the slide valve, and where engines have to drift for a long distance it is found to be a good practice to lower the lever in the quadrant to about half way and to admit just steam enough to the cylinders and valves to carry the oil to the walls of the bushings and cylinders. I think the better practice of oiling the piston valve is to carry the oil to each end of the valve, and as the valve travels back and forth the oil goes directly to the wearing parts. This is done by having a bracket pipe leading to each end of the valve bushing from the main oil pipe. Care must be taken, however, not to drill holes in the bushing so that when the valve is standing in exhaust position at full travel the holes will come in communication with the exhause port, because then every time the engine exhausts the oil in the pipe would be carried away with the exhaust steam.

Steam Distribution.—With the piston valve we get a much larger port than with the slide valve, and this large opening gives a better admission and release of the steam to and from the cylinder than can be obtained by the slide valve. However, I have been unable to obtain any indicator cards that are comparative; but where the valve gives such a large port opening, both to the steam and exhaust, there seems to be no question but what we get a better admission and release. It has been claimed by some that the steam is wire-drawn on account of the beveled shape of the valve on the admission side; but the increased area of the port overcomes this, as it does not show on indicator cards taken with this style of valve. The modern packing ring is made in an L shape, which gives at least one-quarter-inch perpendicular opening to the steam port, and helps to give a better admission.

With the slide valve the Allen port was introduced to get a better steam admission, and while this did help at a high cut-off, it is practically of no use in starting. While this supplementary port helps the admission of steam to the cylinder, it has no effect upon the release, and these supplementary ports do not come into play while the engine is exhausting. It is also necessary with the Allen ported valve to have the valves set with considerable negative lead in full gear forward motion on account of the lead increasing so fast as the engine is connected that when it is in the working notch without this negative lead it would have so much lead as to be a detriment. Consequently, while this port is helpful to a certain extent at high speeds it produces an engine very slow to start a train; while with the piston valve this does not occur as the opening is very large in the corner as well as while hooked up.

There were some piston valves built with the supplementary port, but they have never come into general use, and the only slide valve known to me that provides for a double exit as well as the double entrance for the steam is the Wilson valve, which takes care of both. It seems to me that the existence of these various devices demonstrates the recognized importance of giving the steam the greatest opportunity for rapidly entering and leaving the cylinder, the object being to raise the pressure in the cylinder as near as possible to boiler pressure and decrease the exhaust or back pressure, and thus increase the work done by the engine.

With the piston valve we are able to use a shorter steam port than with the slide valve, and as the clearance indicates the area of the port between the valve and piston when on the center, the shorter the port the less the volume of steam to fill from the boiler at each revolution. However, it has not been found practical to use less than six per cent cylinder clearance with the ordinary piston valve.

Another feature of the inside admission valve is the protection to the live steam by being jacketed by the exhaust cavities, thus delivering the steam to the cylinder at a much higher temperature than would be done with the slide valve or outside admission engine. This is a very important point, as the superheated steam is a recognized feature nowadays for economy, and the drier the steam when it enters the cylinders the more work we can get from it.

Fuel Economy.—In regard to the economy of the piston valve over the slide valve in the use of fuel, I cannot say that there is practically any difference or should be any difference, unless it should come about through being able to longer keep the valves square; when they are kept square our men will generally try to work them at the highest point of cut-off consistent with the work to be done. Otherwise they will generally work their engines where they sound reasonably square.

It was the impression at the recent Washington Railway Congress that a fuel economy of about 10 per cent resulted in the piston valve over the slide valve. I am not able to produce any figures that would show this; but in summing the total of my personal experience and investigation I think a great deal of the fuel economy, if there is any, in the piston valve comes about through the fact that most all engines equipped with the piston valve are of recent date and have a more liberal heating surface than was allowed to many of the slide valve engines of earlier date.

I do not wish to convey the idea that all piston valve engines are better than the slide valve engines, but, as I have said before, I think the design of the valve and cylinder has a great deal to do with the performance of the engine, and as I have outlined in this paper the defects of the different types of piston valves, I personally think that there is only one type of the piston valve that will give good results under all conditions, and that is the inside admission hollow piston valve.

Locomotive Injectors, Modern Practice.

Mr. Kneass presented a paper on the above subject illustrating his explanations by means of stereopticon views. He described the changes required by the new conditions of high pressure steam and modern boilers. The paper had diagrams illustrating the limiting temperatures of feed waters. The location of injectors was discussed and the author was in favor of putting them on the back head.

Break-in-Two of Long Trains, Passenger and Freight, at Slow Speeds, When Releasing Brakes and Methods of Prevention.

The causes of break-in-twos, when releasing brakes, may be traced to the method of handling the brakes, to the condition of the draft gear and the brake equipment, to the make-up of the trains, or to the kind of train service. All these causes, taken singly or combined, are such at times as to make a break-in-two difficult, if not impossible, to avoid, when brakes are released at slow speed if the train consists of twelve or more cars in passenger service, thirty or more in freight service. This is especially true of modern trains, since the weight of the cars has increased rapidly without a corresponding increase in the strength of the draft gear.

A modern passenger locomotive has a tractive force of about 30,000 pounds, and is capable of hauling on a level track a train weighing approximately 1,200,000 pounds at a rate of speed of sixty miles per hour or eighty-eight feet per second. To start a train of this weight and work it up to a speed of sixty miles per hour requires a distance of several miles, through which the locomotive must exert its accelerating power, and this, with the average favorable weather conditions prevailing. The distance required to attain high speed is necessarily considerable, because of the small margin of accelerating power which the locomotive has after a speed of thirty miles per hour has been attained.

Taking the resistance which a car or an engine offers to being started at five pounds per ton the total force required to start a train weighing 600 tons will be 3,000 pounds, leaving an available accelerating force of 27,000 pounds. The rate at which the motion can be accelerated will be found by dividing the accelerating power by the total weight of the train, then multiplying the quotient by the acceleration of gravity, 32.2 feet per second. In this case 27,000 divided by 1,200,000 and then multiplied by 32.2 shows that the motion of the train can be increased at the rate of one foot per second at the start. As the motion of the train increases the resistance increases, the tractive force decreases, so that the rate of acceleration is constantly diminishing. If the accelerating power is considered constant and of the same value that it has at the starting of the train, the time required to work the train up to a speed of eighty-eight feet per second will be found by dividing eighty-eight by one. The distance required to attain a given velocity is equal to the acceleration multiplied by the square of the time, divided by two. In this case this gives 3,872 feet as the distance that would be required under the conditions given to attain a speed of sixty miles per hour.

Since the rate of acceleration constantly diminishes from the instant the train is started until it attains the given rate of speed, it is clear that considerable distance is required on a level track to work a heavy train up to a speed of 60 miles per hour. These observations are made for the purpose of enabling us to compare the power of the locomotive in working a train up to speed with that of the brakes in bringing the train to rest.

A train equipped with modern brakes in good condition can, in emergencies, on a level track, be brought to a standstill from a speed of sixty miles per hour in a distance of one thousand feet or less. With the car couplings and draft gear in good condition and all brakes released, it is practically impossible to break a passenger train in two when starting it with a single locomotive, even though the engineer may find it necessary to take all the slack in the train, and then start forward with the throttle wide open and the engine on sand. This is because the maximum tractive effort of the locomotive is less than the car couplings and draft gear can comfortably absorb without danger of breaking apart. If, however, the slack were all taken and a supreme effort made to start the train while the brakes were applied on two or three rear cars it is quite likely that a coupling would part.

This fact is so well known to engineers that they are careful, as a rule, to note whether all brakes are released or not before making a strong effort to start the train; and in the case of starting long freight trains care is generally exercised by them to take the slack out slowly, so as not to break it in two.

Since we have seen that the total accelerating force of the brakes is several times as great as the tractive effort of the locomotive, and the average force of the blows sustained by the couplings is sometimes enormous, it follows that it is absolutely necessary to prevent excessive strains being thrown on the couplings. This can be accomplished if during the release of brakes the head end of the train can be kept from running out or away from the rear end, or if all brakes on the train can be released simultaneously.

The use of chokes on the driver brake triple valve exhaust has proved an efficient preventative of break-in-twos at slow speed. The action of the chokes is to prevent the brakes from releasing too fast, making it more even.

To prevent breaking in two of long passenger trains, then, when releasing brakes at slow speeds, we should place the brake valve handle in release position, leaving it there for eight or ten seconds before returning to running or lap position, in order to make sure that the rear triples are released.

When brakes are released at slow speed and it is not the intention to stop or to make a second application, before opening the throttle the engineer should allow sufficient time for the rear triples to release, then pull the throttle open gradually so as to be sure not to cause heavy shocks to any couplings toward the rear cars.

With long freight trains, the instruction has always been to allow them to come to a full stop before releasing the brakes; if the speed of the train has reduced to ten miles per hour or less, and it does not seem that this instruction can be very well changed unless the locomotive is equipped with the combined automatic and straight air brake, and with this equipment the engineer should not lose sight of the fact that on a train of fifty or more cars considerable time is required to release the rear brakes, and he should not therefore attempt to use steam until all brakes have had time to release; then the throttle should be opened carefully and slack taken out of the train slowly.

Since the combined automatic and straight air equipment is being applied to all freight engines, both old and new, as well as to switch engines, as fast as possible, it seems hardly worth while to consider the best methods of handling when releasing at slow speed, since the straight air brake, fully applied, can hold the slack of the longest train pretty well bunched, and this being true, there should be little or no danger of breaking them in two when releasing at slow speeds. Without the use of the straight air brake release at slow speeds should not be attempted.

However, before closing this paper, I would respectfully draw the attention of the members of this Associa-

At the Start—The "Sappho."

tion to the benefits to be had from the use of the large air pump when releasing brakes. It will provide an ample supply of air at a high driving pressure, which is what is needed to effect quick release of all brakes; and the quicker and more nearly simultaneous all brakes release, the less the chances of break-in-two because of slack running out. Also that the better the condition of the general brake equipment with respect to clean triple valves, uniform piston travel, tight packing leathers, tight brake pipes, hose and couplings, the greater will be the freedom from danger of breaking the train in two when releasing brakes at any speed.

Subjects.

The report of the committee on subjects was as follows:

Mr. and Mrs. A. L. Beardsley and Son and Mr. J. H Shay.

1. Care of locomotive boilers at terminals and in service.

2. Best method of handling locomotives at terminals to reduce delays.

3. Operation and maintenance of lubricators and mechanical devices for oiling cylinders using saturated steam.

4. The future engineman—the best method of increasing his efficiency and raising the standard.

Individual Papers.

1. The Walschaert valve gear—its application, operation and advantages.

Mr. and Mrs. Frank W. Furry, Mr. and Mrs. Mark A. Ross, Mr. and Mrs. J. W. Johnson and Mrs. Benjamin.

Mr. Hubbard Explains the Valve Gear.

Miss Wicklin. Mrs. Thompson, Mr. and Mrs. J. D. Benjamin, Mr. and Mrs. A. L. Beardsley.

2. Oil burning locomotives, types used, methods of operating and difficulties met in their use.

3. The handling of the air brake in passenger service to avoid break-in-twos and discomfort to passengers.

4. Regularly assigned against pooled engines—merits and demerits.

Chicago was chosen as the place for holding the next convention.

The following officers were elected:

President—A. L. Beardsley, A., T. & S. F.
First Vice President—W. J. Hurly, N. Y. C. & H. R.
Second Vice President—A. M. Bickel, L. S. & M. S.
Third Vice President—J. A. Talty, D., L. & W.
Secretary—W. O. Thompson, N. Y. C. & H. R.
Executive Committee—G. H. Horton, "Soo" Line;

C. F. Richardson and Party on Deck.

W. G. Wallace, J. F. Thompson.

Charles F. Richardson, Frisco; D. L. Eubank, C. & O.

The list of exhibits were as follows:

American Locomotive Equipment Co., exhibiting the Wade-Nicholson hollow-arch, and other locomotive specialties.

Webb C. Ball Watch Co., Cleveland, O., exhibited their demagnetized watches.

S. F. Bowser & Co., Ft. Wayne, Ind., exhibited oil storage cabinets, measuring tanks and pumps for oil, a model of the measuring tanks together with blue prints of large installations, including that of the L. & N.

Crandall Packing Co., Elmira, N. Y., exhibited their locomotive air pump and throttle packing.

The Crane Co., Chicago, had on exhibition their safety valves and spring disc globe valves.

Detroit Lubricator Co., Detroit, exhibited a number of sight-feed lubricators, both in section and whole.

The Detroit Seamless Steel Tube Co., Detroit, had a number of samples of tested tubes on exhibition, together with a sample of billet from which the tubes are made. An accident in their mill prevented the visitors seeing the operation of making the tubes.

The Joseph Dixon Crucible Co., Jersey City, N. J., exhibited graphite packing and sheet graphite for gaskets together with a large number of lead pencils.

The Garlock Packing Co. exhibited ring packing for throttles and air pumps and a new metallic packing for piston and valve rods.

Green, Tweed & Co., New York, had on exhibition their famous Palmetto packing.

The International Correspondence Schools, Scranton, had their car on the C. P. R. tracks for exhibition. This car had just been overhauled and made an attractive appearance.

Jenkins Bros. exhibited their Globe valves, air brake packing.

F. McGuire, Detroit, Mich., exhibited a Westinghouse brake valve with retaining attachment and a fuel dump for locomotive tenders.

Michigan Lubricator Co., Detroit, exhibited a number of sight-feed lubricators.

The Steel Mill Packing Co., Detroit, had on exhibition their packings.

The Storrs Mica Co., Oswego, N. Y., exhibited their mica chimneys.

The Traveling Engineers' Boat Ride

THERE was one thing that occurred at the T. E. A. convention which the members and their friends will remember for a long time with kind feelings for the Detroit Lubricator Co. and the Detroit Seamless Steel Tube Co. This was the boat ride to St. Clair Flats and return.

The two companies chartered the steamer Sappho for the occasion which left the dock at the foot of Woodard avenue at 2:30 p. m. with the engineers, their families and friends making a party of about 600 people. The few gentlemen who were not accompanied by ladies sought the smoking room while the large majority sought the upper deck to gaze upon the beautiful scenes along the river. They all felt well rewarded for facing the cold wind all the afternoon and evening, as the scenes along this narrow strip of water are very interesting.

Provision was also made against the appetite usually encountered by the railroad man when he is on smooth water within sight of land. The hot coffee and chicken salad were well appreciated, if one should judge so from the number of helpings asked for and given. Everybody thought it was too cold for ice cream, but when the ladies saw theirs served in the shape of a lily, the temptation was too great to resist. The same was true on the part of the gentlemen when they saw a locomotive built up with white running gear, red cab, chocolate boiler and with fire issuing out of the stack from a taper.

The return trip was made by moonlight, the beauties of which are self explanatory.

An orchestra furnished music on the upper deck and when the visitors got too cool they easily warmed up by keeping step with their partners in the two steps, waltzes and Virginia reel.

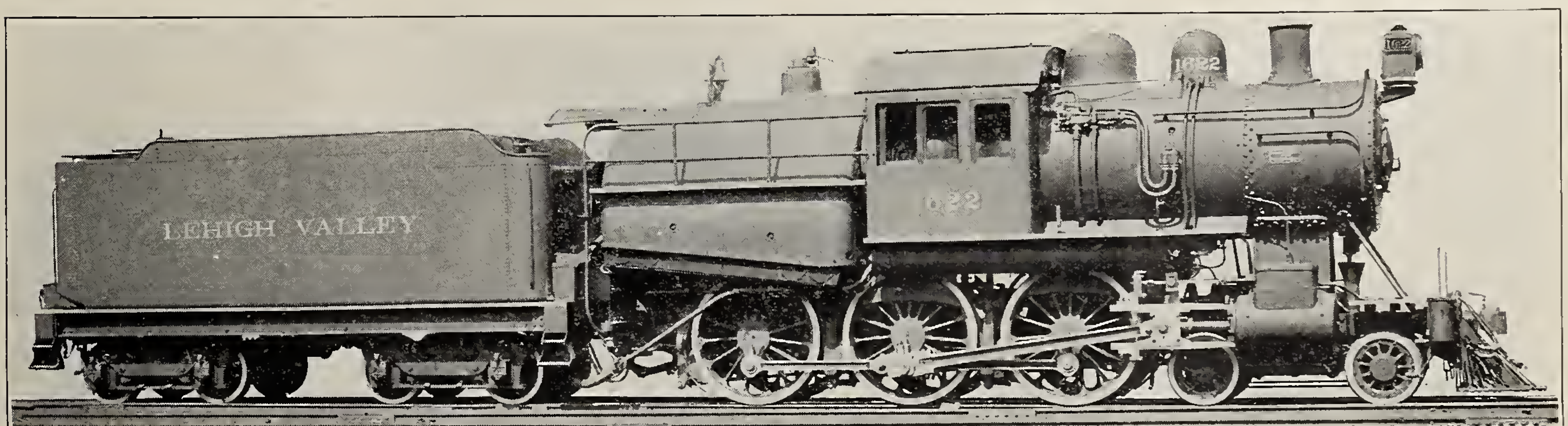
Messrs. H. C. Hodges, president; F. W. Hodges, secretary; C. B. Hodges, vice president and general manager, and A. B. Wetmore, assistant secretary, of the Detroit Lubricator Co., and Messrs. W. C. McMillan, president; T. H. Simpson, vice president; R. H. Phillips, secretary, and George M. Black, treasurer, of the Detroit Seamless Steel Tube Co., were the parties directly responsible for the joyable occasion.

Lehigh Valley Ten-Wheel Locomotive

THE American Locomotive Company has built an order of ten-wheelers comprising a lot of ten, at their Schenectady works, for the Lehigh Valley road, the fuel for which is fine anthracite. They are of the simple slide valve type and have a starting power of 31,400 pounds with their boiler pressure of 205 pounds, the cylinders being 21x28 inches, and the drivers 68.5 inches in diameter. The boiler is high in order to have clearance between the grate and wheels, being 9 feet 8¼ inches from the center line to the rail.

The heating surface is liberal, there being 3,084 square feet in the tubes and 200 square feet in the firebox. The boilers are radial stayed, with two rows of sling stays at the front. The firebox is stayed with Tate flexible staybolts at the throat sheet and also at the side sheets, at which point four rows extend up from the foundation ring, and four rows at each end extend up to the full height of water space staying, taking in the critical points of the firebox. The valves are actuated from the links by transmission bars which span the forward axle and pass to the rockers in a horizontal plane, putting all stresses in a right line. As our half-tone shows, these engines are typical fine anthracite burners, while the descriptive specification below gives important general particulars, conveying the fact that these engines are well suited to either passenger or freight service.

Cylinder, type, simple slide valve; diam., 21 ins.; stroke, 28 ins.
Track gauge....................................4 ft. 8½ ins.
Wheel base,
driving, 13 ft. 4 ins.; rigid, 13 ft. 4 ins.; total, 25 ft. 4 ins.
Wheel base, total, engine and tender...........57 ft. 1¼ ins.
Weight, in working order, 199,200 lbs.; on drivers, 150,200 lbs.
Weight, in working order, engine and tender......351,100 lbs.
Heating surface, tubes........................3,084.26 sq. ft.
Heating surfaec, firebox.......................199.98 sq. ft.
Heating surface, total ....3,284.24 sq. ft.
Grate area ....85.08 sq. ft.
Axles, driving journals, main ....10x12 in.; others 9½x12 in.
Axles, engine truck journals ....diam. 5½ in.; length 10½ in.
Axles, tender truck journals ......diam. 5½ in.; length 10 in.
Boiler, type .... Straight top
Boiler, O. D. first ring ....69⅝ in.



LEHIGH VALLEY TEN-WHEEL ANTHRACITE BURNER.

Boiler, working pressure	205 lbs.
Boiler, fuel	Anthracite pea or finer
Firebox, type	Wide
Firebox	length 120⅛ in.; width 102 in.
Firebox	thickness of crown ⅜ in., tube ½ in., sides ⅜ in., back ⅜ in.
Firebox, water space	front 5 in., sides 3½ in., back 3½ in.
Crown staying	Radial
Tubes, material	Charcoal iron; No. 378; diam. 2 in.
Tubes	length 15 ft. 8 in.; gauge No. 11 B. W. G.
Boxes, driving, main	Cast steel; others, cast steel
Brake, driver	Westinghouse American
Brake, tender	Westinghouse; air signal, Westinghouse
Brake, pump	9½ in. L. H.; 2 reservoirs, 16x142 in.
Engine truck	4-wheel, W. I. frame, swing bolster
Exhaust pipe	Double nozzles 3½ ins., 3⅝ ins. and 3¾ ins.
Grate, style	Transverse rocking in six sections
Piston, rod diam.	4 in.; piston packing, 2 C. I. snap rings
Smoke stack, diam.	18 and 19 ins.; top above rail, 15 ft. 2½ ins.
Tender frame	13 ins. steel channels with ½-in. web and steel plates
Tank, style	U shape water bot. with gravity slide
Tank capacity	7,500 gallons
Tank capacity, fuel	12 tons
Valves, type.	Richardson Bal.; travel, 5¾ ins.; steam lap, 1 in.
Valves, ex., C. L.	⅛ in.
Setting	1-32-in. lead in full gear F. & B.
Wheels, driv. diam. outside tire,	68½ ins.; centers diam., 62 ins.
Wheels, driv. material	main, C. S.; others, C. S.
Wheels, engine truck, diam.	33 ins.; kind, Paige C. I. spoke
Wheels, tender truck, diam.	36 ins.; kind, Paige plate

New York Railroad Club

At the opening meeting of the New York Railroad Club on September 15, a paper was read by John Livingstone of the Falls Hollow Staybolt Company, the title of which was "The quality and utility of solid, flexible and hollow staybolts in iron and copper." The author of the paper took as the basis for his subject, the results of his observations during an extended trip through the country in pursuit of the methods of various roads in staying fire-boxes. The paper touched upon the various types of staybolts in use, and in connection with the hollow staybolt conveyed the information that the idea was about thirty years old, having been first applied to engines on the International & Great Northern R. R. With reference to the use of copper staybolts and fire-boxes, experiments conducted in Mexico had not been productive of results that would warrant their use. The paper claimed that no truly flexible staybolt had yet been used, and if the needed flexibility of such bolts did not develop in use, their greater cost, as well as the larger holes necessary in the outer fire-box sheets, were factors that would militate against their use. Material entering into the make-up of staybolts could not receive too serious attention, and should be bought only under the most rigid specifications. The iron should be thoroughly worked, and the material used be selected free from phosphorous, sulphur or scrap, which will cause doubt as to the integrity of the material. The weight of evidence gathered during the trip of the author, was found to be in favor of the hollow staybolt, rather than the drilled, the flexible, or the solid bolt.

In the discussion that followed, Mr. Desange said that since incrustation had the effect of plugging the holes in staybolts, the hollow or tell-tale hole should be larger than that used at present, say, one-half inch diameter. Professor Hibbard in his remarks said that the many boiler inspectors he had conversed with on the subject of staybolt inspection by the hammer test were in favor of such tests, though the master mechanics' report of 1897 showed that the hammer test for staybolts was not a reliable means to detect broken bolts. The professor called attention to the fact that F. W. Webb had made experiments on the London & Northwestern Ry., in which a temperature of 750 degrees was found in staybolts at a distance of one-half inch from the fire-end. The practice of forcing fires in this country would no doubt increase this temperature, and to an extent that might be sufficient to cause a movement of two-tenths of an inch at the back and front of the fire-box, resulting from a difference of perhaps 500 degrees in the temperature of the inner sheets. The speaker also referred to vibratory tests made at Cornell which indicated the weakening effect of necking due to the increased fibre stress, the same tests showing that lengthening of the bolt increased its power to withstand vibrations. The experiments made on the Lackawanna road with different staybolt spacing was also referred to, in which fifteen fire-boxes were stayed in the usual manner, and fifteen had staybolts put in spaced at one-half of the usual centers. Observation of results thus far obtained, showed that the ordinary spacing was responsible for 365 broken bolts, while the close spacing had shown but 47 failures.

The opinion was advanced by Mr. McIntosh that no truly flexible staybolt has been designed, though his experience with staybolts of this kind had been satisfactory. The hammer test will not detect partially broken staybolts, but tell-tale holes will reveal practically all failures. Mr. Henderson was of the belief that the author of the paper should have made a distinction between the value of the hole and the material in the bolt. He was of the opinion that it was possible to make a solid bar of as good material as could be put in a hollow bar. He expressed doubt as to the high temperature cited by Professor Hibbard, and mentioned some tests made by himself, in which steam was drawn through a gage cock from a point one-eighth of an inch from the side sheet of a firebox, while water was found three-eighths of an inch from the sheet when the engine was working. He was of the belief that the foaming of alkali water was responsible for keeping the water away from the side sheets when the throttle was open. Mr. West gave it as his opinion that the quality of staybolt iron has been greatly improved. Flexible staybolts on his road are giving the best of service, but it has been found that boilers should not be stayed with alternate rows of solid and flexible bolts, for the reason such an arrangement imposes too great a strain on the solid bolts, which causes rapid destruction. Mr. Minshull stated that on the Ontario & Western, by applying the hammer test with 100 pounds air pressure in the boiler, it was possible to detect many partially broken bolts.

Master Car Builders' Standards

SECRETARY TAYLOR announces the result of the letter ballot on standards of the M. C. B. Association, as follows. The following were adopted:

Addition of rib inside oil-box lid.
Clearer definition of location of safety appliances.
Specifications for air-brake hose.
Advancement of coupler specifications to standards.
Worn coupler limit and wheel defect gage standard.
Additional coupler dimensions M. C. B. sheet 11.
Omission of "tail end for continuous draft," sheet 11.
Modification of uncoupling rod bracket.
Securing stake pockets.
Use of malleable iron stake pockets.
Location of stake pockets.
Temporary stake pockets.
Special design of couplers.
Knuckle throwing device.
Location of lock lift.
Butt for 5x7-inch coupler shank.
Withdrawal of design for attaching coupler to cars.
Spacing between steel center sills.
Front and back draft stops.
Spacing between coupler horn and buffer beam.
Designs of yokes for spring and friction gears.
Specifications for followers.

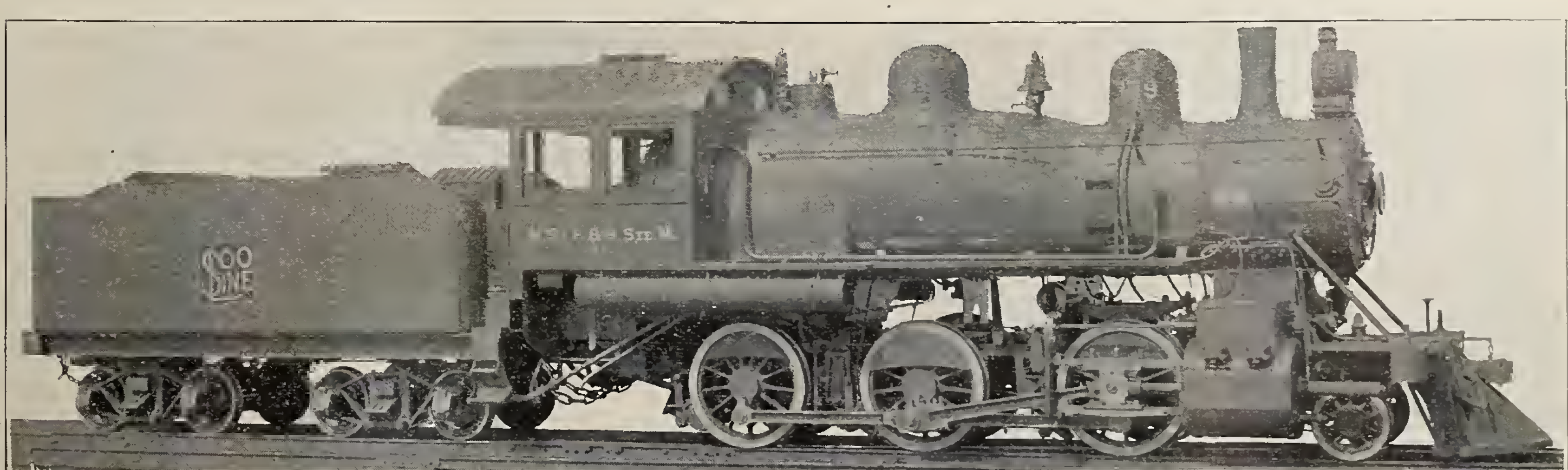
In some cases the negative vote was large, but did not quite defeat adoption. The following were rejected:

Elimination of inside dust guard.
Substitution of wrought for malleable iron wedges.
Distance between brake heads.
Permanent stake pockets.
Spacing between wood center sills.
Distance between front and back stops.

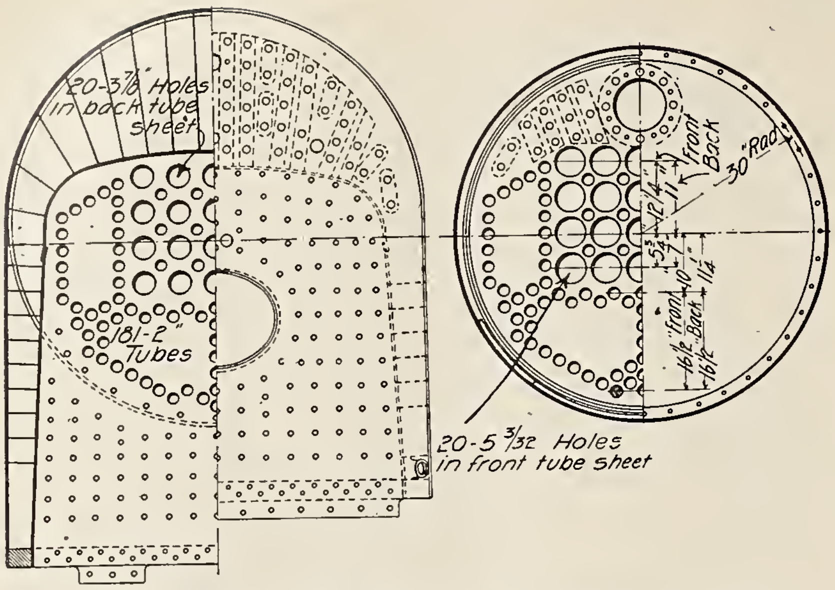
Compound Mogul With Superheater--M., St. P. & S. St. M. Ry.

A TWO-CYLINDER compound mogul engine equipped with a superheater has been delivered to the "Soo" road from the Schenectady works of the American Locomotive Co., and is now in service in the alkali district of the road in North Dakota, in competition with other engines of the same type but with no superheater. The superheater of this engine is of an improved form over those in use on former engines on the road, having a different disposition of tubes, which in this case number 20, five inches in diameter and each containing four small tubes. In the space between the large tubes there are twelve two-inch fire tubes. The experience of the Soo road with superheaters has been of a most satisfactory character in use with compounds, which type of engine has always been popular on that road. The test of the superheater with water strongly impregnated with alkali, will be a crucial one for that device, since if it can operate successfully in such water, there are no water difficulties it cannot surmount. In this delivery was also a mogul similar to the above, but without a superheater, the superheater engine being indicated in the following descriptive specification by underscored data, from which it is seen that the superheater adds about 4,000 pounds to the weight of the engine. They are not powerful machines, as modern engines for freight service go, having a maximum drawbar pull of only 26,600 pounds, since they are to work in a practically level district.

Cylinder, type, Schenectady Comp.;
....................diam, 21 and 32½ ins.; stroke, 26 ins.
Track gauge, 4 ft. 8½ ins.; tractive power.........26,600 lbs.
Wheel base, driving,
..........14 ft. 0 in.; rigid, 14 ft. 0 in.; total, 21 ft. 7 ins.
Wheel base, total, engine and tender...........50 ft. 10¾ ins.
Weight, in working order, 149,000 lbs.; on drivers, 123,200 lbs.
*Weight in working order, 153,000; on drivers, 126,300 lbs.
Weight, in working order, engine and tender.....264,200 lbs.
*Weight in working order, engine and tender....268,200 lbs.
Heating surface, tubes, 1,440.15*..............1,706.10 sq. ft.
Heating surface, firebox, 142.77*................142.58 sq. ft.
Heating surface total, 1,582.92*................1,848.68 sq. ft.
Heating surface, superheater....................259.97 sq. ft.
Grate area....................................38.96 sq. ft.
Axles, driving journals, main, 9½x10 ins.; others, 8½x10 ins.
Axles, engine truck journals, diameter. 6t ft.; length, 10 ft.
Axles, tender truck journals ....diam. 5½ ins.; length 10 ins.
Boiler, type, Ex. W. T.; O. D. first ring...............60¼ ins.
Boiler, working pressure, 200 lbs.: fuel......bituminous coal.
Firebox, type, wide; length, 90⅛ ins.; width.........62¼ ins.
Firebox, thickness of crown,
............⅜ in.; tube. ½ ins.; sides, ⅜ in.: back, ⅜ in.
Firebox, water space, front, 4 ins.: sides, 4 to 6 ins.; back, 4 ins.
Crown staying ....Radial.



TWO-CYLINDER COMPOUND MOGUL, M. ST. P. & S. STE. M. RY.



FLUE SHEETS, "SOO" MOGUL LOCOMOTIVE, WITH SUPERHEATER.

Tubes, material, charcoal iron No. 266; diamater.......2 ins.
Tubes, length, 12 ft. 4 ins.; gauge............No. 11 B. W. G.
*Tubes.........length, 12 ft.; gauge, No. 11 B. W. G. for 2 in.
Boxes, driving, main, C. S.; others.......................C. S.
Brake, driver.................West. Amer. Auto. and St. Air.
Brake, tender..............Westinghouse Auto. and St. Air.
Brake, pump ....2 ft. 9½ ins.; two reservoirs 18½x96 in.
Engine truck.......2-wheel W. I. frame, swing cen. bearing.
Exhaust pipe, single nozzles...............4¾, 5 and 5¼ ins.
Grate, style................Rocking to shake in four sections.
Piston, rod diam., 3½ ins.; piston packing.........C. I. rings.
Smoke stack,
.....diam., 14 and 16½ ins.; top above rail, 14 ft. 8⅝ ins.
Tender frame.................10-in. steel channel and plates.
Tank, style...........U shape with straight sides and collar
Tank, capacity...................................6,000 gallons.
Tank, capacity, fuel......................................10 tons.
Tank, H. P. piston..............................H. P. 1¼ ft.
Valves, type ....
.......L. P. Allen Richardson 6-in.; steam lap, L. P. 1-in.
Valves, ex. lap...............................inside cl., ¼ in.
I. P. & L .P. Line & line ford, ¼ in. lead at ½ stroke (L. P.)
Wheels, driv. diam., outside tire, 55 ins.; centers diam., 48 ins.
Wheels, driving material, main, C. S.; others............C. S.
Wheels, engine truck,
.......diam., 30 ins.; kind, Allen No. 7 C. I. spoke center.
Wheels, tender truck,
diam., 33 ins.; kind, 700-lb. cast iron doub. plate chilled.

*Superheat engine.

The Hatchet Planimeter

Arthur B. Allen.*

It is a singular thing that the hatchet planimeter has not come into general use instead of the more elaborate and costly instruments commonly employed, for it is capable of a very high degree of accuracy, cannot get out of order, and is most simple to make. The present writer has, for example, made a first-rate instrument out of an old steel spindle, with the aid of such tools as are to be found in the abode of any engineer, bending the steel, as seen in Fig. 1, in a gas flame. There is no reason, therefore, why everyone should not be equipped with a planimeter of this type.

*The Engineer of July 15, 1905.

To make it, all that is required is a steel rod about 15 or 16 inches long, and perfectly tapered toward both ends—the steel spindles used in cotton mills are just right for the purpose, being 16 inches long, 5-16 inch diameter at the thickest part, and nicely tapered both ways to about ⅛ inch. Usually the planimeter is made with two short legs of equal length, but the writer finds it a very great improvement to make the pointed end about four inches long to facilitate manipulation in tracing round the diagram. Of course tapered spindles are not essential; a plain steel rod will do quite well.

First file up the thinner end to a long point, and then finish the latter to a fairly sharp, but not too sharp, point to serve as a stylus, taking care to keep the shape true and symmetrical. A hone is the best tool for nicely finishing the stylus. Next bend the pointed end through rather more than a right angle, allowing such a length that the height over all is 4½ inches when the point is upright. Then bend the other end somewhat less than a right angle, exactly parallel with and on the same side as the former, allowing a length of about 1½ inch. This end must now be filed and finished to a sharp hatchet edge, slightly curved, with the line of the edge passing through the point first made. True alignment is important, and can be fairly well accomplished by guiding the point in the same plane as that of the surface of the hone when applying the finishing touches. The last operation consists in accurately adjusting the distance from the point of the stylus to the center of the hatchet edge to 10 inches, by slightly bending the steel more or less at the angles. The length of 10 inches is preferable for general work, not only because it is a handy length, but also because it reduces the arithmetic. Five inches or any other convenient length may be taken if preferred.

Having completed the instrument, the method of using it is shown in Fig. 2. Fix the diagram on a flat board, such as a drawing board or table, and pin down also a sheet of smooth paper (preferably on the further side of the diagram) at such a distance that the hatchet edge will not run off the paper when tracing around the diagram with the stylus. Guess the position of the center of gravity of the diagram and draw a line from it to the boundary of the latter. Then place the stylus on the assumed center of gravity, and gently press the hatchet so as to make a slight indentation in the paper. Now, without lifting the planimeter, trace round the diagram with the stylus, finally returning to the starting point; when this is reached, again press the hatchet so as to mark the paper. Without lifting the plainmeter,

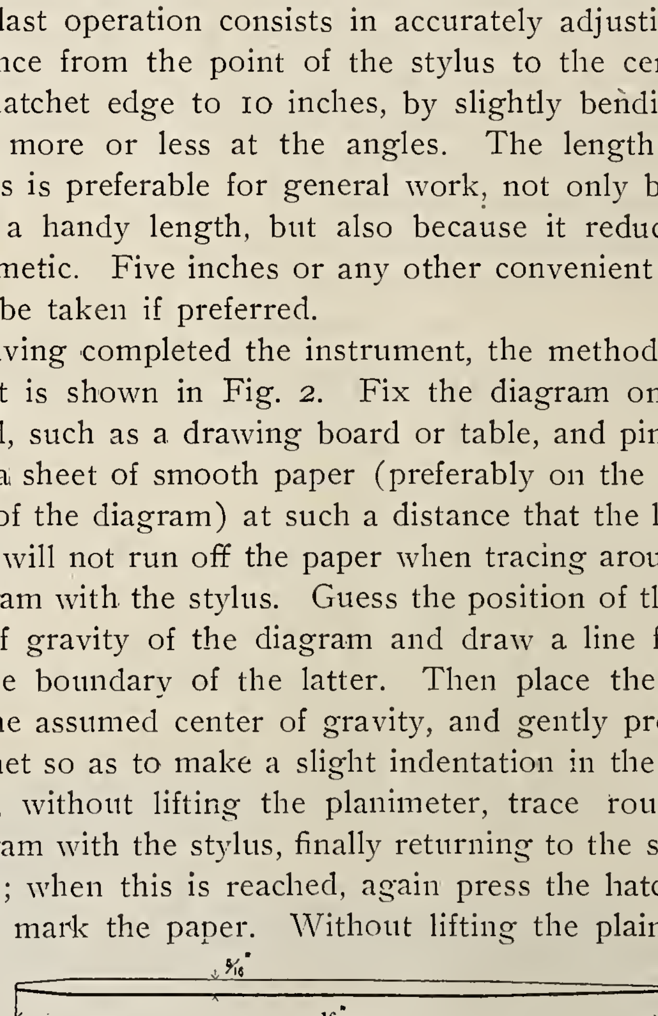


FIG. 1—THE HATCHET PLANIMETER.

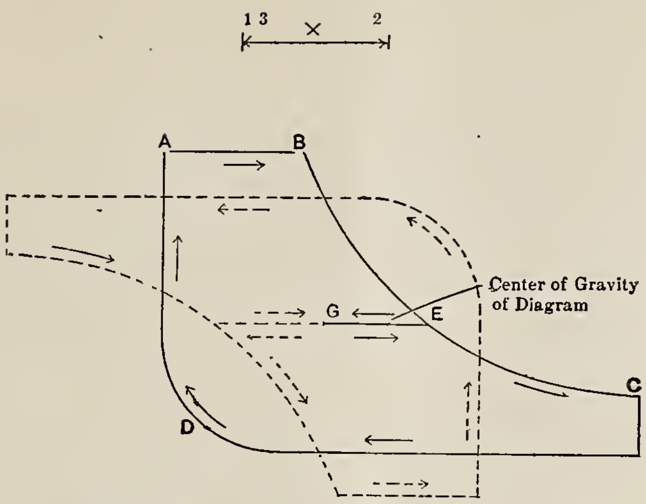


Fig. 2—Method of Using Hatchet Planimeter.

and keeping the point pressed down on the diagram, rotate the diagram through about two right angles, fix it, and again trace around its boundary, but this time in the opposite direction. Finally, after having returned to the center of gravity, press the hatchet into the paper for the third time.

There will be three marks, as shown in Fig. 2, at 1 and 3 and 2. Measure the distance between the distant mark and the mean of the other two as accurately as possible with a pair of dividers, and multiply this distance by the length of the planimeter; the result is the area of the diagram. From this the mean height can be found by dividing the area by the length of the diagram.

It is to be noted here that starting from the center of gravity of the figure or diagram is essential to success; if this is not done, serious errors will be incurred, rendering the measurement quite useless. Rotating the diagram through two right angles and going round it in the opposite direction, is done in order to correct for the inaccuracy of the original guess of the position of the center of gravity. But it is not always sufficient to make this correction. It is not easy to make the hatchet edge exactly in line with the stylus; this error can be detected by placing the hatchet and stylus on a penciled straight line, and drawing the stylus along the line, when the hatchet edge will be found to gradually run off the line unless the alignment is perfect. On account of this the writer finds it preferable to trace around the diagram in each direction before turning it round, and again after doing so. This gives four values for the displacement of the hatchet, the mean of which is taken with the dividers.

The latter measurement is important, as any error in its determination reappears in the result; it is best made, therefore, with a pair of fine dividers, and read off on a diagonal scale in, say, 0.04 of an inch. When a 10-inch planimeter is used, and the area of the diagram is small, the displacement of the hatchet is also small, and in this case a great increase in accuracy can be obtained by going round the diagram several times in one direction, then the same number in the other, and dividing the result by the number of times. By using a short planimeter, the displacement of the hatchet is proportionately increased; and if the length of the planimeter is the same as that of the diagram, the mean height of the latter is given at once by the displacement of the hatchet; the writer, however, prefers to use the 10-inch instrument for all purposes, and thinks that a shorter length than 5 inches should not be used.

By adopting the precautions described above, with a carefully made planimeter, an accuracy of 0.5 per cent is easily obtained, and this is usually a higher degree than necessary, for few diagrams are reliable to one per cent. The process appears far more complicated than it is in reality in fact, it is extremely easy and simple.

In conclusion, it is important to observe that the paper on which the hatchet works is hard and smooth; that the planimeter is held upright while tracing, and that the point accurately follows the boundary of the diagram. This, of course, applies equally to all planimeters. If at the first attempt a high degree of accuracy is not attained do not be in a hurry to blame the instrument; a planimeter needs practice, like any other measurement, before accuracy can be assured. It is a good plan to draw a right-angled triangle or a rectangle of dimensions similar to those of the diagrams to be measured, ruling in the lines with a hard pencil until there is quite a distinct groove, in which the point of the planimeter will run without deviation; then trace this repeatedly in one direction and then in the other, and measure accurately the displacement of the planimeter hatchet each time. If the hatchet and point are in correct alignment, and the lines are closely followed, the displacement will be exactly the same no matter which way the point goes round the diagram; and if the start is always made from the center of gravity the result will be independent of the position of the diagram. The hatchet should be fairly sharp, and curved to a radius of about 1/8 inch.

Wreck on the New York Elevated

THE worst accident in the history of the Manhattan Elevated road, and the only one in the thirty years the road has been operated, in which any car composing its trains, has ever went off the elevated structure into the street below, occurred on the morning of September 11th. The accident caused the death of fourteen persons and the injury of more than forty, and was due to the Ninth avenue train taking the Sixth avenue curve at Fifty-third street, where the two systems join. Through the failure of the motorman to observe that the signal was set against the Ninth avenue line, the train reached the curve at about twenty miles an hour, the motor car and train entering the curve in safety, but the second car left the rails, and breaking away from the train dashed to the street. It was in this car that all the casualties occurred, the car turning completely over and end for end. The wreck was only saved from added horrors by the breaking of the couplings, which if they had held would have dragged the remaining five cars down into a splintered mass. The switchman who failed to give the train the proper track is under arrest, but the motorman who failed to have his train under control at the most dangerous point on the line, has been missing since the occurrence.

The Brooklyn Navy Yard

THE Brooklyn navy yard is still in the throes of activity due to the work on the battleship Connecticut, which is now about 80 per cent completed. There are some heavy tools now in commission, among which is a ten-foot vertical boring mill built there in which the cylinders of the Connecticut were bored. This tool is a fine piece of mechanism in design and finish. There is also a 110-inch lathe built by Bement & Niles for crank shaft work, having double tool heads and taking 30 feet between centers. Besides this there is a 72-inch swing lathe built by the Putnam Machine Co., which will operate over a length of 75 feet. Among the planers is a ten-foot Sellers machine with a diagonal screw drive, which is as silent and smooth in its removal of stock on those giant jobs as a sewing machine. There is also a Pedrick & Harvey ten-foot open side planer which handles monster jobs of unusual shape.

The exhibition of the inventive faculty seen in the vertical boring mill for cylinders is evident in the horizontal lathe devised for turning and facing the foundation rings on which the turrets of the battleships are carried and revolve. The scheme is of the simplest kind to accomplish such important results, being equivalent to a lathe of 20 feet swing. The concrete shop floor is utilized for a base on which to let in slotted castings, to which the ring segments are bolted at a diameter equal to the turret. At the center of the circle formed by the ring is the power mechanism which consists of a heavy vertical post carrying an arm whose length is equal to the work's diameter. This arm has a cutting head at each end, one of which faces or bores, while the other turns. The power is furnished by an electric drive. When the facility of chucking and the low cost of construction of such a tool is considered when compared to a lathe of like capacity, one is impressed with the fact that it is the real thing for the work.

Personals

Mr. John Watson has resigned as master car builder of Nelson Morris & Co., at Chicago.

Mr. E. Madden has been appointed road foreman of engines of the Southern at Selma, Ala.

Mr. A. S. Arey has resigned as general foreman of the shops of the Boston & Maine at Salem, Mass.

Mr. R. Mallen has been appointed road foreman of engines of the B. & O. S. at Chillicothe, O., in place of W. B. Gallivan, deceased.

Mr. J. M. Slater has been appointed chief draughtsman of the Wabash, with offices at St. Louis, Mo., vice Mr. A. R. Baldwin, resigned.

Mr. P. J. Harrigan, formerly general foreman of the Baltimore & Ohio at Connellsville, Pa., has been appointed master mechanic at that point.

Mr. W. A. Mitchell has been appointed master car builder of the Missouri, Kansas & Texas, with offices at Sedalia, Mo., to succeed Mr. H. A. Bowan, resigned.

John H. Davis, master car builder of the Atlantic Coast Line from March, 1884, to February, 1900, died on Aug. 17 at Wilmington, N. C., at the age of 46 years.

Mr. H. H. Hael has been appointed assistant master mechanic of the Grand Rapids district of the Pere Marquette, with offices at Grand Rapids, Mich.

Mr. C. J. Bushmeyer has been appointed acting master mechanic of the Denver, Enid & Gulf, with headquarters at Enid, Okla., to succeed Mr. W. E. McEldowney, master mechanic, resigned.

Mr. F. H. Riley has been appointed general foreman of roundhouse and repair shops of the Chicago & Eastern Illinois at Terre Haute, Ind., to succeed Mr. Curtis A. Weiser, resigned.

Mr. W. J. Haymen, heretofore division master mechanic of the Missouri Pacific at De Soto, Mo., has been appointed superintendent of motive power of the Detroit, Toledo & Ironton.

Mr. C. O. Tulloch, foreman of repair shops and roundhouse of the Louisville & Nashville at West Knoxville, Tenn., has been appointed general foreman of shops of the Central of Georgia at Savannah, Ga.

Mr. H. B. Hunt, who recently resigned as assistant mechanical superintendent of the Erie, has been appointed general inspector of the American Locomotive Co., with offices at Schenectady, N. Y.

Mr. C. B. Sumers has been appointed road foreman of engines of the St. Louis division of the Toledo, St. Louis & Western. Mr. M. Marea has been appointed road foreman of the Toledo division, including Frankfort, Ind.

Mr. F. W. Williams, whose resignation as division master mechanic of the Delaware, Lackawanna & Western at Buffalo, N. Y., became effective on Sept. 15, has been appointed superintendent of works of the Leslie Company, Lyndhurst, N. J.

Mr. J. H. Eaton has been appointed master car builder of the Western Lines of the Canadian Pacific, with offices at Winnipeg, Man. Mr. W. A. James has been appointed engineer in charge of the grade revision and double tracking from Fort Williams to Winnipeg.

Mr. Carl A. Strom, of Chicago, who resigned the position of mechanical engineer of the Illinois Central to become mechanical engineer of the Isthmian canal commission at Panama has been promoted to become superintendent of motive power and machinery of the Panama canal.

Mr. Geo. Durham, formerly traveling engineer of the

Louisville & Nashville, at Corbin, Ky., has been appointed general foreman of repair shops and roundhouse at West Knoxville, Tenn., in place of Mr. A. Feathers, who has been transferred to Corbin, Ky., as general foreman of shops and roundhouse.

Mr. A. S. Grant, formerly division master mechanic of the Missouri Pacific at Sedalia, Mo., has been appointed master mechanic of the Missouri division with headquarters at De Soto, Mo., vice Mr. Haymen resigned. The jurisdiction of Mr. L. Bartlett, master mechanic, has been extended to cover the entire eastern division, the Illinois division, the St. Louis terminals, with headquarters at St. Louis, Mo.

Mr. A. W. Nelson has been appointed division foreman of the St. Louis & San Francisco at Beaumont Junction, Kan., succeeding Mr. William Gibson, who has been transferred to Cape Girardeau, Mo. Mr. J. E. Brooks has been appointed acting general foreman at Monett, Mo., succeeding Mr. Frank Burns, assigned to other duties. Mr. Geo. E. Oliver has been appointed general foreman at Ft. Scott, Kan.

William P. Appleyard, superintendent of equipment of the Pullman Company, was run over and killed by a train on the Illinois Central at the Sixty-third street station on Tuesday night, Sept. 19. He had gone to the station to meet his wife, who was coming from the east on a Michigan Central train and was run down by a train on another track. Mr. Appleyard was 48 years of age and entered the service of the Pullman company about 20 years ago. He left that company in November, 1895, to become master car builder of the New York, New Haven & Hartford, and resigned the latter position in January, 1904, to return to the Pullman company as superintendent of equipment. Mr. Appleyard was chosen president of the Master Car Builders' Association in June, 1904, serving until June of the present year. His portrait was published in the Railway Master Mechanics in July, 1905.

Modoc Car Cleaner

We desire to call the attention of our readers to page 16, showing forth the magnificent plant of The Henry Roever Company, of Chester, Pa., successors to the Modoc Soap Company, formerly of Cincinnati, Ohio, and manufacturers of the famous and world renowned Modoc Car Cleaner.

This company is equipped in buildings and machinery and location as no other company is equipped making a car cleaner. With its splendid machinery, up-to-date buildings and first-class location and shipping facilities combined with the quality and price of Modoc cear cleaner, it is in position to give better and more satisfactory service than any company making a cleaner.

It uses the best and purest materials in the manufacture of its cleaner and at a reasonable price and succeeds in giving the most and best for the least money. Modoc car cleaner is the pioneer and most successful of all car cleaners.

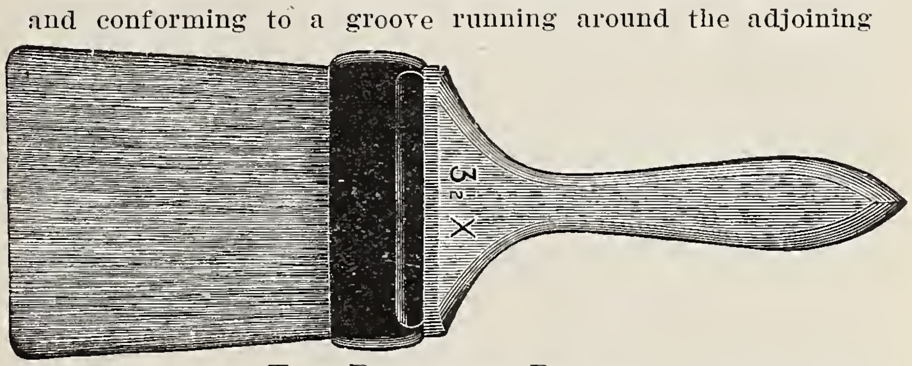
If you have not tried it send for a sample, which will be cheerfully furnished on application and large enough for a fair test.

Dependable Hydraulic Jacks

Unless a hydraulic jack is absolutely reliable, the engineer, mechanic, railroad man or whoever is using it is better without it. Just at the critical moment, when everything depends on a jack "standing up," a poorly made device is liable to give way. The consequences are best left to the imagination, they are not pleasant even to imagine. In the Watson-Stillman hydraulic jacks, every such element of uncertainty is eliminated, hence the confidence reposed in them by those who have to trust life and limb to the dependability of a hydraulic jack. The cylinders and rams for which, in some makes, so-called seamless tubing is thought good enough, are in the Watson-Stillman jacks forged from solid steel billets, forged and bored like the cylinder of a high-class steam engine. Valves, glands, pistons, etc., are made and finished with equal care, packings and other parts subject to wear are easily accessible and replacable, the result being a hydraulic jack so thoroughly dependable and constantly ready for service that it holds first place among this class of tools. The manufacturers, Watson-Stillman Co., 46 Dey street, New York, have a list of about 300 styles of hydraulic jacks, which they will send on request.

The Rubberset Brush

The history of the paint and varnish brush is one long record of failure to retain the bristles in its setting, such failure sounding the death knell of the brush at a time when all of its constituent parts are in a perfect state of preservation. Many methods have been devised to accomplish the one end that can guarantee the life of a brush, the best and most efficient of which is that in which the bristles are secured by an immersion of one end in soft rubber, after which they are put upon the end of the handle (not around it as in the old way), a belt of rubber combined with metal is wound around the whole, covering the butts of the bristle, and conforming to a groove running around the adjoining



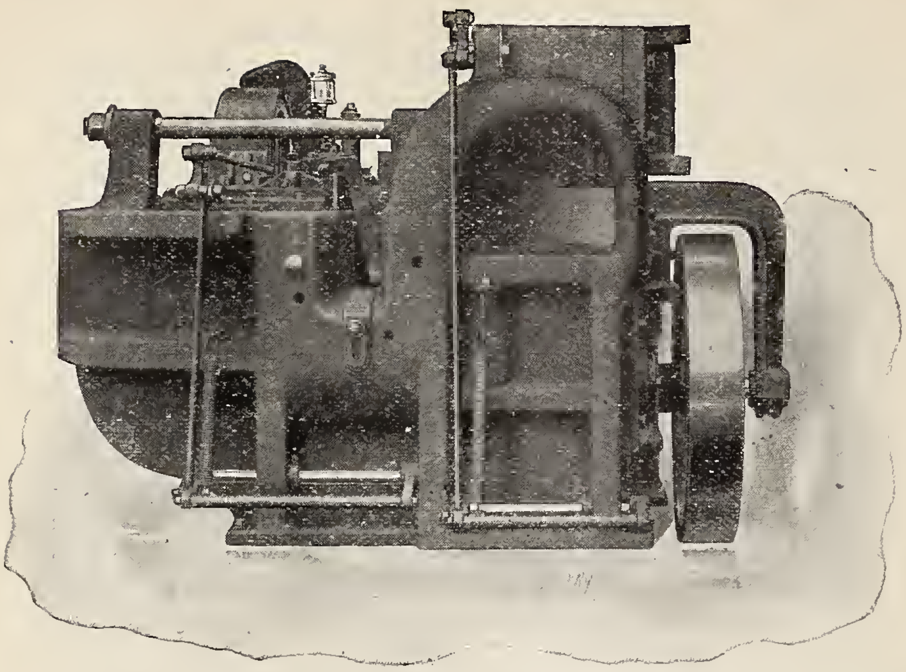
The Rubberset Brush.

end of the handle. The portion of the brush covered with rubber and metal is then placed in a die, and vulcanized (or hardened) under heat and pressure. The result is a solid vulcanized head in which the bristles are so thoroughly imbedded that it is impossible for them to get loose. The beauty of this construction lies in the fact that the bristles are there to stay, since they cannot get loose by any manner of treatment, nor is the setting affected by any liquid, hard rubber being immense against any of the causes that work harm to the old form of construction. Brushes are thus made only by the "Rubberset" Brush Company, of Newark, N. J., who guarantee that their product is indestructible under all circumstances.

Ajax Universal Forging Machine

The accompanying illustration shows the new Ajax universal forging machine, for which there is already a great demand. This machine marks a new departure in forging machinery and the trade has been quick to appreciate it.

By referring to illustration, the reader will readily observe that this machine, while retaining all the features of the well known Ajax heading, upsetting and forging machine, has in



Ajax Universal Forging Machine.

addition, a powerful vertical press which can be used for forging, bending and trimming. This press has a vertical movement of from three inches to five inches, according to the size of the machine. There is a screw adjustment to the stroke of the head which enables the operator, when setting the dies, to bring them to the exact point desired. This screw is readily accessible from all parts of the machine.

The vertical movement of the head is obtained by heavy links connected at the lower end with levers on which are eccentric hubs which give the head the desired throw or stroke. These levers in turn are connected to a slide placed horizontally in the machine and actuated by an eccentric shaft in the back end of the machine. The mechanism that operates the vertical forging press is entirely separate and independent of that which operates the forging machine, although both are in the one bed.

The forging press is brought into operation by the operator depressing pedal on the right of the machine, as will be seen by reference to the illustration. This allows the lock, between the eccentric shaft and header slide, to drop into place. The operator can give one or more blows as desired. On taking the foot off the pedal the lock is released automatically and the forging press comes to a stop with the dies wide open.

The locking device for the forging press is an exact reproduction of the well known Ajax lock.

This machine opens up a new field for forging work, as by its use forgings can be made at a much lower cost than formerly through the saving of heats and handling, and many intricate forgings heretofore impossible to make on forging machines can be readily turned out by this tool.

These machines are built in seven sizes, known to the trade as A, B, C, D, E, F and G, the design of the bed being of the box form type, cast solid in one piece and made of a special mixture of strong, close grained iron and of ample strength to withstand the excessive stress and strain incident to the operation of this class of machinery.

The weights of the machines vary from 18,000 lbs. for the A machine to 180,000 lbs. for the G machine.

This tool is built by the Ajax Manufacturing Company, of Cleveland, Ohio, and is the invention of Mr. J. B. Blakeslee, Jr., general manager of the company.

Notes of the Month

Mr. F. T. Reese, until recently mechanical engineer of the Standard Steel Car Company, has accepted a position in the sales department of the Westinghouse Friction Draft Gear.

We are advised that Mr. Charles J. Thompson, who formerly represented the Hendrick Manufacturing Company, Carbondale, Pa., as manager of their New York office at 149 Broadway, is no longer connected with the company.

The Falls Hollow Staybolt Company, Cuyahoga Falls, O., have just received an order for hollow staybolt iron bars for export to the Imperial Railway of North China, and a leading railway of Japan.

Mr. G. M. Basford, for the past eight years editor of the American Engineer & Railroad Journal, has accepted a position with the American Locomotive Company in charge of a newly established department of publicity. He will assume his new duties Oct. 1, at the general offices of the company, 111 Broadway, New York.

Wall street men and others interested in the New York stock market are no longer compelled to forego information about the movement of stocks while traveling on the Lackawanna Railroad. Arrangements have just been made whereby ticker quotations from Wall street are delivered to patrons of that road at Scranton on all the important Lackawanna trains arriving there during stock exchange hours. The service includes reports on the eastbound and westbound Lackawanna Limiteds, The Syracuse Limited, The Manhattan Flyer, and the Chamber of Commerce Special.

The meeting of the board of directors of the Locomotive Appliance Company was held in their offices, Old Colony Building, on Monday, August 21, at twelve o'clock, noon, for the election of officers and an executive committee for the ensuing year, which resulted in the election of the following named persons to the office stated opposite their respective name, to-wit: Mr. Ira C. Hubbell, president; Mr. Willis C. Squire, vice-president; Mr. Clarence H. Howard, vice-president; Mr. J. J. McCarthy, vice-president Mr. J. B. Allfree, consulting engineer; Mr. E. E. Lathrop, treasurer; Mr. W. H. England, secretary. The president, Mr. Willis C. Squire and Mr. E. B. Lathrop were elected the executive committee.

Technical Publications

The Car Man's Handy Guide, published by F. J. Krueger, Detroit, Mich. Price 20 cents. This book is published annually for railway car men, dealing with weights and prices of M. C. B. freight car couplers and parts, chargeable as per M. C. B. rules; coupler charts illustrating thirty-two of the most common M. C. B. freight car couplers on the market, and every part of same; weight in pounds of bolts; cuts and sketches of air brake material, illustrating the triple valve and other parts of the air brake in common use; weights and prices of metal brake beams and parts; prices of air brake material as per M. C. B. rules and arbitration decisions; defects of the air brake and how to locate them; weight of nails giving the approximate number to the pound; average hours of labor making repairs and names of railroads bearing same initials. This book is one of the handiest guides that a car man can have, and none should go without it.

Proceedings of the Thirty-Sixth Annual Convention of the Master Car and Locomotive Painters' Association of the United States and Canada, Held at Cleveland, Ohio, September 12, 13, 14 and 15, 1905

FIRST DAY.

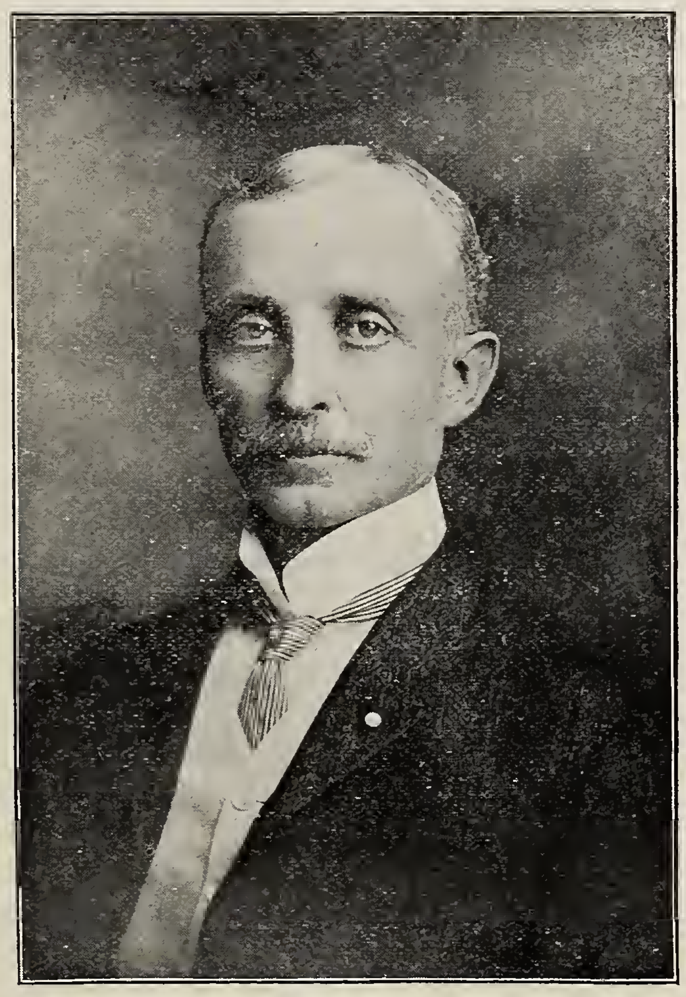
The Thirty-sixth Annual Convention of the Master Car and Locomotive Painters' Association of the United States and Canada was called to order by President John F. Lanfersiek, of Columbus, Ohio, at the Hollenden Hotel, Cleveland, Ohio, September 12th, 1904, at 10:30 o'clock a. m.

The proceedings were opened by the singing of "America," which was joined in by the entire assemblage, after which a prayer was made by the Rev. Robert B. B. Foote, Assistant Rector of Trinity Church, Cleveland. After a humorous recitation by Mrs. Lynch, entitled "Mrs. Casey on Lawn Tennis," President Lanfersiek introduced Mayor Thomas L. Johnson, in the following remarks:

PRESIDENT LANFERSIEK: We have with us this morning the Mayor of this great city, who I know will be pleased to talk to you. I now have the pleasure of introducing to you the Hon. Tom L. Johnson, Mayor of the City of Cleveland, who will now address you.

Mayor Johnson was greeted with loud applause, and addressed the convention as follows:

MAYOR JOHNSON: Mr. Chairman, and ladies and gentlemen of the Master Car & Locomotive Painters' Association. It has frequently been my pleasure, and one of the duties of my office that does not give me any trouble, to meet and welcome to the city delegations similar to this. In the Mayor's office there are a good many disagreeable things to do. I have frequently unpleasant disputes to settle, and I always look upon this as a relief from the ordinary work—to come forward and meet the various delegations that come to Cleveland. I am proud and happy to say that our people are anxious to encourage these meetings, not that we want particularly your presence here that you may spend something here; but we want especially the chance to meet people from other parts of the United States and Canada. We profit by that. We profit by getting a broader view of the general subjects that you deal with; for instance, in your meeting here now it is not all social; you cannot help but drop some little hints that will help our own people. I do not know that the painting trade is any different from the others.



H. M. BUTTS, PRESIDENT M. C. & L. P. A.

They all have their peculiarities. We have a great variety of meetings here. We had the veterinaries not long ago, who cam here to criticise the "automobile town" as destroying their trade. We have doctors of various kinds meet here. But painters,—I presume theirs is a science of trying to cover up dirt, isn't it? We probably need that here as much as anywhere else. (Laughter.) But aside from joking on the subject, my friends, I am glad to welcome you on behalf of the city of Cleveland, and extend to you the courtesy of our city, and, so to speak, I give you the keys to the gate. Though we have a dingy old court house on the other side of the street—which we expect to improve some day—we welcome you all there, and if you drop into the City Hall, I will promise you that every member of the city administration, and the heads of the departments, will do everything they can to be polite to you and make your stay interesting. Above all, I hope that you will have such success and enjoy your stay so much that you will be encouraged to meet here again. (Applause.)

PRESIDENT LANFERSIEK: I will now ask Mr. Gohen to respond to the Mayor's address.

MR. GOHEN: Your Honor, Mr. President and ladies and gentlemen: We thank your Honor very kindly for your encouraging words to us, and we assure you that if you had no more onerous duty to perform than greeting the Master Car & Locomotive Painters' Association, I say to you that you would have a happy time, and would be living in a bed of roses as the Mayor of the city of Cleveland. As you say—and I presume it is true—a great many associations meet here of different kinds—as you say, the veterinarians, and the painters, they have come to exchange ideas and to broaden their views. That is the object and aim of our Association. We meet every year just about this time in the year to exchange our views upon subjects which we are engaged in by the railroads of this country. We think, Mr. Mayor, that you ought to have a little bit of interest in this Association yourself, because you are a street-car man and have been known as a great street-car man in this section of the country. Down in the nice little town of Indianapolis, where I happen to be located, I think you ran a little street-car line there, and if I am not mistaken, you installed that little car in Washington, Illinois, and I think you were the first nickel-in-the-slot man in this country there, where they used one of those bob-tail cars. Every passenger used to come up and put a nickel in the slot that would run down the front.

MAYOR JOHNSON: We have some left yet.

MR. GOHEN (continuing): Well, Mr. Mayor, we are glad to meet in Cleveland. I come here myself on stated occasions and have for a number of years, and I have always enjoyed my visits here. When our people were casting around last year at Atlantic City for a place to meet they seemed to center upon Cleveland as being the next place. I do not know what actuated them in doing it. I presume they wanted to see the great city that had two representative men living within its borders—one, the Governor, and the other, the Mayor. This town is also noted as the home of other great people. The great John D. Rockefeller lives here, and the greatest financier ever known in the United States, almost, lives here—Mrs. Chadwick. (Laughter.)

MAYOR JOHNSON: She is respectable since the Equitable case came along.

MR. GOHEN (continuing): I was not speaking of companies, but was speaking of individuals. But I trust our meeting here will be all that his Honor expects it to be, and that we expect and hope it will be. I hope you will have a nice, pleasant time, and when we go away we will not be sorry for having had the honor of Mayor Thomas L. Johnson coming to give us a greeting on this occasion. (Applause.)

President Lanfersiek here delivered the following address: Ladies and Gentlemen:

We have had an exceedingly warm welcome to this great city by its genial and affable chief magistrate, Tom L. Johnson.

It is now my privilege as well as my duty to welcome you to this, the Thirty-Sixth Annual Convention of the Master Car and Locomotive Painters' Association of the United States and Canada.

It is pleasant indeed to meet together once a year in social and business intercourse, renewing old friendships and forming new ones.

How thankful we should be that an all merciful providence has permitted us to assemble here.

We come together as friends, and during our sojourn here we should apply the Golden Rule, "Do unto others as you would have others do unto you."

To the ladies who have come, anticipating many pleasures, I again say welcome; yes, thrice welcome, and it is hoped your anticipations will prove true.

I regret to announce the death of Mrs. W. J. Byrne, who passed away on June 16th at Richmond, Va. She was, with her husband, W. J. Byrne, a regular attendant at our conventions and I know she will be missed by all.

To our friends, the supply men, who have so largely contributed to the pleasures of our previous conventions, I extend a hearty greeting and welcome.

To the members of the association, gentlemen. On looking back to our last convention it seems but yesterday since we packed our grips and left Atlantic City for our respective homes, and yet a year has passed.

This flight of time should admonish us that our lives are rapidly slipping away and we barely have time to think of the future before it is upon us.

Our lives are short at best and it will be only a few short years until all of us will be gone, therefore, it behooves every one of us to think and prepare for the great beyond.

Although the year has passed rapidly away our respective countries have been blessed with plenty and made substantial progress. I know the members of this association have shared in that progress.

This Association is now thirty-six years old. It has made some progress each year and I firmly believe it is better fitted to do the work assigned it now than ever before.

I hope that, when we get down to business, we will all do our utmost to make this convention a success. It is expected that all of the members will be in their seats promptly at the opening of each session and take part in the business. It is your duty to do so. The pleasures of the convention can be participated in by all after the sessions are closed.

I attended the meeting of the Advisory Committee in New York last February. The subjects chosen are all good and we expect the members will be highly entertained and enlightened by hearing many good papers read and discussed.

I have had no report from the chairman of the Teit committees, but expect it will be ready when called for.

We have lost two members by death during the past year. Mr. Henry Laidler, who died December 11, 1904, and H. A. Dumbaugh, who died May 13 of this year.

Suitable action, by the proper committee, will be taken in due time.

In conclusion let me say, we are here as friends and brothers of a noble craft. Therefore, let us prove ourselves to be men among men and assist each other to bring about results that will raise our association to a higher plane and redound to the benefit of the great corporations by whom we are employed.

I now declare the Thirty-Sixth Annual Convention of the Master Car and Locomotive Painters' Association of the United States and Canada open for the transaction of business.

PRESIDENT LANFERSIEK: Before the ladies retire, I would be pleased to call upon Mr. Brazier, who will now address you.

Mr. BRAZIER: Mr. Chairman, I do not know why you say "before the ladies retire." I think, perhaps, it would be better for the ladies to retire, for I feel a little in the spirit of saying a few plain things to you painters. In the first place, you may wonder why I am here, as I am not a painter. I am a good deal like the darkey down in the Methodist church. They held a great revival, and they were trying to get him forward to the anxious seat. The preacher said, "Come forward and join the Lord's army." He got a few forward, and he says, "If you don't come pretty soon, I'm going to call names out!" He had one particular man he wanted to get, and he said, "Brother Johnson, won't you come forward and join the Lord's army?" He got up and said, "I want you to understand that I joined the Lord's army in the Baptist church last week." He replied, "No, that is not the Lord's army; that is the Lord's navy." (Laughter.)

I feel in railroading that it makes no odds whether you are in the operating department, the painting or the car department. We are all under one head, working for one thing only --that is, the good of the service. I am just as much a car painter as a car builder, because painting comes directly in my department, but I am very fortunate in the position that I hold, having a man under me who forgot in a few minutes more about painting than I ever knew. Last year I said something to the young man. I advised him, and repeated it over and over again, as to the future—the prospect there is for a young man in railroading. It is true, in looking up the list of painters, that there are a few painters that have risen out of their own craft, yet it is in their own hands. We are fortunate, when we have trouble on our system, in having a man who will go and settle the differences better than some of us who are paid higher prices than he is—a man who is respected from one end of the road to the other. That man is Mr. H. M. Butts, your worthy Vice-President. I say this without a spirit of flattery to Mr. Butts, because he is beloved by us all. He knows his business and attends to it.

Now you painters somethimes think you are overlooked, that you do not amount to anything, that the last fellow who gets the car is the painter, who gets the devil for it all. That is very near true and there are painters in this hall who have known me for a great many years, and who have been associated with me, who have gotten me out of some pretty narrow escapes in not getting the equipment out on time. When I first came East I met a prominent master car builder. You know the Eastern people think as a class that they are a little bit better than other folks—narrow-minded. I can appreciate that, for I was born there myself, and know what I am talking about. He said he thought their shop was the best adapted for getting out work, and the best place you ever saw. He used to paint and varnish cars out doors. The trucks were not taken out from under the cars, and I never saw equipment in such shape as that. He since has been changed, and has been West, and came back, and he said, "I did not know anything. I found out." Now, you have got to get away from home. That is where the blessings and results of this convention come in. I want to say to you, Mr. Chairman, and to all of you, that this convention won't amount to a thing if you come here and discuss things and don't put them into effect. As I said last year, do not let Brother Gohen and some others do all the talking. There are just as bright gentlemen here among the young men as the old, and if you come here to get any good, go home and put it into effect. Then you will benefit us in charge of the rolling stock. But if you come here and sit and hear somebody talk, and say, "My idea is better than his," then you are too narrow, and the convention does you no good. Remember that this is an educational body, and not a legislative one. The Masters are the legislative body; we make laws and rules and you carry them out. You come here to discuss things, and, as I said, perhaps you some times think your idea is better than Mr. Butts', and some others, whose names I cannot recollect, yet it does you no good unless you come and try to learn. When I first came in and saw the crowd here, it reminded me of a story I heard of a minister, who had somebody call at his house. He had a room full of company, and the visitor said, "You have'nt enough chairs for all?" "No," he said, "I have got too much company for the chairs." That is about the way with you here. You are a little bit overcrowded. I had expected to meet Mr. Parish, of the Lake Shore, and we had arranged that the both of us were going to come on and say something encouraging to you. Mr. Parish is one of the brightest young men who have come along in the Lake Shore Car Department, and he takes an interest in this work. I was thinking, while riding here, what I might say to the painters. A great many thoughts came through my head, and this was one:

Then let our conventions be held each year;
Brings subjects and discuss them without fear.
May everyone that attends from the North South, East
or West,
Say that this convention is the best.

It will do you no good, as I said in the first place, unless you come and learn. The officers are not letting you away and paying expenses and time unless they expect they are going to get results. We do. We have a free willingness on our part for all our mn to come and attend these conventions. We find we get double returns.

I sat on a table back there a few moments ago with a very sensible man, who after a time listening to the speaker who spoke right to the point, he said, "That's good." Now that the Mayor and the minister have gone, I want to say, with regard to the Mayor, who has risen from the ranks, he is a man amongst men. He thinks it is no disgrace to speak to a common motorman or a conductor. That is the successful man of to-day. Some of our foremen get a little lifted up; they think they are a little bit better than anyone else. I never consider him better than the lowest man connected with me. Mr. Bailey was the first man I met this morning, and you would have thought we were like father and son when they meet. That is the kind of people you want. Those are the men who get results. The man who has the right magnitude in him gets the best results.

I wondered how the ladies would come in, but I don't know of any subject that the ladies are more interested in than painting. (Laughter.) There are some who can paint themselves most lifelike. (Laughter.)

I hardly know what else to say. I want you to feel after the convention is over, that you have enjoyed it, and that it has been beneficial. Above all, do not think Mr. Butts does not agree with you, or that I or this man are not correct.

I want to thank you, Mr. President, and when you are in New York at any time, come and see me; our doors are open, and our painter is just as good as any other man in the department. (Applause.)

PRESIDENT LANFERSIEK: The ladies are now at liberty to retire. The next order of business is the Report of the Secretary and Treasurer. I want to say to the members that on account of ill-health the Secretary is not able to attend this meeting. His physical condition is such that it is almost impossible—of course, it is impossible to say how long he will live, probably a month, probably not more than a day or two. I have therefore appointed Mr. A. P. Dane and Mr. Charles A. Cook as Assistant Secretaries, who will take charge of the business. You will listen to the report of the Secretary.

REPORT OF SECRETARY-TREASURER.

Mr. President and Members:

I present you today with the annual report, noting for your information the transactions of the Association for the year ending August 31, 1905. The meeting last year was well attended considering the inability of many members to get free transportation to Atlantic City. The interest shown by the majority of members present, in the discussions and transaction of business during the sessions gave evidence that they were working for the advancement of the objects for which we are associated. The proceedings of the thirty-fifth annual convention were published and mailed to all members.

One hundred and thirty-three copies of the Railway Master Mechanic were subscribed for and sent to all active members in good standing.

The Advisory Committee met in New York City, February 25th, and prepared the programme for this convention, which was published in our official journal.

The annual circular notice was issued August 1st and mailed to seven hundred foremen car and locomotive painters, inviting them to meet with us at this convention.

Each year all members over two years in arrears for dues are given an opportunity to pay up at the convention, and if they fail to do so their names are dropped before the list of members is published in our annual report.

Last year nineteen members were dropped for non-payment of dues, and four by request.

It is our sad duty to announce the death of J. P. Waggoner, Henry Laidler and G. H. Rattenbury. There may be others, but these are the only ones that have been brought to our notice.

Sixteen active and two associate members were enrolled during the year, giving us a membership September 1st of 195 active, 24 associate and 13 honorary members. Total, 232.

The financial condition of the Association is good, our receipts this year were not so large as last year, but our expenses were lower, so the balance in the treasury has increased.

RECEIPTS FOR THE YEAR.

Membership fees	$ 68.00	
Annual dues	580.50	
Cash on hand September 1, 1904	115.60	
Total	$764.10	
		589.75
		174.35

DISBURSEMENTS FOR THE YEAR.

1904.	
September 13—Express on banner	$ 2.00
September 13—J. H. Pitard, express on Test samples	2.60
September 25—J. H. Lighty, stenographer	60.00
October 14—W. S. Kent, paper and envelopes	4.00
November 1—One hundred and thirty-three subscriptions to Railway Master Mechanic	66.50
November 11—Two hundred and fifty clasp envelopes6	3.00
December 12—Printing annual report	178.15
December 17—Express on reports	5.25
1905.	
June 30—Expenses of advisory committee	16.50
July 3—Paper and envelopes	2.25
July 3—Printing 1,000 circulars	8.00
Postage for the year	41.50
Secretary-Treasurers' salary	200.00
Total	$589.75

Leaving a balance in the treasury September 1, 1905, of $174.35.

ROBERT M'KEON, Secy'y-Treas.

PRESIDENT LANFERSIEK: Gentlemen, you have heard the report. What is your pleasure?

The report was, on motion, accepted.

PRESIDENT LANFERSIEK: The next business will be the report of the Committee on Tests.

The Committee not yet being ready to report, the convention proceeded to the nomination and election of officers. President Laufersiek appointed as Tellers, Messrs. D. A. Little and James A. Gohen.

ELECTION OF OFFICERS.

MR. BUTTS: Gentlemen, I rise to my feet to nominate a man for President for the coming year whom you all know. No words of mine could add anything to your knowledge of his ability to serve you for another year. I would have the pleasure of nominating Mr. John F. Laufersiek, our present President, for another year. (Applause.)

MR. GOHEN: With all due respect to Mr. Butts' sentiment, and with my kindly feeling for our President, I certainly say No. This association must distribute its honors. There are just as many of our members of this association that are capable of filling this chair just as well as President Lanfersiek. I will not say any better, but just as good and it is and act of injustice to the other members who want recognition, and should have it, whether they seek it or not, to re-elect the President of this Association. I had the honor of being President at one time of this Association, and was solicited very strongly to accept a second term. I positively refused to accept it, because I thought that one term as President of this Association was enough honor for any man who belonged to it. With all due respect to Mr. Lanfersiek, I do not wish to see him re-elected. On the contrary, I nominate Mr. H. M. Butts as President for the next year of this Association.

PRESIDENT LANFERSIEK: I want to say to you that I heartily endorse every word that Mr. Gohen has said. While I thank you very highly for electing me President last year, I do not wish to serve another year. I would therefore prefer to have our First Vice-President elected.

The nomination for President was closed, and Mr. Bishop moved that the Secretary cast the ballot of the convention for Mr. H. M. Butts for President.

The motion was agreed to, and Mr. Butts was declared duly elected.

MR. BUTTS: Mr. President, Gentlemen, and members of this Association: I will not take up your time any more than to say that I heartily thank you for the honor that you have conferred upon me. I certainly consider it the greatest honor that has ever been conferred upon me in my life to serve you as President. I came up from the ranks among the painters; they are all my friends. I have their interests at heart, and shall try the best I can during the coming year to serve you one and all alike. (Applause.)

PRESIDENT LANFERSIEK: The next nomination is for First Vice-President.

Mr. Stroud nominated Mr. J. H. Kahler for First Vice-President.

There being no opposition, it was moved and seconded that the Secretary cast the vote of the convention for Mr. Kahler, who was thereupon declared duly elected.

PRESIDENT LANFERSIEK: Next in order is Second Vice-President.

Mr. Paulus nominated Mr. B. E. Miller.

Mr. Quest nominated Mr. J. W. Houser.

MR. LITTLE: I second the nomination of Mr. Houser. In 1888 Mr. Houser was made a member of this Association in this room, I believe—or in this house—and he is an old and faithful member, older than a great many of us here. He was here a great many years before I was, and before a great many others. He has been nominated year after year as a candidate, but others have been elected newer than him. I think it is time for us to tender the honor to brother John Houser.

The nominations for Second Vice-President were closed, and the delegates proceeded to vote, the tellers reporting the result as follows:

Mr. Miller	32
Mr. Houser	59
	91

PRESIDENT LANFERSIEK: Mr. Houser having received a majority of the votes cast, I declare him duly elected as Second Vice-President during the ensuing year.

MR. HOUSER: Mr. President and gentlemen, I want to thank you, and I promise to fulfill my position the best I can in my humble way.

PRESIDENT LANFERSIEK: The next will be the election of a Secretary and Treasurer. I want to say to the members of this Association that it has been understood for a number of years that as long as Robert McKeon lived he would be our Secretary, and I hope that idea will be carried into effect. Nominations for Secretary and Treasurer are now in order.

MR. STOUT: I move that Robert McKeon be nominated for Secretary and Treasurer.

MR. BAILEY. Before that vote is taken I want to say one word. I am up here for the purpose of nominating a new man. I do not understand that Mr. McKeon is an active member of this Association, and I do not see how he can hold any office. He is certainly physically incapacitated from filling it. He has been an honor to the Association, and I think we have honored him all that we really ought to, and I am in favor of electing a man who can fill the place, and that man is Mr. A. P. Dane, the man who has acted as Secretary at two or three conventions, and I do not remember that he has ever even been thanked for it. I hope he will be elected. I have nothing against Mr. McKeon, only I think we have honored him all that we ought to consistently, and I think it is due to us and to him that we have a new man.

Mr. Quest nominated Mr. Charles A. Cook.

MR. GOHEN: I always like to defer to the wishes of the Nestor of the association, and while we have honored Robert McKeon, I think if it were not for the active and earnest efforts of Robert McKeon there would not be any Master Car & Locomotive Painters' Association. When this Association was in the death throes, that man held it up, as you all know, and I tell you that so long as that man lives no other man will get my vote for Secretary. He may be dead now, for all we know, and word came to us last night that he was about to die. We can elect Mr. Dane or Mr. Cook or any other man, whether or not a member of this association, as an assistant to Robert McKeon, but so long as he lives let him hold the name of Secretary of this Association. In answer to Mr. Bailey's remark about his not being a member in the association, I do not think you will find anything in our Constitution and By-Laws that debars us from electing anybody we want as Secretary of this Association. I believe the Master Car Builders' and the Master Mechanics' Secretary is not an active car builder. Am I right, Mr. Brazier?

MR. BRAZIER: That is right.

MR. GOHEN: He is not a member of those associations, and it does not matter whether or not the Secretary is a member of this Association. He was a member; it is not his fault that he is not a member to-day, and that cannot be said of some others who might have been members of this Association, but are not. So I say, boys, let us hold Bob just as long as he lives. You never had any other one. Let us not have any other one as long as he lives. (Applause.)

Nominations were closed, a vote taken, with the following result:

Mr. McKeon	91
Mr. Dane	11
Mr. Cook	3
Total	105

PRESIDENT LANFERSIEK: Robert McKeon having received the majority of all the votes cast, I declare him elected as Secretary and Treasurer of this Association for the ensuing year.

MR. STOUT: I move you that the gentleman who has been the mainstay, I might say, of this Association since its existence—I think it would be no more than appropriate that we should declare he was unanimously elected Secretary of this Association.

The motion was seconded and carried.

MR. GOHEN: There is no proviso in our Constitution for the election of an Assistant Secretary, but under the head of "New Business," before this convention adjourns, I wish to introduce an amendment to our Constitution, providing for the election of an Assistant Secretary and Treasurer, and I hope that you will all vote for its adoption. That shall have to be done in writing under the head of "New Business." Then we can at that time elect an Assistant Secretary and Treasurer.

MR. BAILEY: Let us not go to that trouble. It takes a whole year to do that. Let us fix it up right here. We can by unanimous consent elect a man to that office.

MR. GOHEN: If that is agreeable to the Association that would be still better. Mr. President, I move that the rules be suspended, and that we proceed to the election of an Assistant Secretary and Treasurer with the right of succession.

The motion was seconded and carried.

Mr. Stroud nominated Mr. A. P. Dane.

Mr. Wynn nominated Mr. Charles A. Cook.

The nominations were closed, and the convention proceeded to vote, with the following result:

Mr. Dane	51
Mr. Cook	37
Total	88

PRESIDENT LANFERSIEK: Mr. Dane having received the majority of all the votes cast I declare him duly elected as Assistant Secretary and Treasurer.

MR. COOK: Allow me to thank the Association for the very hearty support they have given me in this friendly contest between my twin brother and myself. While it would have been a great honor you to serve in that capacity, it may be that when Mr. Dane gets old I can be his assistant. (Laughter.) I move the election of Mr. Dane as Assistant Secretary and Treasurer be made unanimous.

The motion was seconded and carried.

MR. DANE: I thank you very much for the honor you have conferred upon me, and I will endeavor to perform the duties to the best of my ability.

PRESIDENT LANFERSIEK: I think it would be well to take into consideration, as long as we are in that line, the matter of compensation for the Assistant Secretary. I think this association can afford to be generous at this time, at least. What is your pleasure?

MR. LITTLE: I presume that Mr. McKeon will do the greater part of the work at his home, or his daughter, who has been doing it for years, and I suppose the Assistant Secretary will only have light duties after this convention is over. His main work will be at the convention here, but all the work during the year, such as sending out notices, will still come from Mr. McKeon.

MR. GOHEN: I don't think you will ever get another notice from Mr. McKeon. For all we know, Bob McKeon might be dead now. I got word last night that they were looking for him to die. He may be alive now, but certainly will not live over sixty days. He will never do any active work for this Association, and upon his death succession follows. The man today elected as Assistant Secretary and Treasurer of this Association succeeds Mr. McKeon to all the emoluments of the office. That is the way I look upon it, and I think I am right. I do not think I am wrong in it at all.

MR. LITTLE: We can arrange that whatever the Assistant Secretary will do we can compensate him for at the next convention or at the end of this convention.

MR. BUTTS: I concur in nearly everything that the two brothers have said, but I look at it this way: I think the work should be done, under the circumstances, by the Assistant Secretary. It is going to mix matters up considerable to have the work done by Mr. McKeon or his family, and from the prospects it is going to be more or less of a burden for them to do it. I want to be very much in favor of having the Assistant Secretary do the work, and relieve them from any further responsibility. I think we can afford to be generous enough to pay the Assistant Secretary the same salary we have been paying the Secretary—for one year, at least, and I should be in favor of that. He has practically got to assume the duties of Secretary and do the work; he has been doing it without compensation for one or two conventions. We can afford to be generous enough to pay him, I think.

MR. STOUT: Why not leave this matter to the officers and let them settle it?

MR. GOHEN: The Assistant Secretary, of course, takes hold now. What he has done is like what any of the rest of us would have done—just as an accommodation to Robert. The duties of the Assistant Secretary begin now. He will not have earned his salary until the year is up. Why not let the question of salary go until next year; then we can do what is right, and we will do the right thing.

PRESIDENT LANFERSIEK: That matter will be deferred, then, until the next convention.

MR. RODABAUGH: We are not any different from any other organization that has officers, and if an officer dies during his term there is not anything said about salary. I do not see why we should not give it to Secretary McKeon's daughter. She has been doing the work, and if he drops off I think she ought to have the perquisites for one year. I do not think there should be any question about that at all.

PRESIDENT LANFERSIEK: That is a matter I thought of when I brought the subject up. I think it would be right, if he should die to-day—he is elected Secretary and Treasurer, and should be paid a salary as though he did the work. At the end of the year we can fix the salary for the Assistant Secretary. So, therefore, we will let that matter drop until the proper time.

MR. GOHEN: We will be just as liberal with the new Secretary as we have been with the old one.

The convention at this point, on motion of Mr. Gohen, adjourned until Wednesday, September 13th, 1905, at 9:30 o'clock a. m.

SECOND DAY.

Wednesday, September 13, 1905.

The convention was called to order by President Lanfersick at 9 a. m.

PRESIDENT LANFERSIEK: Mr. Walbank, one of the committee of the supply men, desires to know whether the members of this convention would like to take a sail on the lake this afternoon. He says on account of the roughness of the weather, he does not feel it would be the proper thing to engage a boat unless the members of the convention are satisfied to go, and he desires an expression from the members whether they wish to go or not. I would be pleased to hear from any of the members.

MR. B. E. MILLER: I think for the benefit of those who have never sailed on the lakes, like some of us have, I would suggest that the matter be deferred, at least until the weather is a little more propitious. I feel sure that in going out in this gale to-day a great many of the members, their wives and daughters would get deathly sick, and regret having attempted the trip.

MR. SAMUEL BROWN: I second the suggestion for the simple reason that I have had some little water mixed in with my time of life, and it is one of the most unpleasant things in the world to be sea sick. You will forget you ever owned a cent, or ever had a friend in the world if you get sea sick (Laughter), and if it is reasonable, I would suggest that Mr. Millers' remarks were very good—to defer it.

MR. BURTON: I hope this matter will not be dropped, because, while I do not want to be sea sick, I want to have the pleasure of sailing on the lake before I leave Cleveland. I would not mind being a little sea sick, but would not want to be in the condition the brother mentioned; in fact, I regard myself up to the present time with a view to remaining in good health. If I got sea sick, there would be "something doing," sure. I want to go sailing on the lake.

MR. BUTTS: As I understand it, the committee would like to have some assurance that there would be a good attendance. They have got to engage the boat in advance, and go to considerable expense, and I think it would be a fair expression of the delegates here if we would take a rising vote of those in the room, to see how many there are who would say they would go on the excursion, whether it is rough or not, and I would move you that we take a rising vote of those present.

MR. COPP: Could it not be postponed until to-morrow afternoon?

MR. BUTTS: Or until some time when the weather would be fair, when we would not get sea sick. I doubt very much whether there would be a great number go to-day.

MR. COPP: I think it had better be deferred until tomorrow.

MR. MILLER: I understood that we were going to go sailing in small sail boats, which is of an entirely different character and nature. Mr. Walbank informs me that we are to take some of those large side-wheelers plying between Detroit and here. I do not believe there is enough wind to make anybody seasick in a large craft of that description. I do not see but what we could undertake that sail on the lake to-day as well as any other time. It is also a fact that the wind always settles down towards the afternoon. I believe it would be all right to go. I thought we were going to undertake it in the small open yawls.

MR. BISHOP: I find a great many ladies object to going unless the lake is smooth.

MR. MILLER: I move we undertake the trip this afternoon. I will guarantee you there won't be a dozen that will get sick.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: Before we proceed to any further business I would like to read this communication from Mr. H. F. Ball, Superintendent Motive Power of the Lake Shore & Michigan Southern Railway:

"Cleveland, Ohio, September 13, 1905.

"To the Chairman and Members of the Master Car & Locomotive Painters' Association: Gentlemen: If any members of your Association, or immediate members of your family, who are with you, wish to take advantage of the opportunity to visit Niagara Falls during your stay in this city, the Lake Shore & Michigan Southern Railway will be glad to furnish transportation to Buffalo and return. Application should be made direct to Mr. Robert Shore, who will make the necessary arrangements."

PRESIDENT LANFERSIEK: I desire to say that Mr. Shore told me that if any of the members desire to take advantage of the invitation, to come to him direct, giving the names of all the persons in their parties that desire to go.

MR. MILLER: For fear some of the members may not know who Mr. Shore is, I would suggest that he be pointed out.

PRESIDENT LANFERSIEK: I have the pleasure of introducing to you Mr. Robert Shore, of the Lake Shore & Michigan Southern Railway.

MR. LITTLE: I move you that we give a rising vote of thanks to Robert Shore and the officials of the Lake Shore road for their kind invitation, and that it be accepted.

The motion was seconded and carried.

MR. SHORE: I would like to get a report of how many are going by to-morrow noon, so that we can make the arrangements and get the cars. They will put on two or three coaches, or whatever is necessary. They can go on Friday at 3 o'clock, get a night's sleep, and see the Falls the next morning. I would like to know how many are going. I know at the conventions I have attended they usually adjourned at Friday noon.

MR. MILLER: In order to give the matter as much publicity as possible, I would suggest that the Committee on Arrangements be instructed to post a notice in the lobby of the hotel, immediately, so that all the members and visitors may be informed upon the subject as to the proper mode of making application to take in the trip.

PRESIDENT LANFERSIEK: I would suggest that Mr. Shore, with two other members of the convention, go down and meet them and ask them to post that notice, in order that all may be notified. Mr. Miller and Mr. Stroud will go with Mr. Shore and get matters arranged satisfactorily to the members of the convention.

I would say to you that we have with us this morning Mr. Sam Brown, who was unable to be here yesterday. I know we would like to talk to you this morning.

MR. BROWN: I thank the president very much for the beautiful introduction he has given me. My principal purpose, gentlemen, is to comply with the promise I made last year. I am sorry that I could not be here yesterday morning, but I was too far away and the cars did not move fast enough for me. There were various things that bothered me. I have been bothered all through life. I was afraid I might be bothered in finding a few remarks to make, so one of our clerks kindly volunteered to put something on paper, and, if I am able to read it, I will give it to you in that form.

To the Officers and Members of the Master Car and Locomotive Painters' Association.

Brothers:

It affords me great pleasure, I assure you, in being permitted to comply with the promise I made at our last convention in regard to presenting the Association with a gavel made out of a piece of wood taken from the U. S. Flagship Olympia, which made such a memorable record for the United States on May, 1st, 1898, at Manila Bay.

After the battle of Manila Bay the Olympia came to Boston and received extensive repairs, and the piece of wood was given me by an officer of the Charlestown navy yard.

In behalf of one who has always taken a deep interest in the success of the M. C. & L. P. A., I respectfully present it to you; not for its intrinsic value, but more for its historical connection with the country we should honor and uphold.

Having served in the United States navy in 1862 and 1863, I hope you will pardon me for taking a little pride in the history of the navy, and having been associated with the M. C. & L. P. A. practically since its inception, at which time I was working under the direction of Mr. James Platt, who was foreman painter for the Old Colonial Railroad Company at South Boston, Mass., I also take great pride and interest in its welfare.

With my best wishes for the success and perpetuity of the Association, I am,

Yours fraternally,
SAMUEL BROWN.

PRESIDENT LANFERSIEK: I will ask our First Vice-President to respond to Mr. Brown.

MR. BUTTS: Mr. President and members of the convention: I know that I will voice your sentiments when I say I certainly heartily thank plain Sam Brown for his thoughtfulness and efforts in our behalf in furnishing us with a beautiful gavel of this kind. It certainly is ornamental, and I hope will be useful for many years to come. You know there is no member of this Association who has at every session contributed more to our pleasure and interest than our worthy member here Mr. Brown. He is always ready to entertain us, both at the opening and close of the sessions, and we honor him for it. I will thank him on behalf of the members of this association for this beautiful gavel. I want to move you a vote of thanks be extended to Mr. Brown for this gavel.

The motion was seconded and carried.

MR. BROWN: Mr. President and gentlemen, the thought occurred to me that some party of an inquisitive turn of mind might like to know what kind of material was on that gavel. The material that is on that gavel is of a new departure. We have had so many names for the old fashioned goods, and I was at a loss to give the material a name that is on that gavel until looking over the September number of the Railway Master Mechanic Mr. Warner Bailey came to my relief. If any of you have seen that number you will see the different names he gives of the various kinds of material there, and they are all spelled most peculiar, but they are pronounced all the same. Now the material on that gavel is spelled this way, "S-h-e-r-l-a-q-u-e-i- r-o-u-i-n-e," but, gentlemen, it is pronounced "shellac." (Laughter.)

PRESIDENT LANFERSIEK: I desire to call attention to the fact that this convention was called at 9:30, as agreed upon yesterday by the vote of this association. I will say, further, that the convention will be opened at the appointed time, regardless of the fact whether there are many members present or not. If there is a quorum present, we will open.

The first business of the meeting will be the reading of papers. The first subject is "The Renovation of Coach Window Shades, Particularly Those Most Generally Used, Such as 'Pantasote,' etc., With a View to Increasing Their Life." The first paper on this subject is by Mr. R. J. Kelley, of the Long Island R. R., Brooklyn, N. Y. Mr. Cook will please read that paper.

Mr. Cook here read the paper as follows:

MR. KELLEY'S PAPER.

MEMBERS OF THE M. C. & L. P. ASSOCIATION—SUBJECT NUMBER ONE.

The Renovation of Coach Window Shades, Leather and Imitation Leathers.

The writer takes up this subject with delicacy, owing to its newness, it never having been discussed before this Association at any previous meeting. This subject, no doubt, was selected by your conference committee, on account of the great number of cars equipped with leather and leather effects.

In the past few years woven fabrics for car curtains have been displaced to a certain extent by the imitation leathers, principally on account of the difference in cost. The woven fabrics, either cotton or wool, were handled strictly by the upholstering department, and were cleaned with soap and water, or benzine, as the case required. At each shopping, when beyond cleaning, the remedy was to re-dye. The latter process is not only costly, but has a tendency to destroy the web of curtain cloths. Increased cost of maintenance of the woven goods cloth brought substitutes by the score; two or three of the leather effects are principally used and give good satisfaction when they are looked after and maintained the same as other car furnishings. If allowed to go too long without attention they take on a whitish effect, caused principally by moisture and helped along to a certain extent by sulphur fumes from the locomotive. The latter affects the coloring of curtain backs. This we have demonstrated by hanging samples of leather effects in the ventilators of the engine house.

With a good many leather substitutes we find on the colored side of curtain a substance of the nature of shellack; in the case of trolley cars equipped with this material we have found white marks. This is caused by curtains being pulled down and exposed to rain and then wound up and allowed to dry. The same thing applies to regular steam equipment, windows are up in the summer time and curtains down, operating at the will of the traveling public. This condition we cannot deal with. Ours is to inspect and renovate. In different parts of this country there are various deposits of as many different natures, principally sulphur and alkali that adhere to car curtains. We have found that that old reliable cleaner, soap and water, will, in most cases, with the addition of a little agitation with a bristle scrub brush, remove this deposit from curtain backs. After drying apply with a piece of sponge or cotton waste a very little of any of the well-known varnish renovators in use. In cases where curtains have been allowed to go too long and after removing dirt deposit with soap and water you find the color has gone the only remedy is to apply more color, shade to suit the original. This to be applied as a very thin glaze. We have found a good finish in varnish thinned with turpentine to be satisfactory. Of course, with sufficient coloring to match original shade. For the information of those who have not had experience in handling leather effects, would state we have personally experimented with mixtures of shellack, lacquer, boiled oil, raw oil, rubbing varnish and colors mixed with Japan oil dryers. We find the outside car finishing, cut with turpentine and a little coloring added, will give best results. Like a great many remedies, if taken in time, it will not be found necessary to paint curtains very often. Where roads practicing terminal cleaning they should instruct their men in charge to wipe outside of curtains regularly, while a little car cleaner will be found a remedy to prevent the white marks, caused by moisture showing when cars are in service. Cleaning of the cloths of interior side of curtain is usually done with benzine or any of the powdered soaps; the benzine brushed over is more commonly used than soap. With the latter we have found the color to run and stain balance of pattern, especially with the blues and greens.

We would like to hear the experience of those who have been for a long time practicing terminal cleaning or shop handling of leather curtain material and its imitations. We think this will be of great interest to superiors who are much interested in this subject. R. J. KELLY,

Gen'l Foreman Car Dept., Long Island R. R.

PRESIDENT LANFERSIEK: The next paper is by Mr. H. W. Forbes, of the Erie R. R., N. Patterson, N. J.

The Secretary read Mr. Forbes' paper, as follows:

MR. FORBES' PAPER.

Master Car and Locomotive Painters' Association of United States and Canada.

Gentlemen:

Subject No. 1, "The Renovation of Coach Window Shades"—particularly those most generally used, such as "Pantasote," etc., with a view to increasing their life, would naturally appear to be in the upholsterers' line, but there are saveral members of this Association whose duty it is to take care of the window shades. The keeping of car curtains clean is a very important matter to all railroads. This difficulty can be in a measure overcome where "Pantasote" curtain material is used by the following method:

Instructions should be isued to the cleaning department at terminals, when cleaning a car that all curtains should be pulled down and any accumulation of dust that has collected on the inside of the curtain, removed with a brush or air jet. The outside or "Pantasote" side can be cleaned at the same time they clean your windows, by going over the glazed, or "Pantasote" side, with a wet sponge or cloth.

This will remove all stains and accumulation of dirt. Where "Pantasote" curtains have been allowed to run without care for a few months they can be cleaned and restored to their original condition by removing them and stretching them upon a table that has tight joints between the boards (open joints will mark the curtain) and taking a close grained sponge or a brush and give them a thorough rubbing with a good soap solution on both sides—the amount of rubbing will depend upon how much dirt shows up in the lather. Then wash off with clean water. The "Pantasote," or leather, side of curtain when the lustre wears off should be coated with an elastic coating adapted for leather dressing. The curtains made entirely of cloth should be thoroughly brushed or blown out with compressed air at the terminals, and when cars are shopped, if the curtains are in good condition, a thorough washing with an ammonia and soap solution will restore them to good condition.

When the curtains have reached the stage where washing will not restore their color both the "Pantasote" and cloth curtains should be dyed, which may be done in the following manner:

First, wash the curtains with a solution of ammonia and water or ordinary soap and water and if the curtains are so dark that the dye will not color them properly, remove the old dye from them by placing them in a cold bath of chlorine, agitate them occasionally until the dye is entirely or sufficiently removed, then rinse in cold water and they are ready for re-dyeing.

The color is optional, you can use any shade desired, but in case you wish to make them a nice shade of dark brown you can charge a color dye bath with 5 ounces of "Diamine Brown" and 2 pounds of ordinary table salt for every ten gallons of cold water. Immerse the curtains and work them for about three-quarters of an hour. Then dry them at a low temperature, not exceeding 110 degrees. The best method of handling these curtains I have found is to have a wooden vat made large enough to alow the curtain to hang full length into it and have an air line run into the vat with two branch pipes that have been drilled full of holes, fastened to the bottom of the vat, then when the curtains are placed in the dyeing solution all that is necessary to do is to turn on a little air pressure which will keep the solution in motion and thoroughly mixed during the time necessary for the dyeing process. Respectfully submitted,

H. W. FORBES.

Scranton, Pa., September 1, 1905.

PRESIDENT LANFERSIEK: The last paper is by Mr. W. H. Estabrook, of the D. L. & W. R. R., Scranton, Pa. The paper was read by the Secretary, as follows:

MR. ESTABROOK'S PAPER.

To the Officers and Members of the Master Car and Locomotive Painters' Association, Cleveland, Ohio:

The subject, "The Renovation of Coach Window Shades," particularly those most generally used, such as "Pantasote," etc., with a view to increasing their life, has been assigned to me for discussion.

In renovating Pantasote curtains my practice has been to thoroughly dust or blow them. I then take a weak solution of oil soap and water, lay them flat on a table and scrub thoroughly with a car scrub brush, rinse, clean and hang up to dry. After they have been dried I oil off the leather or Pantasote side with a solution of one-half raw linseed oil and one-half benzine and then wipe them dry. In this way I have had very good results.

I have also done some experimenting in dyeing Pantasote curtains, but up to the present have not had very good results inasmuch as after dyeing them I find the sun's rays has a very damaging effect, causing them to fade very fast. This gives them a most unsightly appearance and in my opinion is dileterious to the life of the curtain.

Respectfully submitted,
W. H. ESTABROOK,
Foreman Car Painter, D. L. & W. R. R.

PRESIDENT LANFERSIEK: Gentlemen, the subject is now ready for discussion.

MR. B. E. MILLER: Mr. Chairman, this is quite an important subject, and I think it ought to be discussed a little bit. A great many of the railroads are after information on this subject and they are after it in a vigorous manner. I have done a great deal of experimenting myself along the line of taking care of "Pantasote" curtains. I have experienced no trouble whatever in taking care of the glazed side, or weather side of the curtain—the imitation leather, as it were—but when it comes to taking care of the cloth side, that is different. The cloth side of nearly all of the "Pantasote" curtains is composed of cotton goods, and cotton goods are quite a difficult problem to handle when it comes to dyeing them. It is different from dyeing woolen goods, and as you have noticed in Mr. Estabrook's paper, he states they fade very readily, which is a fact. We have had that experience when we resorted to re-dyeing curtains. You can get them to look very fair for a little while, but there is no permanency to the die. Another objection to re-dyeing them is the fact that you cannot get an even color over the entire curtain. The parts that are faded won't die up as dark as the parts that have not been exposed to the weather, or the sun's rays, and as a consequence are not faded as much as the exposed parts. Another problem is getting rid of the gilt decorations on the cloth side before you can successfully re-dye them. The exposed parts will be found without the gilt ornamentation, while the unexposed parts will have the gilt ornamentation intact, and before re-dyeing can be resorted to these gilt ornamentations—usually a little gilt star which you are all familiar with—have to be removed, and it requires some pretty vigorous stuff to remove that gilt decoration, which you will often see is necessary before successful re-dyeing is possible. For this purpose we have tried ammonia, potash and the likes of that, and they result more or less in injuring the fabric and loosening the material from the adjacent part of the curtain. So it is quite a problem, and I would like to hear in full from any of the members who have had any experieuce in taking care of these curtains.

PRESIDENT LANFERSIEK: Has any other member anything to offer in this matter?

MR. HUTCHINSON: I have had a little experience in trying to meet the difficulty Mr. Miller has mentioned, and I find in taking care of the inside of the curtain very often the trouble that he is up against, so to speak, is caused by the curtain being worn off on the outside from continual handling. The surface having worn away it absorbs the material applied on the outside, and that prevents us being able to make a satisfactory appearance on the inside of the curtain or to get results satisfactory on the inside of the curtain. I think we have had in several instances to turn the curtain. This is in our shop a matter we leave to the upholsterer, but of course in finishing the outside of the curtain it comes under the head of the paint department. There are a great many varnishes or solutions used. We have one, which I cannot call to memory now, but it just seems to me that anything we put on the outside of the curtain will, in a short time, overload the curtain, and the usual result, of course, from overloading with varnish or anything of that kind is a damage that we cannot overcome by finishing these curtains in that way. I do not know but I have concluded that it is not wise to apply anything in the line of a hard-drying varnish, for the reason that it dries on bone-hard in time and cracks, and it seems to me that some carriage solution, like carriage-top dressing, flexible—supposed to be flexible coating—is the material we ought to apply to the outside of these curtains, something in the nature of a wax, that will not dry hard, and it seems to be an impervious protection to the curtain.

MR. HOUSER: Our experience has been that the curtain becomes stained, dark—very dark, and we have trouble in that respect; in fact, I sent some to the woolen mill in our town to see if they could renovate them, but they could not do anything with them successfully. We cleaned them up in the shop with a solution of soap about as good as they did in the woolen mill. We never tried dyeing them, for they were stained so very dark, we would have to make the curtain so dark to overcome the stain. We practically have given up the cotton curtain, and are using "Pantasote." As yet we have not done any renovating of the "Pantasote" curtain. I would like to know if anyone can tell me how we can get rid of that stain on the cotton curtain?

MR. FORBES: We dip the curtains in a solution of chlorine, which removes all the dye and renders the curtain ready for re-dyeing. We have had no trouble in removing the stains or dark color from the curtains. In dyeing, if you want to dye them brown, add "Diamine Brown," in the proportion of five ounces to every ten gallons of water, and two pounds of salt, and that solution will dye the curtains. You can select any color that you desire.

MR. HUTCHINSON: Is that satisfactory in curtains that have been used for several seasons? Have you no difficulty with what has been applied on the outside of the curtain?

MR. FORBES: I was talking about the cloth curtains, but "Pantasote" when that gets so bad it commences to decay, we do not try to renovate it. We have no trouble in removing the stars with ammonia, and taking all that gilt ornamentation off.

MR. MILLER: Along the bottom will be found a streak varying from six to twelve or fifteen inches, where it has turned lighter. It has been exposed, and all the gilt stars and ornamentations have worn off. That streak right through the bottom of the curtain will be found much lighter than the rest of the curtain. I am talking about the cloth finished cotton goods side. When cleaning those up with ammonia or chloride solution, what do you obtain? Are you able to eliminate the difference in color so that when the curtains are re-dyed the whole cloth side of the curtain assumes a uniform color? That is something we have not been able to overcome with a good deal of experimenting ourselves. Another thing, we find that this cotton side, if you are successful in getting a fairly good color by dyeing, just a few days' exposure to the sun will almost be sufficient to take it all out again, and it will look worse than before. I really believe that when curtains reach that stage, we will have to throw them into the scrap heap, and get new ones.

MR. FORBES: We use ordinary table salt. We have it in barrels, and it is very handy, but where we find a light streak we use chlorine, but you have to be careful or you will blister the outside of the "Pantasote." But the gilt ornaments, we remove them with ammonia. Several curtains we had were very bad, and the upholsterer reversed the curtains.

MR. MILLER: I would like to hear from Mr. Glass. He has had considerable experimenting in that line.

MR. GLASS: Mr. Miller has covered my experience. In other words, you all know I am with him. I simply follow his instructions. With regard to removing the stars, we are able to do it. I found it took considerable time and considerable money, but as far as lye is concerned, or ammonia, that Mr. Forbes has referred to, I tried that and was not satisfied with my results there. I took some weak solution of lye and considerable elbow grease, and I was able to remove the starts. We used dye, as Mr. Miller has said, to those curtains, and exposed them. We used different dyes, one I found much better than the others. In other words, we took the curtain and doubled it; half the "Pantasote" side would show and half the cloth side, and we exposed that to the sun, and thirty days' exposure showed several shades. So, as Mr. Miller has stated, I do not believe at present we have arrived at the point whereby it can be done satisfactorily. In my opinion, if you use ammonia, or any other strong liquid that removes the stars, it will virtually remove the goods; in other words the goods will be rotten when you get through. Elbow grease and a solution of lye or ammonia will do, but I doubt very much whether you will be able to repeat that.

MR. KAHLER: I was present at the meeting of the Advisory Board in New York, and Mr. Weis, the author of that question, was talking to me about this curtain business, although I have nothing to do with that class of work. I jokingly remarked to him at that time to atomize them and put on a flock.

MR. COPP: Up in my way the curtain business is all in the upholstery department. There is no renovation done whatever, as far as the Boston & Maine is concerned, and I think the New Haven do the same. They make Holland curtains and use them altogether. The Boston & Maine have a machine for cutting up the cloth and making the curtains entirely. It seems to me that is a good deal better way to maintain the curtains in coaches—to use Holland. It can be made very cheaply, and when it becomes soiled, throw it away and put on a new one. You can do it for less money than renovation, in my opinion, and maintain a better looking curtain.

PRESIDENT LANFERSIEK: Has any other member anything to offer? If not, we will proceed to the next subject, No. 2—"Piece Work—It's Advantages and Disadvantages From the Standpoints of Both Employer and Employe." The first paper is by Mr. W. K. Orr, of the Erie R. R., Buffalo, N. Y.

The paper was read by the Secretary, as follows:

MR. ORR'S PAPER.

Mr. President and Members of the Master Car and Locomotive Painters' Association.

The subject assigned to me for a paper is "Piece Work," its advantages and disadvantages to the employees and the employer.

I am not surprised that our Advisory Board took up this subject, for it has become one of the vital subjects that are agitating the labor world today.

I will endeavor to express my views on this question in as few words as possible.

In the first place the railroad companies turn out more work in the same time by piece work than they can by the day work plan.

Now, we take a shop that holds sixteen cars under the day work plan, this shop turns out thirty cars per month with a force of sixty-five men. Under the piece work plan the same shop turns out forty cars per month, with a force of forty-five men.

This shows that they turn out one-fourth more cars by the piece work plan, which increases the shops capacity one-fourth, and gives the company the use of their rolling stock, from five to ten days sooner than under the day work plan.

Now, I do not say that they save the difference in wages, between the forty-five men and the sixty-five men, for the piece work men will make a better average in wages per month than the day work men, which will pretty well offset the difference, but they get one-fourth more work turned out by the piece work plan.

Now, I know that some of my brother master painters, who have never tried the piece work, will be skeptical about this statement, but I would say to them, try it.

Say you take four of your average men, then set your prices at just what it costs you now to do the work, and give them to understand that you will not cut the price on them, and just see what they will make.

You will see just how much more work they will do than they did under the day work plan. But you will hear some men say, "but you do not get the quality of work that you do under the day work plan." Now, I do not think this will hold good, for you will find that some of the best roads in the country are doing their work by the piece work system. You can look over their equipment and compare it with your own, and you will find that it looks just as good as your own does, and has not cost quite as much either.

I believe that another advantage to the employer is that you can keep a better class of men in your service. They can earn better pay by the piece work system than they can by the day work plan, that they are better satisfied. They know that they do not have to do some other man's work unless they get paid for it. Consequently they will stay with you.

I do not know of any disadvantage to the employer in the piece work system.

The advantage and disadvantage of piece work to the employee:

First. I claim that piece work is an education for the "mechanic." I remember when I was first compelled to work piece work. I say compelled, for we, that is the painters were told that if we would not do work by the piece they would get painters that would.

So we went to work with fear and trembling, as we thought we would starve to death. As we had always worked by the day, we never did any figuring for ourselves, but went to work at 7:00 a. m. and worked until 12:00 noon, and from 1:00 p. m. until 6:00 p. m. We considered that the company owed us our ten hours pay, not because we had earned it, but because we had worked ten hours. We did not know whether we had earned more than what we would receive, or, not so much. But after working piece work for a time we could tell all about it, and then it was as hard to get one of us to work day work as it had been to get us to work piece work. We had learned what we could do and what it was worth to do it, and I believe this is the case with all men who have never worked piece work.

You can offer them 20 per cent more than the job is worth and nine out of every ten (10) men will not take hold of it, because they have not thought about it in that light.

Second. Take, for instance, two men working by the day. We will say "putting up a car." One man, to all appearance, works good and steady and the foreman can find no fault with him. He puts in the ten hours all right and the company owes him ten hours pay, but here is his companion, he is working with him and getting the same pay, but this man does one-third more work than the first man. At night he only gets the same pay as the first man.

Now, is that fair and just? But what can you do about it, under the day work plan? The rate of wages are set, and you cannot give the second man more pay, for that is his rate.

Therefore, I say that the piece work system is the only fair way to work and you can gamble that one man will not impose on another very much in this respect, or he will soon hear about it. You will find, that the men will find out for themselves the quickest way of doing the work when they are working piece work and what one does not know some other will know, and in this way they soon will become experts.

Then it gives a man a chance to make more money. He will work harder and steadier if he sees he can make more money by doing so. You will also find that the men will not stretch a job like they do when working day work. For instance, if they have a job that they could finish at 11:30 a. m., they would stretch that until 12:00 o'clock, rather than go for another job. But the piece work men will be after you if they get out of a job at 11:45 a. m. They will want something to start on after the noon hour.

Some disadvantages to the employee:

First. I would say, is the unfair way, some piece work prices are set. Now take a railroad that has four or five shops on their system. One or two of these shops will have good conveniences—such as stationary scaffolds, good light, etc., while the other shops will have no conveniences to speak of.

Now, it is unfair to the workmen in the latter shop to have to compete with the shop that have all conveniences.

For instance, a man or two men are sent to varnish a car or paint a roof, and they have to hunt up a scaffold and put it up. It will take a good portion of their time to do this, while the men in the other shops have nothing to do but to go ahead with their work.

The same can be said of a shop that is not properly heated. I have seen the temperature down to 50 degrees and men trying to put on a coat of varnish on a car. Any painter who has tried this will appreciate just what a job is and just how long it will take you to do it. While the other shops have good heat, the varnish works good and the men have no trouble with the varnish crawling or working hard. These men can make their money much easier, and I think that when prices are set for piece work these conditions should be considered.

There is one other disadvantage that I would like to speak of and it is one that exists in some shops. That is, the men are not allowed to know the prices of the work they are to do.

Now, I do not consider that this is fair to the workman for no man would think of working by the day unless he knew just what he was to receive. Now, why ask a man, who is working by the piece to work that way? At night he does not know how much he has made during that day, or in fact not until he draws his pay on pay day.

Yours respectfully,
W. J. ORR,
Master Car Painter, Erie Railroad Co., Buffalo, N. Y.

PRESIDENT LANFERSIEK: The second paper on this subject is by Mr. H. M. Butts, of the New York Central & Hudson River R. R., W. Albany, N. Y.

Mr. Butts read the following paper:

MR. BUTTS' PAPER.

PIECE WORK, ITS ADVANTAGES AND DISADVANTAGES FROM THE STANDPOINT OF BOTH EMPLOYER AND EMPLOYE.

The successful adoption of piece work calls for patient effort and careful consideration and appeals equally to the judgment of both employer and employe.

Its thorough mastery is worth the best efforts of the brightest minds engaged in solving the intricacies of modern shop management. It has been wisely said that times change and we change with them. This truth is visible in the management of worldly affairs in general and is equally applicable to every detail of successful management of railroad work.

Glance for a moment at the panorama of changes which have taken place in the world's affairs in comparatively a short period of time. From the famous ride of Paul Revere to the message by telegraph or telephone; from the wooden gunboat to the modern battleship; from horse cars to subway express; from the canal boat to the 20th Century Limited. Indispensable as all these things are to our modern civilization, we well know that at their first inception they were met by stern opposition and were compelled to win their way into our affection by degrees. These changes have brought with them advantages and comforts of which our forefathers never dreamed. With these innumerable examples, for us to oppose piece work as an innovation without a practical trial would seem to be a retrogression quite out of spirit with the times, for it seems to be another step toward the Golden Era to which the American workman is steadily advancing.

In shop methods a new order of things is before us, small shops are being abandoned and the work is being concentrated in large central plants where special machinery and other facilites are being provided for the more rapid and economical handling of work. This permits a workman to remain upon one class of work a sufficient length of time to become thoroughly familiar with it, or in a word, a specialist. The all-around man who can do any kind of a job is no longer in demand, but is being superceded by the specialist who becomes proficient in his line.

Piece work gives to each an equal chance to develop his talents and to demonstrate his ability, which brings its reward in increased earnings. A shop well organized on the piece work plan to my mind has a tremendous advantage over the day work plan for it is manned with a corps of experts who are inspired with a zeal to work both mind and body for sure reward of individual effort. To be well organized means that both employer and employe should be banded together to work for their mutual interest.

But, in many instances, the adoption and successful execution of piece work is greatly hindered, not because the men dislike the plan itself, but because they know of many instances where some greedy employer has cut the prices as soon as the men earned a small per cent above their hourly rate.

Two things are absolutely essential and entirely indispensible to the successful adoption of piece work. The first is that no limit should be placed upon the amount a man shall earn. The other is for a fixed price with a guarantee for a certain number of years. Several instances have come under my personal observation where the management thought it wise to place a limit of 5 or 7 cents per hour upon the regular hourly rate paid. This plan, I believe, has always worked to disadvantage. Limiting the earning power destroys the incentive to increased effort. There should always be held out to the piece worker a positive reward for individual effort. Without this piece work becomes nothing more than stint work, which is very little if any better than working by the hour. Special reward for individual effort is the prize offered to the piece worker, and any plan which does not embody this as one of its cardinal principles is placed at a great disadvantage and is foredoomed, as it ought to be, to miserable failure.

This fact is becoming recognized more and more by the managers of the large railroad interests. In proof of this I will quote from an article recently written by Mr. J. W. Kendrick, third vice president of the Santa Fe R. R. He says:

"There is a great difference between men both morally and in skill and capacity. Of two men each selling his time to the company, one may close his eyes to everything effecting the company's interest except the minimum he must do. Wastes do not concern him. He does not go out of his way to take the stitch in time that would save nine. There is no tangible or overt act on which to lay the finger, but results are disastrous. The other man is wideawake, instinctively hates wastes and losses whether he is directly responsible for them or not. His mind is as active as his body. Such a man is worth much more than the other, but while the first one will go on strike and drag his fellow employes with him rather than submit to a small reduction of wages, not beginning to offset his wasteful methods, the latter can be secured and held by increased compensation."

Other railroad officials not only endorse all that Mr. Kendrick says, but go much farther, as is evinced by instructions issued by the general superintendent of motive power of one of our large railroad systems. These instructions guarantee a compensation (after it has been fixed on a just basis) for a specified length of time, which insures the piece worker that his increased efforts are not establishing a record which will be taken advantage of by his employer and in the end work to his disadvantage.

The chances of the piece worker being taken advantage of by his employer in cutting prices would seem to me to be much less than when working by the day. No wise employer could possibly be so blind to the advantage of having the shop filled with expert contented workers who are exerting both mind and body to increase the output, who would run the risk of destroying their confidence and discouraging their efforts by cutting prices, instead he should do his utmost to inspire confidence in his men and this can more readily be accomplished by adopting a system of rewards based upon a plan which will allow every diligent and faithful worker to receive full benefit in dollars and cents for his increased effort. Money is the argument which appeals more keenly to the sensibilities of the man who toils for day wages than he who is able to count his wealth by millions. Nothing could be more discouraging or unfair than to limit the amount a piece worker shall earn after the price has been fixed. You may calculate with some degree of accuracy the capacity of the locomotive or any other machine, but you can never compute the capacity of a man. No two persons are alike in either mind or body; therefore, their earning capacity is never the same. Also, a man's individual capacity is continually changing from the fact that his output increases as he increases in proficiency, consequently he should be paid accordingly. No matter how much he earns the company is always being amply rewarded by the increased output.

When once a fair price is established for a given operation the employer should encourage the man to increase his effort to make all he can. A discouraged piece worker when he has passed through the experience of having the prices cut, simply because he has hustled will naturally plan to make the time fit the price and thus destroy all the advantage which otherwise might be gained.

One advantage which the piece worker gains over the day worker is the opportunity to demonstrate his capabilities for advancement; the man who increases the output by his own individual exertion is bound to be noticed.

An instance came under my personal observation where a superintendent of motive power came to his shop foreman and said, "Who is this man who is earning such big money working by the piece? He must be a hustler. I am looking for a man to fill a good, responsible position, and I thought I would like to look him over." It is said that opportunity to do better comes to every man at least twice in his life time. If this be true, the one who has demonstrated his fitness for advancement is sure to win.

If space would permit we might go into details to show the great advantage the shop organized on the piece work plan has over any other. After an experience of a number of years I am free to say that there is almost no limit to the amount of work which can be turnedoutfroma wellorganized amount of work which can be turned out from a well organized piece work shop. The greatest anxiety the foreman has is to get work enough to keep his men busy. No time need be spent watching the men to keep them from idling, the men will be active in seeing that the work is finished in time. They are all practically in business for themselves, and are always very loath to take as partner any one who is not willing to do his share. Consequently, the lazy, indifferent workman soon loses caste among his fellows. With a good corps of honest, faithful inspectors the quality of the work likewise improves. The men soon find that it does not pay to do a job twice for the price they are to receive. Their ability becomes a matter of individual daily record, which inspires a sense of self-respect which is much greater than by any other plan.

These are only a few of the advantages which can be claimed for the employe.

The advantages which accrue to the company need not be further dwelt upon. A shop filled with a steady, well paid, self-respecting, ambitious, contented lot of piece workers means a shop which can be run up to its fullest capacity with no thought of discord, strikes or trouble of any kind, and to my mind is verging upon the ideal and should be welcomed by employer and employe alike.

Albany, N. Y. H. M. Butts.

PRESIDENT LANFERSIEK: The third and last paper is by Mr. B. E. Miller, of the D. L. & W. R. R., Scranton, Pa.

Mr. Miller presented the following paper:

MR. MILLER'S PAPER.

Scranton, Pa., September 1st, 1905.

To the Officers and Members of the Master Car and Locomotive Painters' Association, Cleveland, Ohio.

The subject, "Piece Work, It's Advantages and Disadvantages from the Standpoints of Both Employer and Employe," has been assigned to me for discussion. It is an old theme which has been frequently debated, not only in our own meetings, but also in allied associations and conventions, in fact at nearly all gatherings of representative railroad men.

Opinion has been divided for and against the adoption of Piece work in railway paint shops. Exponents of the system have, at times, made wild exorbitant claims in its favor, which could not be substantiated, while those opposed in turn have frequently shown a disposition of unfairness and stubbornness which prevented their viewing the subject from an unbiased standpoint.

The introduction of the piece work system has, in many cases, proven a complete unqualified success, while in others it has resulted in utter failure. We are free to assert that in most cases where unsuccessful attempts at the introduction of piece work have been made, or where, after its establishment, the practice was abandoned, the failure was, in a large measure, due to inexperience, lassitude and lukewarmness of the head of the department or lack of spirit and hearty co-operation on the part of the middleman, or foreman, coming in direct contact with the men affected by the change.

The past twenty years' experience, divided by us about equally between piece work and day work, both as employe as well as employer of labor, and being put in, as it were, on both sides of the fence, prompts us to unhesitatingly declare in favor of the piece work system in shops where conditions warrant its installation, as being advantageous to both parties.

Car paint shops with a monthly output of ten or more passenger cars; locomotive shops of similar capacity and freight paint shops turning out twenty-five or more new or repainted cars of different kinds, would be considered by us as favorable fields for the piece work system. Shops of a smaller capacity would probably be conducted with equally good success on the day work plan.

For the successful operation of the piece work system volume is necessary. The work must be subdivided and specialized. Men must become experts in various lines and kept at certain classes of work to the mutual profit of both employer and employe. The general all around man must, in a measure, give way to the specialist or expert in the different branches of the trade. He will be rewarded by increased earnings while, when once accustomed to the work, his task will be found no more arduous than under the old system of day work. There is no room for the drone or incompetent, he must either keep up with the procession or drop out entirely, making room for the more ambitious worker and the superior mechanic. Seldom, however, is this expedient necessary. Men with the requisite grit and stick-to-a-tiveness succeed eventually and often prove the more valuable and better satisfied help being, in this respect, more desirable than the naturally swift or active worker.

There is usually more or less opposition, among workmen, to the introduction of piecework, and, frequently, much diplomacy is necessary to accomplish the desired end. Strikes have been known to result from injudicious attempts at forcing the issue. Experience, however, has taught that the most strenuous opponents of the system, and those who, in the beginning, are the loudest in their protests against the change from day work to piece work subsequently become the warmest advocates of the latter class of work and usually protest severely when asked occasionally, even temporarily, to return to the former system. This is an absolute fact and almost without exception.

Let us briefly touch upon the advantages to be gained by both employer and employe in the successfully operated piece work shop. The principal argument of the employer, in favor of the piece work system is, of course, the increase in production over the old system and a consequent reduction in cost. This is the inevitable result when piece work is introduced and conducted along practical lines. No matter how faithful a body of men may have been and how diligently they may have applied themselves to their daily labor under the old system, believing that further reduction was almost out of the question, the cost of nearly every class of work is easily still further reduced to a considerable extent when the change from day work to piece work is made. Men at once become resourceful creatures, they resort to every strategy, their brain is brought into active use and work is laid out and planned a long way ahead. Every advantage is eagerly sought, no unnecessary steps are taken, no superfluous movements are indulged in, all of which costs them practically no additional effort, and not only are they, themselves, the gainers thereby, but the employer shares in the profits as well.

Another advantage which accrues to the employer is the fact that piece work is bound to give him a more proficient, more intelligent and better satisfied lot of men to deal with. Once the piece work system is established and in smooth running order very little friction is apt to occur and beyond an occasional dispute over a proposed new piece work price or the readjustment of an old one, little cause for wrangling exists.

The advantages gained by the employe are also of a substantial nature. The financial gain to him in dollars and cents, earned with little additional exertion on his part, is a convincing argument with him in favor of piece work, overshadowing all other points which might be advanced, and contributing substantially to his peace of mind and general satisfaction with the system. This gain in wages he would be loath to relinquish and, as previously stated, it would be a difficult matter to induce a lot of men who had been employed on the piece work plan for any considerable length of time to return to the old system of day work. A better satisfied and more contented complement of men than those employed, for a time, on the piece system it would be difficult to discover.

Besides the substantial gain in wages usually resulting to the piece worker, and which any fair-minded employer is willing to concede to him, the enjoyment of greater personal liberty and less stringent shop rules are important factors in causing the men to rally around the banner of piece work and make them permanent converts to the system. These remarks, however, must not be construed to mean that the introduction of piece work means the surrender of discipline and the abolishment of established working hours, shop rules, etc. Nothing of the kind takes place; on the contrary, strict discipline must be enforced at all times, no new rules are necessary, no old ones need be abolished, no leniency as to the required hours to be put in at work need be shown, but the fact is that hustling, pushing and driving which, at times, was found expedient under the old day work system, will now be found almost unnecessary, a condition which will be soon enough appreciated and thoroughly enjoyed by all workmen.

In a shop of this kind it is but natural that eventually matters are bound to run rather smoothly, improved methods are invented and numerous small labor saving devices are discovered by the men themselves and put into execution. Heretofore everything depended upon the foreman, his was the master mind to do all the planning, all the urging and, in fact, he furnished all the thinking power needed in prosecuting the work, but now he is materially aided along those lines by the men themselevs, who do their own hustling and scheming, thus furnishing, unconsciously perhaps, a large portion of the brain work to the mutual advantage of both.

Having thus briefly touched upon the advantages of the system from the standpoint of both employer and employe, let us in a like manner view the picture from the other side, and consider its disadvantages which, though slight and by no means numerous, are deserving of mention.

It has been claimed by opponents of the piece work system that inferior work was sure to follow its adoption and that carelessness; dishonesty and natural hoggishness of men would soon assert themselves to the detriment of good work and that incidentally everything would go to the eternal bow-wows as far as neat, clean and first-class workmanship was concerned. To those we would say that nothing could be farther from the truth, and that experience not only has disproved this argument, but that frequently the reverse is true. If true in isolated cases we feel free in asserting that again the foreman is at fault and that improper organization and careless methods have been instrumental in bringing about the conditions. He may have been overloaded with work, he may be in need of a wideawake assistant or additional clerical help, and again he might have been negligent himself, for under no circumstances can the blame for careless, slipshod work be attached to the system, but it is invariably the result of shiftless or incompetent supervision. In the properly conducted shop the work is done not only as well but in many instances actually better than on the day work basis. These are not idle assertions, but indisputable facts based upon actual experience.

It will be argued by some that in a piece work shop the help is more or less tied up and that the foreman frequently is at a loss where to put his hands on a man needed here and there or on emergency work usually best performed by day work. He feels disinclined to disturb the piece worker, deeming it an injustice to pull him away from his work and asking him to stand the loss in time naturally incurred by changing from one task to another. The argument does not hold good and the seeming inconvenience instead of being a detriment is at times a blessing in disguise. The foreman usually devises some means of squeezing the odd jobs out of someone who happens to be disengaged or an apprentice is called upon to help out in the matter.

Speaking of apprentices. It is our opinion that they should at all times be worked by the day, and while we thoroughly believe in the efficacy of a properly conducted apprentice system the matter of apprentices should not be overdone. In our estimation the number of apprentices should approximate one to every eight or ten of all other classes of paint shop help. An excessive number of apprentices in a piece work shop would be apt to interfere with the successful and economic operation as such besides working an injustice to the boys who are there to learn and be taught and to whom we are looking for our future mechanics and piece workers.

The increased cost of supervision and clerical hire necessitated by the adoption of piece work is, perhaps, the only argument against the system worthy of serious consideration. All work must be thoroughly inspected and if a good sized force is employed, making it impossible for the foreman to look after these duties himself, an assistant or piece work inspector must be installed to relieve him of this duty. Clerical help will be found necessary to provide piece work schedules from time to time, and finally all piece work slips should be carefully checked by competent office help after having passed the hands of the foreman or inspector and approved by them. This checking will be found necessary to prevent duplication and errors or attempts at dishonesty. However, as the increased cost on this account is counterbalanced many times over by the general saving effected in favor of piece work, the argument cannot be considered a valid one.

The success at piece work is due almost wholly to the wideawake diplomatic and experienced foreman, the man of patience and perseverance, a keen and observing, yet fair-minded person, ever ready to score a point for his employer at the same time treating with impartiality and fairness those employed under him. He must be free from arrogance and stubbornness and, if found expedient, willing to occasionally yield a point if fairly convinced that the interests of his employer are best served by such concession. Men of this kind are naturally scarce, especially those who have had a practical experience piece work. If you are without a man of this kind at your command it would pay you to make haste slowly. Do not attempt to make the change from day work to piece work with one bold stroke at a given time. Better introduce it gradually, sneak it in, as it were, using diplomacy. A little molasses here, a little persuasion there, and force if necessary at the proper time and place. Thus will you succeed and once with piece work in successful operation you will be convinced of the superiority of the system. The advantages will greatly overbalance the disadvantages and you will never think of returning to the old method of work.

Respectfully submitted,

B. E. Miller,
Master Painter, D. L. & W. R. R.

PRESIDENT LANFERSIEK: I have another short paper on the advantages and disadvantages of piece work, by Mr. Fred W. Bowers, of Kent, Ohio, and if there is no objection, I will have it read by the Secretary.

MR. BOWERS' PAPER.

President and Members of Master Car and Locomotive Painters' Association:

Although not a member of committee on subject No. 2, "Piece Work, Its Advantages and Disadvantages From the Standpoint of Both Employer and Employe," but at the suggestion of one of the members that I give my experience on this very important subject in which we are all interested.

When we consider carefully the importance of this subject, it can readily be perceived that piece work is the first and essential step to the solution of the problem, as to the amount and compensation an employe shall receive for each piece of labor performed by him, also the quality he is expected to give in return for the same.

Before piece work was fairly introduced and given a just trial, it was objected to and discouraged by some on account of a scheme to get more work, regardless of quality, especially employes looked upon the same with mistrust, as they thought it a stab at their wage rate, but now the go-ahead class of mechanics in shops where the piece price problem has been solved, are satisfied and would not welcome the return of the former system of day work.

There are some certain operations in the railroad paint shop that cannot be successfully performed under the piece work system, but they are few. Among them I might mention matching of colors, touching up after the trimmers, steam fitters, carpenters, etc.

The question sometimes arises, Does the quality of work performed by piece work compare favorably with that performed by day work? to which I reply in the affirmative, provided, however, that a rigid system of inspection is enforced and the prices are fair. Neither can the shop on the day work plan, minus of an exacting system of inspection, as the reputation of every shop, irrespective of what wage system governs the same, hinges on that point.

Increased "output" at a decreased cost over that of day work is really the object of piece work system and in maintaining the increased "output" at a decreased cost, the mechanic is not selling "output" but skill and ability to create the same. "Output" is what the motive power departments are seeking when considering the usefulness of the paint shop, and "output" is what the piece work system is furnishing.

Another praise worthy feature of this system once fairly worked out and put into practice, is that it creates a sense of partnership between employe and employer, in which the interest of one comes to be the recognized interest of both, and I think it is the only modern and profitable method of conducting shop operations, employer and employe being considered alike.

The best recommendation to be offered in its behalf is the statement that both foreman and men having been once profited by this system, are opposed to its abandonment, as it stimulates energy and makes each a contributing factor to the total capacity of the paint shop.

Fred W. Bowers, M. C. P., Erie R. R.
Kent, O.

PRESIDENT LANFERSIEK: Gentlemen, before we proceed to the discussion of this subject, I want to say that we have with us this morning Mr. A. B. Phelps, President of the National Maintenance of Way Painters' Association of the United States, and I know will all be pleased to hear from him. Gentlemen, I have the pleasure of introducing to you Mr. Phelps, who will now address you.

MR. PHELPS: Mr. President and gentlemen of the convention of Master Car & Locomotive Painters: I slipped into the room as quietly as I could. I did not want to disturb the meeting, and I am sorry that I did. I did not want to be seen and I did not want to be heard, but Mr. Brown was a little too much for me. I can only say that we have a small organization similar to your own. We call it the Association of Maintenance of Way Painters, which will meet in Cincinnati on November the 14th and 15th, and as a representative of that organization I greet you heartily, and offer you the best greeting that we can. I would like it. if you consider it best, if you would send officially one or more representatives to the convention down there, and I hope that each member of this organization will consider that he has a perfect right to come, and will be welcomed if he will attend that meeting at that time, and as we are very young and you are old and prosperous we simply will ask an interest in your prayers. I thank you. (Applause.)

PRESIDENT LANFERSIEK: Subject No. 2 is now ready for discussion.

MR. LORD: I would like to say that the papers that have been read on piece work were very interesting. The shops that I am connected with are on piece work, and I cannot see from hearing those papers but what they have expressed my views to the letter. There are few subjects but what they have covered. There were points in Mr. Orr's paper where he said men worked without knowing what they were going to receive. We are obliged to give every man a book of the prices they are to work for, so that each man knows just exactly what he will make and what he is getting for his job. So that there is no trouble in that respect. There were many points touched on in those papers that were interesting to me.

because I have been through the same experience, being called up to answer why one man was getting more pay than another at the same price. etc., and the men that are on piece work understand very thoroughly why they do. It is because one man will do his work a good deal easier and quicker than another, and accomplish more and get more out of it. I can heartily say that if I were to return to the day wages, I am afraid I would have to get new men to go to work for me, and I am convinced that piece work has come to stay. It is the only satisfactory way that we can do our work. It is of more benefit to the company. You can turn out more work and get better results. The men will make more pay and you are not required to have nearly as many men to do the same amount of work as on day work. So I am satisfied that piece work is the satisfactory way of doing it.

MR. GOHEN: There is a little matter I was requested to bring before the Association, and it won't take but a minute. A number of the members have gone personally to the representatives of The Sherwin-Williams Co., and said they would like to visit their place if it would be agreeable to them, and they asked me what I thought about it. I told them I thought it would be eminently proper. That is one of the representative concerns in the country, and is located here in Cleveland and they have extended an invitation on the request of these parties to all the members of the convention and would like to have you go over there tomorrow afternoon. They have gone into the matter of seeing whether it could be arranged for the convention to go there—that is, with the supply people, and they have arranged satisfactorily in that way. I presume they will have a little treat of some kind for you, and I have been requested to put it before the convention, whether they wish to accept the invitation of the Sherwin-Williams Company to visit their works tomorrow afternoon. I will say to those of you who have never been there, that it will open your eyes. It is a great concern, and they have many ways of doing things over there which are mysteries if you have not seen them.

PRESIDENT LANFERSIEK: You have heard the remarks of Mr. Gohen. A motion to accept or reject the invitation of The Sherwin-Williams Company is now in order.

MR. STOUT: I move we accept the invitation.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: Gentlemen; I believe the papers read on No. 2 covered the ground very fully, and I think any further discussion is useless. We will therefore pass to the next subject, No. 3—"The Best Material and Method in the Construction of Paint Shop Floors That Give Best Results From the Painters' Point of View." The first paper is by Mr. J. W. Houser, of the Cumberland Valley R. R., Chambersburg, Pa.

Mr. Houser read his paper, as follows:

MR. HOUSER'S PAPER.

Chambersburg, Pa.

The best material and method in the construction of paint shop floors that give the best results from the painter's point of view.

I believe the idea of this subject is to get the opinions of the painter in regard to such floor as he has had experience with. My early experience in this direction was with plank or wooden floors. My later experience has been with a more modern and substantial one, namely, vitrified brick laid with cement. This floor, if properly constructed, will give very good results and can be laid at a normal expense, about $1.40 per square yard, and after the first cost, the expense of maintenance is practically nothing for years.

The shop I refer to has a floor of this kind which was laid eight years ago, and up to the present time has not cost one cent for repairs. It is easily kept clean, as it can be flushed with water at any time and if properly drained when laid, will dry off in a few minutes. After eight years' experience with the floor referred to, we think we have one of the best, if not the very best, that can be had for a paint shop.

At first we were in doubt as to what effect this floor would have in the temperature of the shop in cold weather, but found to our very great satisfaction that it is all right. The bricks seem to absorb the heat and we do not have any trouble in maintaining almost any degree of temperature which is desired, on account of the perfectly dry condition of the floor. Our shop is practically free from dampness and thus far we have not had any trouble with varnishes or colors drying. Very respectfully, J. W. Houser.

PRESIDENT LANFERSIEK: The next paper is by Mr. F. A. Weis, Central R. R. of N. J., Elizabeth, N. J.

The Secretary read the papers, as follows:

MR. WEIS' PAPER.

Elizabeth, N. J., August 28, 1905.

Mr. President and Members of the Master Car and Locomotive Painters' Association:

Gentlemen: With reference to the relative merits of the various floors for paint shops, viz: Cement, asphalt, block and plank.

Having had considerable experience with all of the above mentioned floors, can safely recommend:

First: Cement; because when properly installed, will remain hard and smooth and the generation of dust therefrom will be very small; is absolutely fire-proof; will absorb very little water, insuring against dampness; is easily kept clean, and in ordinary paint shop service requires practically no repairs. I might emphasize the fact that the proper installation is a very important factor.

Second: Asphalt; but it is inflammable; hard to keep clean; will become soft in warm temperature, at which time it is easily indented.

Third: Wood block; but the wood must be chemically treated to prevent rotting within a very short time; must be perfectly laid; filling all spaces between the blocks flush with the top surface of the blocks; it is practically impossible to keep the top surface smooth. Again, it is absolutely necessary to have good foundation under the blocks or there will be a tendency to settle in spots, causing ruts or uneven surface. Wood blocks absorb moisture easily, creating dampness. On account of the necessity of building a good foundation under the wood blocks and the repairs necessary, the cost would be as great, if not greater than cement.

Again, wood block is inflammable, which is no small item in a paint shop. Therefore the cement floor is not only much better, but cheaper as a paint shop floor.

Plank makes a poor floor at best.

Cost of Modern Floors: The cost of a cement floor, both as regards first cost of installation and maintenance is less than asphalt or wood block, therefore, I am heartily in favor of the cement floor for paint shop.

In my opinion the best method of construction of paint shop floors is as follows, provided cement or asphalt is the material selected for the purpose:

All drains to be under floor.

One drain under each car, in center, both as regards track and car, (see sketch No. 1), with sanitary trap, the floor to be one and one-half inches lower than top of rails at highest points. This height to be maintained along inside of rails, but to be depressed in center on a gradual slope toward drain opening in floor, both from rails and ends of tracks, see sketches Nos. 2 and 3.

The floor between the tracks should slope from rail, at which point it should be flush with the top of rail, up at an angle of one-quarter of an inch per foot (see sketch No. 4).

Respectfully submitted, F. A. Weiss,
C. R. R. of N. J.

PRESIDENT LANFERSIEK: The third and last paper is by Mr. J. H. Whittington, Chicago & Alton R. R., Bloomington, Ill.

The Secretary then read the paper, as follows:

MR. WHITTINGTON'S PAPER.

To the Master Car and Locomotive Painters' Association:

Gentlemen: The subject assigned me is a very difficult problem for a painter to handle, inasmuch as this subject usually comes under the supervision of mechanical engineers, whose duty it is to prepare plans and specifications along these lines to be worked out by practical mechanics in the building department, and these plans are seldom referred to the master painter for his approval, or is he asked if he has any suggestions to offer.

In most cases the floors are made, and the master painter told to go in and paint cars, if we were given the least consideration in these matters I think the main aim would be to see that the foundation would be equally as good as priming coats on a car, as it is a very sure case of faulty work if the foundation is not properly prepared and put down right. From a painter's point of view as to the best methods and material employed in the construction of a paint shop floor, I will treat to the best of my ability. From a sanitary point of view, I prefer a concrete floor, as the health of our employes must be looked after, as the quality and quantity of the work largely depends on the convenience and the good health among the employes. From experiences I have had with both wood and concrete floors, I find it is not practical nor healthful to have a wood floor in the shop, as it is generally known that wooden floors absorb and retain a certain amount of all infectious liquids that fall on it, and some of it will go through the floor through the numerous openings, and stays there unmolested and produces diseases in the shape of malaria and fevers; whereas, if you have a good concrete floor with the proper drainage and sewerage, this detriment is easily overcome by simply washing the floor with a weak solution of potash, flooding it with a hose, and it soon presents a neat, clean appearance at all times. If kept sprinkled, and occasionally a small amount of some good disinfectant is added it will not only keep the dust settled, but will add greatly to the health of your employes.

I wish to refer you to the Illinois Central Railroad paint-shop at Burnside, Chicago, which is one of the most complete railroad paint shops in the west.

The following formula, I think, if carried out, will give entire satisfaction. Cement or concrete floors should be laid as follows: The ground should be leveled off about 10 inches below the finished surface of the floor, and well settled by ramming; a foundation five inches thick should then be laid, of either coarse gravel, stone chips, sand or coal ashes well tamped or rolled with a heavy roller. The concrete should then be prepared in the proportion of one part of cement, two parts of sand and three parts of gravel, mixed dry; then a sufficient quantity of water is added to make a stiff mortar; this concrete should be spread in a layer from three to four inches thick and should be well tamped. Before the concrete has set, the top or finishing coat should be laid, and only as much concrete should be used as can be covered with cement the same day, for if the concrete becomes dry on top, the finishing coat will not adhere to it. The top coat should be prepared by mixing one part of the best Portland cement and one part of fine sand, or clean, sharp, crushed granite, or flint rock. The material should be thoroughly mixed, dry, and water added to give the consistency of plastic mortar; and it should be applied with a trowel one inch thick and carefully smoothed and leveled on top between straight edges laid as guides.

This, I think, will make a good, lasting floor.

Respectfully, J. H. Whittington,

Bloomington, Ill. Chicago & Alton Railway Company.

PRESIDENT LANFERSIEK: Gentlemen, the subject is now ready for discussion, and we would be pleased to hear from any of the members.

MR. MILLER: I would like to hear from some of the members having concrete floors in operation. I have visited a number of shops where floors of this kind have been installed, and it seems the universal opinion that the concrete floor is a very dusty thing, especially where the place is heated by the hot air system. In my opinion, vitrified brick floor is the thing on account of the objection just mentioned to the concrete floor. In this opinion I know I am upheld by a number of the members. I do not know whether they are in the room or not, and I would like to hear from some of them on the concrete floor question.

MR. LORD: I would like to ask if anyone has any trouble or complaint from their men of their feet getting sore from traveling around on this concrete? I met a man on the train coming out here that is connected with an establishment at Beverly, Massachusetts, where the whole establishment is made of concrete from the foundations to the top of the buildings, and he said he was obliged to leave his job on account of his feet getting so sore in traveling around on the floor that he could not work, and could not stand it, and there were a number of men affected the same way. This is the first time I ever heard anything of the kind.

MR. MANN: With regard to dust getting on the concrete floor, in our shop we have a concrete floor, and we did have some trouble in keeping the dust down, which would accumulate. First I got a broom and had the men sweep the shop, but that did not seem to be successful; we got then a large brush about eighteen inches long, and that made very good success, but the best thing I found was coal oil and saw dust mixed together sprinkled over, then take an ordinary broom and every particle of the dust was removed without any trouble.

PRESIDENT LANFERSIEK: Do you have any complaints from the men about their feet?

MR. MANN: In reference to that, I cannot say that I have had any experience, or heard of any trouble. Once in awhile I get tired myself standing around when everything is going lovely. (Laughter.)

MR. MORRIS: We never have any complaints about feet getting tired; in fact, when the whistle blows the men run and are quite in a hurry to get off their overalls. As for dust, we never have a particle of dust. We have a drain under ground. It is perfectly clean and we have never had any trouble about dust.

MR. HUTCHINSON: I am much interested in this floor question. I am located at London, Ontario, and we have there practically a new shop, unfortunately we have a plank floor, and therefore I am in hopes in the near future of getting the best floor, so you can understand that I am interested in this question. But as Mr. Miller suggested a vitrified brick floor and the gentleman who spoke previous to him referred to complaints made by the men about their feet being sore, I would say that in our stock room we have a brick floor. It is not a new building, it belonged to the store department, and we fell heir to it, as it were. My stock men have complained about the brick floor, and I am anxious to hear, of course, from those who have had experience in this line, for the reason that if there is anything in this, we want to decide, of course, on the best floor. We have the plank floor in the shop, and I need not go over the disadvantages of a plank floor; you all know them well but so far as a brick floor is concerned, it just occurred to me, as that gentlemen has mentioned it, that my stock men and the men in the sash room, which has also a brick floor, have made complaints about the brick floor. If it were possible, I think, myself a brick floor would be the best floor, for several reasons; one reason in particular would be the dust, and another reason would be that perhaps if the floor were damaged it could be repaired very easily, and I therefore think the brick floor would be the best floor, if it could be made smooth, so that the low parts, where the bricks join which naturally make ridges, would not affect the feet or injure the feet in that way.

MR. HOUSER: I can readily see that there might be some complaint from the stock-keeper, but the stock room should be a proper one. Now, in the shop they are on a scaffold and off a scaffold; they are not on the floor constantly. They would not average half a day on the floor. We have had a brick floor in the shop for eight years, and I believe I have yet to hear the first complaint from any of our men in that direction. Now, we have vitrified brick and I do not think we are having any trouble keeping it clean. Sometimes it gets a little dirty, but I guess that is partly my fault and the sweeper's fault, but it can be kept clean. As far as injury to the men is concerned, I do not believe we have ever had a complaint, but in the stock room, of course the stock-keeper is on the floor constantly, he does not get any change at all; it is simply one thing all the time, and I believe that it might be injurious, but in the shop, I do not believe it is injurious.

MR. CLARE: I have worked on a brick floor for six years, and I would say that brick is much preferable to a smooth finished or cinderlithic floor for this reason: The paint shop proper was brick and the stock room was smooth finished, and having left a board floor to go to this shop, I soon found the difference. In a month's time I was so crippled I could hardly get about until I had become more accustomed to it. On a smooth finished or cinderlithic floor, it is just about like trying to walk on ice. I think that is one of the things that make the men so tired and the floor objectionable to them. I think that is a question to be considered, whether we ought to have a smooth finished floor. As for the dirt, I do not see that there is much difference. Both floors will get an accumulation of dust.

MR. MILLER: As I understand it, the objection to the concrete floor, from the standpoint of creating dust, was on account of the softness of the concrete or the preparation with which the floor was finished. Continuous sweeping would loosen up the fine dust and particles of concrete would be blown around the shops. I have had men tell me they could sweep the shop perfectly clean, go from one end to the other, then go right back and start over again, and they would have just as a big a pile, and they could keep that up all day. It just loosens it from the floor probably because the floor was not put down properly, not enough cement used, perhaps, and that I find has been the greatest objection to the cement floor. We have with us Mr. Shore, of the Lake Shore, who has recently been installed in new shops at Collingwood. I should like to hear from him on the concrete floor question. I understood you have them?

MR. SHORE: Yes, sir. I would say it is harder on the men, especially where they have got to be chasing around all day. It is a strain on your feet. We have got concrete and we have got a grating there, which I do not approve of. I think we made a mistake there, because the dirt goes there, and you have got to lift that up and it costs time and money to clean them out. I was only sorry that some of the members here were not up to our shop to see the scaffold we have got. I think we have a scaffold that is all right, with one exception, and that is, we have got it a little too close to the car. A draughtsman made that (Laughter), and he did not consult the painter. So we put it up. We found when we first started they had three boards, and the man could not stand there, and when he got down to the baggage car he would be liable to fall off. We finally lengthened it, and put it to the upright, with a weight and cable to it, and a little button to pull out, which catches it at the height you want. As to our stock room, I must say we have a very nice stock room.

MR. COOK: What has been your experience as to dust

MR. SHORE: Our tanks are put on one side and the varnish, oil, turpentine, etc., room is back of that. We have an elevator running up and down on which we pit all the barrels. We have a great many shipments over the road, for we supply a great many roads with material on our line. We are not bothered much with dust.

MR. ROSCOE: For the last three years I have had experience with a cement floor in the paint shop, and previous to that we were on an oak plank floor. We have got no paint shop; we do the carpenter work and paint work under the same roof. A s far as dust is concerned, we are well fixed for dust. We also overhaul the trucks in the paint shop. You know how grease and dirt accumulates on the trucks, and drops on the cement floor and remains there until somebody sweeps it up, but for all of that I would not give up the cement floor for anything we had previous to that and as far as sweeping the cement floor is concerned, the dust and cement you sweep off of that is nothing to speak of. It is laid with good cement and adheres. Again, it does not crumble off. At times when our shop is emptied, to keep the floor good and hard and free from dust, we take some drying oil, put it in a sprinkler and go over the floor. Sometimes they use Japan oil. I find that to be very good to keep the dust settled. As far as I am concerned, I would not "swap" the cement floor for anything we have had experience in for a paint shop floor.

I do not know anything about vitrified brick for floors, but with regard to some of the people complaining about their feet getting tired by constantly remaining on the cement floor, in the sash room, where they work at the table or bench, they lay carpets down and stand on it, and that makes it a little softer, and protects their feet in that way. For those who have tender feet, as they call it, I could recommend rubber heels or cork soles for them. As far as I am concerned, it never gives me any trouble. I have walked on it for the last four years, and do not feel any bad effects from it yet.

MR. BROWN: Mr. Dutton has a floor in his shop. I would like to hear from him.

MR. DUTTON: Concrete seems to wear off constantly. We use, instead of brooms, brushes to sweep it off. I would prefer a brick floor or something of an asphalt nature.

MR. QUEST: I think I replied to a communication from Mr. Miller, and I do not know just how far I committed myself in that reply. But we have never had any trouble or complaints from the men having sore feet from standing or working on the cement floor, but we did have some little trouble from the floors, as they were, becoming saturated with the stuff running down off the side of the car, and it became so smooth and slippery that there was danger of throwing people; it would get very slippery. We tried a broom at the beginning for sweeping and abandoned it for a brush, as referred to by one of the previous speakers. We have a mechanical heating and ventilating system, and of course if there is any deterioration of the floor—that is, through loosening it up—we have got that trouble. To overcome the slippery and smooth feature of it, we occasionally use a lye solution and go over the floor. The base of our floor is concrete and the top is cement, presumably put down, as suggested in one of those papers, so that it was a thorough amalgamation of concrete and cement. That I suppose is done to prevent the top layer separating from the lower layer. Our floor slopes down into a thirty-inch pit. We have pits in our shop, and we have no trouble from the water lying on the surface, and I should judge that there would not be any trouble in cleaning off the floor if you used old abandoned carpets or something of that kind under the car; in fact, lately we have resorted to that in order to save some lye cleaning.

MR. HUTCHINSON: Proper drainage is something we ought not to forget about.

MR. QUEST: Our floor drains into pits—that is, the water from washing the cars drains into a thirty-inch pit. Our shop is longitudinal. and the pit extends the full length of the shop, and the drainage opens in the center of the pits.

MR. COWAN: We have had new shops, and I was very much disappointed that we did not get a cement floor. There is only one section that has a cement floor. I found no trouble from the men from that floor, and have had no complaints at all. As for the dust, I found as much dust with the wooden floor as I do with our cement floor. The only place I ever heard a complaint from, was in the stock room. Our stock room and pattern room are together. The men in the pattern room have found it kind of hard on their feet, and they used pieces of carpets, but in the section that we have got for washing, and doing varnishing now and then, I have heard no complaints.

MR. SHORE: Speaking about the stock room, puts me in mind that I painted the floor, and there is no dust in there at all. Take the cellar in your own house, it will accumulate dust all the time. In my stock room I painted it from one end to the other. Probably once in two months I give it a coat of paint, still it is a stone floor just the same.

MR. BURTON: I have worked in shops where the floors have cement, and shops where they have been brick, and I believe this talk about hurting the feet is all bosh. A fellow wood or a cement floor. No one has spken abut the cement Do you mean to tell me that there is more spring to the cement, that it is easy on the fellow's feet? Does a plank two inches thick give when you walk on it? The very fact of walking on brick makes a fellow feel he is getting something unusual. It would hurt him just as bad if it were wood or a cement floor. No one has spoken about the cement cracking. I visited several shops yesterday and noticed where the floor had cracked all around. You do not see that in a brick floor. As far as the dust question is concerned, I see no difference. In the vitrified brick floor, it is well grouted, as they call it, with cement. This gentleman over here spoke about painting the cement floor. I want to talk to him. I am up against that now. I was called on to paint our engine room, which has a cement floor, and I have been scratching my head. They want something there that won't cme off. If you have something to paint a cement floor that will stay I want to talk to you, (referring to Mr. Shore).

MR. RODABAUGH: I have a cement floor in our shop and have had it for about twenty-two years, and it is as good to-day, most of it, as when it was put down. I have never had any trouble about dust, and never heard anyone complain about sore feet. If anybody has sore feet in a paint shop he must be either constitutionally tired or working on day work. (Laughter.) I prefer the cement floor. I have worked on both—three of them—brick, plank and cement, and I have never seen anything to excel the cement floor in a paint shop. You can keep it clean, it is always nice and in good order, with very little labor. There is no labor at all to keep it clean. I have never had the trouble that my older brother there speaks of, and cleaning it off with lye. We never had any trouble except around the mixing table. He uses different material and it drops down and accumulates there, but we do not use that kind of material, (Laughter).

MR. PITARD: This is a very important question. For a good many years the wooden floor was in use and I know there has been a gradual change, and the tendency is toward the concrete floor. In our shop we have a wooden floor made of pine, and I think in the last eight or ten years we have had about two new floors put down. It decays very readily. I am down in that section of the country from where you get your yellow pine and turpentine. The pine is bled and it decays much quicker than if the turpentine were left in. Where it has been bled and put in a position where it is constantly subjected to dampness, it rots much more readily. In my shop I have noticed in the morning in opening the doors there was a very bad odor in the shop arising from the rotting of the floor, and, naturally, fevers will be the result in such cases. For that reason I favor the concrete floor. As far as the inconvenience to the feet is concerned, you know when you change the surroundings of some people, about the first thing they look for is the disadvantage rather than the advantage, and, as the saying goes, some people would kick if they were playing football. It is very important that the sentiment of this convention be clearly understood on this point, for the reason that it may decide the destiny of some other member when he makes application for a concrete floor. Therefore, I move you that it is the sentiment of this convention that the concrete floor is the proper thing for paint shops.

The motion was seconded.

MR. MILLER: Am I to understand that the brick floor is to be discriminated against?

PRESIDENT LANFERSIEK: Yes.

MR. MILLER: I would offer an amendment to that motion --that concrete or brick be suitable for paint shop floors.

MR. PITARD: I will accept the amendment.

MR. RODABAUGH: I would offer an amendment to the amendment—that the word "brick" be left out (Laughter).

PRESIDENT LANFERSEIEK: The motion now is, that it is the sense of this convention that either cement or brick is the most suitable for paint shop floors if properly constructed.

The motion was carried.

PRESIDENT LANFERSIEK: We will now pass to the next subject, No. 4—"Are you burning off your passenger equipment before it is necessary?" The first paper on this subject is by Mr. Albert V. Locke of the Brooklyn Rapid Transit R. R., Brooklyn, N. Y.

The Secretary read Mr. Locke's paper as follows:

MR. LOCKE'S PAPER.

"Are You Burning Off Your Passenger Equipment Before It Is Necessary?" is a question of importance to the management of every road, although, perhaps, it is given too little attention as a rule.

Treating the subject in a general way, I should answer, no, we do not burn off our equipment before it is necessary. It is my observation that most roads in their desire to keep expenses down and get all that is possible out of the paint, run the cars too long before revarnishing; necessitating the cutting in of the bodies, when if treated at the proper time, touching up and a coat of varnish would have been sufficient. Repeated coating in this manner causes cracks, and each succeeding treatment adds to the depth. When it is finally decided to overhaul and repaint, the question arises: shall I burn off the paint? Perhaps I can better illustrate my personal opinion by telling you what we are doing on the Brooklyn Rapid Transit. Our cars had been running from six years to a period back beyond the memory of man, and were in all kind of conditions; out of 493 that have been through the shop for year ending September 1st, 1905, 313 were burned off, and the varnish removed from the inside, and I am positive that in no other way could we have obtained the results required by our mechanical department. Although we have experimented (as I suppose all painters have) with knifing surfaces, etc., with varying results, I have yet to learn of a method of filling cracked paint and varnishes so it will "stay filled," and not open in time deeper than before. When conditions are not so bad. as in case of perishing or when the paint and varnish is simply worn out, if the car is shopped at the proper time, I think very few master painters nowadays would recommend the use of the torch, but instead would give the work a good thorough sand-papering, removing everything in the shape of loose paint or putty, after which the usual method of building up would be followed with results equally as good as though the paint had been burnt off, and of course at much less expense.

We of the elevated branch of the business have troubles that the steam surface roads know little of. With a continuous and increasing traffic that taxes the equipment to the limit twenty hours a day, 365 days in the year, with no dull season, there is no time when the operating department does not need every available car. Under these conditions it is easy to guess that our cars are allowed to run too long before being revarnished, and when it is taken into consideration that our stations are only four or five city blocks apart, with all that implies in the way of scratches and bruises, I will leave it to you to imagine the proposition confronting the master painter on an elevated railroad.

I am aware that papers are to be presented here today by gentlemen of wide experience suggesting a method of treating cracked paint without burning off, and while I admit I am a little skeptical, I hope to learn of a way to do this work successfully. Respectfully, Albert V. Locke,
Master Painter, Brooklyn Rapid Transit.

PRESIDENT LANFERSIEK: The next paper is by Mr. A. J. Bishop, of the Northern Pacific Railway, St. Paul, Minn.

Mr. Bishop read his paper as follows:

MR. BISHOP'S PAPER.

President and Members Master Car and Locomotive Painters' Association:

Gentlemen: Having accepted the privilege of replying to query designated as topic No. 4, a topic selected, I presume, for discussion at this convention, I feel that I can readily answer the query, "Are You Burning Off Your Passenger Equipment Before Necessary?" without going into detail. Speaking from experience I have had during my service with the Northern Pacific Railway Company, I answer, No; and in making this reply I do so feeling that I have sufficient data to warrant my taking a firm stand and in making reply make it an emphatic No. In order, however, to make this topic one of some interest and, if it be possible, succeed in bringing out statement of facts where by the service life of the painting upon the equipment may be lengthened, I shall feel as though the little which I may have mentioned has been the means of bringing out something promulgative for better results.

During the year 1896 I burned off and painted sixty-five cars, of which three were business cars, one a postal car, two combination mail and express cars, three express, seven baggage and thirteen emigrant and tourist cars, sixteen coaches, six dining and fourteen sleeping cars, of which there has been burned off since owing to various causes, the following:

Business cars, 1, account reconstruction, service 6 years.
Postal cars, 1, account reconstruction, service 5 years.
Express cars, 1, account reconstruction, service 6 years.
Baggage cars, 1, account being wrecked, service 4 years.
Baggage cars, 1, service 8 years.
Baggage cars, 2, service 6 years.
Emigrant and tourist, 1, account reconstruction, service 3 years.
Emigrant and tourist, 1, account being wrecked, service 5 years.
Emigrant and tourist, 1, service 8 years.
Coaches, 2, account being wrecked, service 4 years.
Coaches, 1, service 5 years.
Coaches, 1, service 8 years.
Dining cars, 1, account reconstruction, service 3 years.
Sleeping cars, 1, service 6 years.
Sleeping cars, 1, service 7 years.
Sleeping cars, 5, service 8 years.

Thus showing that out of the sixty-five cars burned off during 1896, twenty-two have again been burned off, majority of which show a service of eight years, the balance forty-three cars being still in service. From such a showing it can readily be understood why I feel the right to claim that cars are not being burned off unnecessarily. During the years following the foregoing the number of cars burned off were, during 1897, sixty-two, 1898, thirty-eight, 1899, twenty-five; 1900, fifty-nine; 1901, thirty-six; 1902, fifty-one; 1903, forty-eight; 1904, thirty, and for the first six months of 1905, forty. The ratio of service of these years comparing favorably with the service shown for cars burned off during 1896. This data is taken from the records of output from our Como shops, St. Paul, Minn. While we here present figures to establish a ratio to show that cars are not being burned off unnecessarily, the question naturally arises, how about the condition of these that have not been burned off during these nine years. To reply to such a query, I will say that not all of these cars have a piano finish at this time, many are not perfect, there are quite a number of cracked surfaces among the lot, but the majority of these surfaces have a very fair appearance and indications are that muy will not need be burned off for months and possibly a year or two yet to come. Our equipment are practically in continuous service when not shopped, and the territory through which they travel passing through the fertile fields of Minnesota, the bounteous acres of North Dakota, the Bad Lands, the barren waste, the alkali district, and again the wealth producing Rockies of Montana, the rich and productive valley of the Gallatin, again into the picturesque Rockies, winding its way through rocks, forest and glen, piercing the very bowels of Mother Earth, passing through the sandy sage brush desert, being redeemed by irrigation, in Idaho, emerging into the richness of the heart of the Yakima, and then into the beautiful Kittitas valley, again entering into the higher elevation, crossing the Cascades, then descending into and through the great timber lands of Washington and Oregon, coming to a final terminus to prepare for the return voyage into the lower elevation, the warmth and the climatic beauty of the western ocean, giving to the outside of the equipment such a variation of temperature and atmosphere, passing in the trip through sunshine and rain, snow and sleet, wind and storm, heat and cold, variations which can not but have more or less detrimental effect upon the surface, and is such as to be very trying upon the outer surface, i. e., the varnish, and yet our average service between shopping is not less than sixteen months, this equipment in transit making a continuous run of more than 2,000 miles, leaving St. Paul at an altitude of 710, passing through higher and lower altitudes as the distance is traveled, reaching an altitude of 5,565, and terminating at Portland, Oregon, at an altitude of 39, this difference in altitude bringing to the surface variation in temperature and atmosphere the effect of which may readily be realized by the imaginative. I might, if necessary, show among this number of cars quite an assortment of classes that were burned off and painted after having had a service of only two or three years, and these cars were not burned off before necessary. In fact, the surface condition of these cars were in far greater need of removal than we are now able to find upon cars having nine years' service. I am thankful to be able to say that these cars are not of our painting. However, these facts are to me a distinct demonstration that it pays to do work right in the beginning, using good and sufficient stock.

properly applied for proper surfacing and protection in the first painting. It is to us a well known fact that whenever new equipment is purchased that it matters not how careful and exacting the specifications may have been worded the product does not pan out, and results are as heretofore shown, the necessity of burning off cars having had a service of only two to three years. This behooves me to say that I might reply to the query, "Are cars being burned off before necessary or more often than necessary?" Yes; because I do not believe it necessary to apply paint that will not give a longer service than two or three years. It is not only unnecessary, but it is an absolute waste of both labor and materials. Besides this, it certainly does not place those responsible for this state of condition in a very high estimation with those to whom they thus become known or with those who later handle these cars, and are compelled to burn off the surface years before the cars have given anything like an average service.

This respectfully submitted for your consideration,

A. J. Bishop,
Foreman Painter, Northern Pacific Railway.
St. Paul, Minn.

PRESIDENT LANFERSIEK: The third and last paper on this subject is by Mr. John Stock, of the Maine Central R. R., Waterville, Me.

MR. STOCK'S PAPER.

"ARE YOU BURNING OFF YOUR PASSENGER EQUIPMENT BEFORE IT IS NECESSARY?"

Mr. President and Members of the Master Car and Locomotive Painters' Association:

When I received the notification that I had been appointed to write a paper on this subject I thought some one was playing a joke on me. "Are You Burning Off Your Passenger Equipment Before It Is Necessary?" Well, I should say not. We, on the Maine Central, have a lot of cars that need burning off right away, and this is no joke.

When a car has been in service for twenty years and over and never received any such treatment, do you wonder the paint and varnish is falling off in large patches? I think burning off is the only remedy.

On the other hand, I have burnt off a few of our best cars, where the varnish was badly cracked, yet the priming was in good condition. Now, had I known of some successful method of treating these cracks I might have prolonged the operation of burning off for a few years. But I had to apply the torch, knowing no other alternative to give them a respectable appearance.

I hope Mr. Leach will enlighten me how to treat a cracked car, whose priming is still in good condition, so it may give a few more years of service before burning off, for at present I am "up against it" good and hard and know of no other practical way to do it than I have been instructed to do. If there is some successful method and material for painting an old cracked car and make a good lasting job of it without burning it off, then we want to know it, and know it right off, but at present I cannot help my skepticism on the subject, which is derived from my own observation and hearing the experience of older men.

Still, I suppose it is not too late to discover an elixir of life, so that even bald heads may grow a luxuriant crop of hair that is not even grey. This is what I am longing for, and hoping some one will produce. As yet, I am in a waiting attitude for not only this but many other things, a way to successfully paint an old cracked car being one of them. Therefore I have nothing farther to offer upon the subject.

Respectfully submitted, John Stocks.
Waterville, Maine, Aug. 30, 1905.

PRESIDENT LANFERSIEK: Gentlemen, you have heard the papers read. They have fully covered the ground. You will notice this is merely a query, and I think we can close this subject by a vote of the Association. Each member can vote his sentiment and will save all discussion and quicken the business.

MR. MILLER: I move you that it is the sense of this convention that, as a matter of fact, we do not burn off our passenger cars as often as is necessary.

MR. COPP: I think before that motion is put, we had better have Mr. Leach's paper. It was Mr. Leach's paper that was the cause of this subject being presented, and I think the reading of his paper and showing the samples promised to be exhibited would have a material bearing on voting on this subject.

MR. MILLER: I will withdraw my motion.

MR. BISHOP: I had a phone message from Mr. Leach yesterday before I left that he would not be here, and he asked me what he would do with the samples, and I told him to send them to the Hollenden Hotel.

PRESIDENT LANFERSIEK: The Secretary will read Mr. Leach's paper.

The Secretary read the paper as follows:

MR. LEACH'S PAPER.

Mr. President and Gentlemen of the Master Car and Locomotive Painters' Association of the United States and Canada:

In my letter of acceptance to read a paper before this association, entitled "A New Method of Treating an Old Cracked Car," I stated that I would furnish samples of siding taken from an old car showing the process of renovating as performed in the M. & St. L. shops. Unfortunately, I have not been able to obtain the desired and promised material, because of the heavy passenger traffic on our road, and regret exceedingly my inability to thus give you an ocular demonstration of how we treat a car that is filled with unsightly cracks.

A great many methods have been employed to obliterate the unsightly cracks on passenger equipment, but without lasting results. I do not think it proper, at this time, to attempt to tell you the cause of the cracking of paint and varnish on passenger cars, or what has been done to remedy the evil, but will deal only with what I consider the best method of remedying these defects without burning off the car.

After experimenting with all sorts of methods for a number of years—after attempting to fill up the old paint and varnish cracks, and after rubbing down the car with sandstone, which is a tedious and expensive operation, and only a partial success, it occurred to me that by removing some of the paint and varnish and preserving the original foundation as much as possible, the existing evil might be remedied, and if the work is properly done, it is my belief that the repainted car will give longer and better service than when originally painted. With this end in view, I commenced experimenting with "Varnish Remover." The "Remover" is applied with a three inch camel's hair brush, and the varnish kept moist by constant application until it, the "Remover," takes hold of the varnished surface equally all over, or, in other words, until the "Remover" gets in its work. After the varnish loosens up and gets rough, it will hold the "Remover" until it has expended its cutting powers. The dissolved varnish and paint may then be removed with the aid of a putty knife, using care to clean out the beads at each application, as the mush in the beads holds the "Remover" longer than does a flat surface, and if the beads are not cleaned out after each application of the "Remover," the varnish and paint will come off down to the wood. This you want to and can prevent. At the same time, care must be exercised against mutilation of the surface with the knife.

After the first layer of varnish and paint has been removed, you will be able to judge how many applications like the one just described will be necessary to accomplish the desired result. You may have to make three or four applications; this, of course, will depend upon your own judgment and the condition of the car as regards depth of cracks.

After the desired amount of paint and varnish has been removed, allow the car to dry until the following day, then smooth the surface up with rubbing stone and water. The car is then ready for one coat thin flat lead, put on with a camel's hair brush. After this is dry, sandpaper and putty up all imperfections, and the car is ready for the body color.

My experiments along these lines have convinced me that a primer, no matter whether used on wood or iron, should have in its composition some kind of a mineral base.

After a personal experience with both, I recommend the liquid as better than the paste "Remover," because the liquid permits of ready observation at any and all times of its working powers, which the paste "Remover" does not permit of.

I would advise every master painter who adopts this method to familiarize himself thoroughly with the process, that he may the more intelligently instruct the cheap labor to do this class of work. And, en passant, I beg to be excused if I suggest that no amount of argument in favor of or against this, or any other similar procedure, ever did, or ever can, settle the question of its practical value. Only practical test demonstrations upon well known aged and decrepit, cracked and other defaced passenger equipment, can or will prove the value of this or of any similar renovating process. Yours truly, W. F. Leach, M. C. & L. P.
Minneapolis, Minn., September 9th, 1905.

PRESIDENT LANFERSIEK: The paper is now before you for discussion.

MR. BUTTS: I cannot withstand the temptation to say a word or two regarding the paper. A number of years ago I went thoroughly into this subject of trying to remove varnish and retain the old foundation, and the beginning I would say was made upon a car that had a good foundation with the exception of the varnish being worn considerably and I made a success of it, but I soon got hold of a car that was filled with surfacer cracks, where the surfacer had cracked. These cracks go clear down to the priming, and here is where 80 per cent at least of our troubles comes. We have to deal with cracks that are made by a brittle surfaces. Now, I would like to ask any man in this room where he is going to stop when he uses a varnish remover, to save his foundation if he takes off the cracks? If you had nothing but the surfacer crack in the surface coat of varnish to deal with you could carry out a process of that kind with some success. But that is where our trouble lies and another trouble you would find is that if you will attempt to remove the surface painting of a coach one board perhaps will have more surfacer on it than another, but your varnish remover is spread alike over all, and perhaps the car is an old car that has been patched up frequently, and in some instances the boards are covered with the old original surfacer very thick and heavy, and on other parts light, and when you start to take it off, you will find the varnish remover will go clear through the wood in some places and in other places only a short distance. In my experience it is entirely impracticable, will cost more money and you will get poorer results.

MR. PITARD: Mr. Butts' remarks on this subject brings up to my mind past experiences and recollections. It is a very important subject. In my experience I have found a cracked car sometimes where the cracks were only in the varnish, while the surface was in good condition. Naturally we go back to discard the cracks and save the surface, but it is impossible to do so. I remember quite a number of years ago in a shop where I was employed we resorted to a practice for doing this that was ver ysuccessful, and it was the standard method of treating cars at that time in our shop, and we saved considerable labor. Instead of using a varnish remover for taking off the varnish, which I found endanger the under-surface, as Mr. Butts has suggested, we removed the top coating of varnish with ammonia, and did that very safely. It did not seem to injure the under side at all, and did not seem to have any effect. We would go down so far, then we would give the surface a slight rub with pumice stone and water, and proceed then with the top coatings, and we got several years' service out of those old surfaces by that method. At that time we considered it successful, and I have no reason to doubt but what it would be equally successful today. Referring to the papers read a few moments ago, as to whether we are burning off equipment before it is necessary, I am inclined to believe that in some instances we do burn off a car before it is necessary. You will pardon me for digressing from the question under consideration, but I merely make this refernce, and I believe that in many instances if these cracked surfaces where the cracks were only in the varnish were removed with ammonia, the old surface could be retained and built up again, and several years service can be gotten out of it.

MR. BUTTS: I was using ammonia the same as Mr. Pitard used it, but here is where I met my Waterloo. In the first few cars the surface was in fairly good condition and I thought I had discovered something that would revolutionize painting, but I finally got hold of a car where the bottoms of the panels in between the windows running along the belt rail had shrunken, so that there was an opening underneath between the belt rail and the bottom of the shield. The ammonia which had gotten into that opening was absorbed by the wood. I painted the general manager's car that way, and in about two weks there was about three inches on the bottom of the panels where the painting entirely left and fell off. I did not use ammonia any more.

MR. HUTCHINSON: This whole thing boiled down it seems to me is a question of economy. Mr. Leach's paper did not give us even the comparative time taken in burning off the car, or the cost of the removal of the varnish. When you consider time, as I said, economy is the question and it just seems to me, from my experience,—which has also been the same as my friend Butts has just told you—that in taking into consideration the cost of burning off the cars as we do today with this process of removing the outer coats of cracked surfacer in the varnish it is a much more expensive method.

MR. COOK: It may be interesting for me to state in connection with Mr. Butts' remarks about ammonia, that in the Pullman shops at Wilmington, Del., which are very close to my own shops, whenever they bring in C. & O. cars with the yellow color, they have got to remove that color to repaint the car, and they use ammonia. I was just wondering how it was they could use that without any bad results. It seems to me with regard to what Mr. Butts has said,—he had some experience in using it without detriment to the color? I find that is what they are doing continually with the C. & O. cars.

MR. WRIGHT: I have had considerable experience with ammonia. If I had experience in a few cars I would not get on my feet, but as you know the B. & O. painted their cars blue about nine years ago. After the blue color had been in use about four years the management decided they would paint the cars the Pullman color. It happened that I went with the road about the time they started to paint the cars blue, and it fell to my lot to burn off about nine-tenths of the cars at that time. As the foundation was only about four years old, when they changed from blue to the Pullman color, it was the desire of the management to get the cars into the Pullman color as quickly as possible. It became necessary to repaint a large number of the cars in order to avoid burning off the cars, which were then only about four years in surfacer. I experimented for some time with ammonia, tried it and gave it up, tried it again and gave it up, but after several weeks—or I might say several months of experimenting—I found that ammonia could be used successfully for stripping off the old cracked varnish, and it is possible to repaint over the original foundation successfully. I think I have stripped off the varnish of about at least six hundred cars with ammonia and have repainted over the old foundation, and while you do not get as good a surface, perhaps, as a newly-rubbed surface, from the standpoint of durability I believe it is feasible to remove old cracked varnish and repaint it without burning off.

MR. PITARD: As far as the trouble is concerned which Mr. Butts speaks of when he got into using ammonia, I submit that the same trouble might have happened just from the use of water for the reason that there were evidently some cracks where this ammonia had penetrated and then soaked through the panel and brought the paint off with it. I do not think ammonia contains anything injurious to paint after it has been exposed openly for a day of two, because it loses all of its injurious qualities by evaporation. It is the pungency that takes off the varnish. I think that trouble could have been avoided if the precaution had been taken to putty up all the little cracks around the car where this ammonia could find entrance, because even if water gets into the little openings around a car, it must evaporate, it must get out some way. After it gets in there if you are going to putty up the opening, the water has to escape. If a person chooses to adopt the method of cleaning off varnish with ammonia they could obviate that trouble, I think, by putting up all the little openings beforehand, instead of putting them up afterwards. Usually there are not many places around a car to be found where water and ammonia could find entrance. So that while I am not an advocate of the ammonia method particularly, I think the objection which Mr. Butts speaks of could be obviated by just puttying up all the cracks and places where the ammonia could find entrance.

MR. BISHOP: It does not appear to me that the use of ammonia as mentioned at this time in connection with removing varnish from the outside surface of the car has anything to do with removing the cracks in the foundation coat of a car that has got to be burned off. There are probably fifty different methods of removing varnish from the outside of a car, but that does not obliterate the cracks in the foundation. It is not necessary to use ammonia; you can use lye if you will use it as carefully, and it is my opinion,—and I think it is the opinion of all the members of this association,—that when a car is in a condition to be burned off, there is nothing that will remove the cracks so that they will be obliterated. You will also admit that a crack that has penetrated through the foundation to the wood leaves a photographic impression in the wood that will again show up in the finished surface. Even after the car has been burned off and sand-papered, and the cracks made so that they cannot be seen when the car leaves the shop, after they have been in the sun for a short time, the crack, although filled, will again show up. While we have methods of filling the cracks and do fill them, and get service out of our cars, my opinion is that removing the varnish with ammonia does not fill or obliterate the cracks.

MR. MILLER: I think Mr. Bishop's remarks are right to the point, and I will make a motion that it is the sense of this meeting that we are not burning off cars before it is necessary.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: I want to take this opportunity of appointing several committees.

Committee on Resolutions: J. D. Wright, chairman, B. & O. R. R.; Eugene Laing, Northern Central R. R.; J. J. Sheerin, P. R. R.

Committee on Next Place of Meeting: D. A. Little, P. R. R.; T. J. Rodabaugh, P. Ft. W. & Chicago; J. H. Pitard, Mobile & Ohio R. R.

MR. PITARD: I move we adjourn until tomorrow morning at the usual time.

Seconded and carried.

And the convention adjourned until 9 a. m. Thursday, September 14, 1905.

THIRD DAY.

Thursday, September 14, 1905.

The convention was called to order by President Lanfersiek at 9:10 o'clock a. m.

PRESIDENT LANFERSIEK: The first business for this morning is subject No. 5,—"Preservation of Steel Cars from Decay. What New Developments has the Past Year Brought Out?" The first paper is by Mr. T. J. Rodabaugh, of the Pittsburg, Ft. Wayne & Chicago Ry., Ft. Wayne, Ind.

The secretary read the paper as follows:

MR. RODABAUGH'S PAPER.

Ft. Wayne, Ind., Sept., 1905.

To the Officers and Members of the Master Car and Locomotive Association.

Subject:

THE PRESERVATION OF STEEL CARS FROM DECAY.

Gentlemen:—What progress have we made in the past year in the painting of steel cars?

I do not think we have made any. I attribute this to the limited privileges that the foreman has in making practical tests. As far as I am personally concerned I wouldn't give a test any consideration without it was a practical test. If a foreman knows anything he ought to know enough to paint a steel car. He, being a practical man, ought to know how to mix his colors, and what liquids to use in mixing them, and what, in his judgment, would stand the greatest amount of heat without blistering, and when he has his colors so mixed by testing them, giving it then a practical test on one of the company's cars that he represents.

But will the company give him a car for the purpose of testing his formula or mixture? In the majority of cases, no! I think if the company would give his foreman the same privileges, and show his foreman the same courtesies, give him the encouragement he should have in experimenting that they would give to paints that are sent from the manufacturers for trial, that it would be of more real benefit to the company.

Tests that are made by painting plates of steel and nailing them on the sides of a shop, and putting them on roofs for the purpose of testing to see which is the best material, I do not consider them of much value because they are not practical tests. They are not exposed to the different climates, and to the same conditions that a car is when running on the road.

I do not think that the problem of painting a steel car will be solved until the management stops the practice of loading hot slag, and taking sledge-hammers and pounding the outside of a car to loosen the coal and slag that has frozen in them during the winter. I think that if we had steel box cars to paint that we could solve the problem much quicker.

I do not know of any manufactured paint now on the market in my opinion that will stand fire.

The best paint, I believe, for first coating, a formula composed of red lead, adding 25 per cent white lead mixed with raw linseed oil; the oil should be boiled not longer than five minutes. This will enable you to skim off all the dirt and grease that will rise to the top. Do not use dryer of any kind.

In preparing the car to receive the first coat when built, we should be very careful that all the oil and grease is wiped off clean with turpentine which has been left on by the riveters.

The thin scales should all be removed with scraper, wire brush, emery, or sand blast, or anything that will remove the scale.

If a car is treated in this manner I think it possible to make it stand, barring fire.

The first coat should have ample time to dry before the other colors are applied.

I would suggest that if an old car is to be repainted all the loose scales or rusted parts should be thoroughly removed, and the above mixture could be used on these parts.

In the early seventies I painted two steel coaches which I think were built by Barney & Smith, of Dayton, Ohio. (You can see that the steel car is not altogether of recent date.) I used the above formula. I kept touch of those cars for about six years and the foundation was good at the end of that time.

Very truly yours,

T. J. Radabaugh.

PRESIDENT LANFERSIEK: The next paper will be by Mr. Quest, of the Pittsburg & Lake Erie R. R., McKee's Rocks, Pa.

Mr. Quest read his paper as follows:

MR. QUEST'S PAPER.

THE PRESERVATION OF STEEL CARS FROM DECAY.

Mr. President and Gentlemen:

"What new developments has the past year brought out?" is the question. In reply, we wish to assure the steel car painting world that we will not assume the responsibility of answering such a broad, compromising question from other than a strict individual standpoint, based wholly upon a practical up-to-date experience when in charge of re-painting steel cars in the interest of Company employing us.

To quickly get down to the grist of the subject, we will begin our task by briefly giving a summary of steel car paints tested, from beginning up to date; also as requested, of past fourteen months—from June 1st, 1904 to July 1905, leaving our critical hearers to judge as to whether or not we have developed anything new in our continuous grind, offering you, as we tell our story, some weird tales of steel car abuse; also of the many and varied kinds of paints used in our dutiful efforts toward helping solve the present and future problem of paint preserving the probable millions of steel burdened cars to come, which, according to the up-to-date expressions of expert and railway official sentiment, rates the steel car a qualified success, barring the yet unverified fear that the great wheeled tonnage carrier is probably doomed to be prematurely eaten up by the elements producing metal corrosion if some cheap acceptable method and material be not timely discovered as a preventative.

During the period between 1898 and 1905, the Pittsburgh & Lake Erie Railroad Company has authorized practical tests made of some one hundred twenty odd special and regular so-styled steel car paints—30 per cent of which being, in our judgement, total failures; 65 per cent, passably fair; 5 per cent, fairly good, but not up to official expectation, which, through matter of exaction, we are much afraid will never be realized upon so long as the great service abuse of the steel car is officially tolerated, such tremendous abuses, in our estimation, undoubtedly contributing over 75 per cent of both the metal surface and paint deterioration of the steel car which is fast becoming a matter of great concern to the railway official economist.

With a view of helping honest endeavor in producing a perfect steel car paint, the Pittsburgh & Lake Erie Railroad Company's experiences have been so numerous and varied that we shall not attempt recalling all, but we believe we are not exaggerating our position in claiming to have had a passing acquaintance with a large majority of the advanced steel car preservatives, and as the writer is still a very young man with a large bump of inquisitiveness, he expects to keep right along with his share of work in the interets of the Company and trade craft.

In looking over our records, we find that our material experience in test and regular painting of steel cars includes combinations of carbonates of lead, blue leads, red leads, pure earth pigments, iron and zinc oxides in combination with the inert materials too numerous to mention, all kinds and makes of carbon blacks, graphites, natural mineral and manufactured pitches, petroleum and other residuums, asphaltums from all countries, and last, but not least, coal tar in so many disguises as to puzzle a college of chemists, or a whole association of railway master painters in everlasting session to define.

The following is a partial list of paints under test in our fourteen months' experience:

A COAL TAR COMBINATION

June 1st, 1904:—Hopper coal car 13715 two coats of the paint—a coal tar combination, machined on. Inspected for condition, June 3d., 1905; coating found fairly elastic, but badly checked; scheduled for one more year's service with final inspection. Have no hopes of this tar paint becoming a winner, but as a matter of equity we will say that this coal tar product is making the best showing of any cheap coating previously handled by us for same purpose.

TEST OF THE CHROMIC ACID SYSTEM FOR NEUTRALIZING STEEL AND IRON CORROSION:

June 3d., 1904:— P. hopper coal car 10075—old paint entirely removed from three panels, exposed steel surface left unprotected until next day, when the night's slight accumulation of rust was neutralized by applying and scraping in a chromic acid solution, using a broad scraping knife for purpose.

The solution was furnished by the Detroit Steel Paint Company of Detroit, Michigan, inventors of the Detroit System, they claiming that the basis of the sytem is the chromic acid treatment through taking up all foreign corrosive matter on steel or iron surface, thereby forming a thin coating of what is chemically termed a chromate of iron, which, under action of light and heat, turns black and hardens, making a metal protective noncorrosive coating similar to the oxidation produced on aluminum, copper, brass and other metals through exposure to the elements. After chromic acid treatment, the panels and car were painted two coats of a carbon proofcoating, but as paint on this car was totally destroyed by fire and sent to shop in March, 1905, we regret to say that we are unable to fairly judge efficiency of chromic acid process, other than to say that a close examination developed fact that, though so badly charred as to need re-painting, there was no indication of any under scale of rust on treated panels.

In connection with this reported test, we submit a small piece of sheet steel half surfaced with the acid and one coat painted with a mixture of graphite paint, which has been exposed to the weather for sixteen months, the only criticism of which we will make, being the fact that as chromic acid is soluble only in water in case of abrasion water, as you will observe by closely examining painted surface of panel, is permitted to work in between paint and metal, which in our judgment, would become a source of promoting an under rust much to be avoided in steel car painting. As the chromic acid system will not remove flash scale, and there have not yet been any provisions made for preventing the physical abuse of the steel car, we are of the opinion that our present found test results would hardly justify the time and expense of treating the re-painted steel car with the chromic acid system.

A COMPOSITION COMPANY'S QUICK DRYING SPECIAL STEEL CAR PAINT:

June 1st, 1904:— Two hopper coal cars 10509 and 10435, test painted with a phenomenally quick drying paint. 10509 was machine painted two coats of red mixture of specialty and re-stenciled within six hours of one day; 10435, two coats of dark metallic brown, and re-stenciled within a 10-hour day, the method and time of applying paint being according to personal instructions and supervision of Concern's representative. 10435 was inspected July 31st, 1905, and reported upon as being in a very unsatisfactory paint condition. 10509 was inspected August 7th, after fourteen months' service; also reported in bad condition, the old paint on surface being reduced to an almost powdered form, showing conclusively that the wearing protective paint of to-day must conform with that of the past, which if over-oxidized was not worth the time and cost of application.

AN ASPHALT STEEL CAR PAINT.

July 7th, 1904:—Hopper coal car 13706, test painted two coats with a very slow hardening asphalt combination. Car made a first class appearance when leaving yard—white lead markings showing no indications of an understain. Inspected August 18th, 1905—painted surface found to be so badly undercorroded from loose scale as to require re-painting, showing conclusively that the natural tars are about as unreliable as coal tars where put to test in steel car painting.

A STANDARD CARBON PAINT:

April 27th, 1905:—Third consecutive yearly inspection for paint condition of hopper coal car 10382, test painted two coats of heavy bodied carbon black, applied December, 1901. Barring where service abused, the paint on this car was found still to be a very elastic preservative and as car has been in continuous general service almost four years, we judge reported fact should cause further investigation as to whether or not the slow drying inert oil suspending carbon pigments are not best for steel car painting.

A SPECIALTY STEEL CAR CARBON BLACK:

November 7th, 1904:—Hopper coal car 10551, test painted two coats of a high grade slow drying carbon black, painted with machine. Inspected August 21st, 1905. Where not service abused, the sample paint on this car was found to be wearing and looking first class and if not hammered or burnt up, we will predict years of preservative wear from this test sample of carbon black paint.

NATURAL CARBON BLACK PAINT:

June 4th, 1904:—Hopper coal car 13526, machine test painted two coats with a black paint guaranteed to prevent all forms of corrosion where applied. This sample of Black paint seemed to be granular, instead of flaky in its dry pig ment form. In paint form the material worked a little pigment heavy, but made a good coated appearance. Although ordered to inspect this car we have not done so, on account of failure to catch car on home road, but we hope to be in position to hand in results of inspection of this claimed new thing in time for Association's 1906 Convention.

AN IRON CLAD PAINT:

August 1st, 1904:—Hopper coal cars 10686 and 10671, machine test painted two coats of a ready mixed iron oxide made-up paint. The pigment of this test paint was very fine and strong of color, made a good appearance, etc. 10671 was sighted in a moving train July 1905, but could not be closely inspected so hurriedly; paint seemed to be very hard and dry, which is an undesirable condition for a paint to become on a steel car at any time within a fair paint life limit.

A SUN PROOF PAINT:

April 5th, 1905:—Hopper coal car 13686, machine painted two coats of an iron oxide ready mixed paint; sample finely ground and made a fine coated appearance when finished. We also hope to be able to make an inspection report of this so-styled sun proof paint in time for 1906 convention.

A GUARANTEED FIRE RESISTING PAINT FOR STEEL CARS:

April 27, 1905:—Hopper coal car 10552, machine test painted two coats of the newest thing in way of a fire resisting paint. We are patiently awaiting to learn service results of this paint, and would like to own a block of stock in Concern in event paint on this gar coes through the fiery ordeal of a hot carloard of mill slag or other hot stuff usnally loaded on a steel car (because it is a steel bar) and come out point intact, as claimed it will do.

To be reported upon at expiration of one year's service.

A SPECIAL IRON OXIDE COMBINATION:

July 14th, 1905:—Hopper coal cars 10192 and 10670, test painted two coats with brush; hopper 13740, machine painted two coats first class specially ground and prepared iron oxide paint used, paint worked smooth and appears to indicate a preservative elasticity, which possibly may verify claims made for this exclusively special iron oxide combination, that, as a steel paint, it could not be excelled.

A CARBO ENAMEL PAINT SPECIALTY:

August 8th, 1905:—Hopper coal car 13552, machine painted one coat; on account of material solubility, a second coat could not be applied. The car made a fair appearance with exception that white lead stencil on markings turned to the usual dirty yellowish brown collor, which is generally much criticised by people unfamiliar with the peculiarities of a coal tar paint.

This especially authorized test will be inspected and reported upon in due time.

A NEW STANDARD STEEL CAR PAINTING SYSTEM:

August 8th, 1905:—Hopper coal cars 10695 and 10686, test painted with a specialty system designed for steel structural buildings, steel cars, etc., consisting of a special primer followed by two body coats. The body coating was furnished in two colors, the 10695 being body coated with a finely ground red iron oxide and the 10686 with a heavy bodied carbon black. As authorized, all of this test was machined on.

This special steel car painting system is styled Flexite by promoters, which, to render up an account thereof at end of a fourteen months' service test, we have been officially enjoined so to do.

A SPECIAL STEEL CAR PAINTING SYSTEM:

August 8th, 1905:—Hopper cars 13689 and 13619, machine test painted with a material system. 13689 entire outside body, including end bottoms, draft rigging, etc., was sandblast cleaned and a primary coat of red lead lute was applied; also two coats of body carbon black, twenty-four hours between coats. 13619 was ordinarily hand cleaned, red lead lute primed and carbon black painted two coats, which was done after this manner to prevent the idea of any unfair advantge being given this Concern over others, whose test sample paints have been applied on hand cleaned cars exclusively.

We trust that the promoters and champions of the red lead lute and carbon black system will realize on their greatest expectations in this, the most expensive steel car painting test we have ever been concerned in, and, as a pronounced anti red lead man, we await the verdict of the elements, which must decide the question after a year's steel car service abuse, and to be finally judged by a committee of inspectors.

In conclusion we will state that last winter something over two hundred steel cars were body damaged at unloading points, several new cars had paint entirely destroyed, quite a number were badly paint damaged on end bottoms, also over gas and coke fires in order that frozen up loads might be run through discharge hoppers. There were also many of these cars dynamited for same cause and purpose having side and bottom sheets blown full of holes, some so badly damaged as to require sheet renewals.

Under such severe service condition, it cannot be reasonably expected that paint of any kind is going to survive, and consequently is cause of much adverse opinion as to policy of expending time and money painting the steel car for appearance sake, where such service abuse exists. The uncertainty in matter of interior deterioration has also become a live topic among car service people, the investigative thinking official having long since been aware of the fallacy of applying paint on steel car interiors, and also being aware of the fact that paint not chaffed off, is sure to be quickly eaten up with the strong sulphurated solution formed deposits, undoubtedly the source of heavy rust films found in great quantities adhering to plate of steel car interior.

To ascertain actual loss in tensile strength of a badly corroded steel plate, freed of all loose rust matter, would, we think, be a task for a chemist or expert mathematician, and as we do not belong to either class we are not going to even venture an opinion on the matter.

The idea of rough cleaning and crude oil spray coating the badly corroded interiors of several steel cars was recently officially carried into effect at the Pittsburg & Lake Erie—McKees Rocks Shops. Three five year service cars were selected. The first car's interior was freed of all loose scale and rust, thick and thin, three hundred and sixty-four pounds of corroded matter by weight being removed therefrom—requiring fifty hours labor for operation. This was followed up with a liberal spray coating of crude ground oil, requiring 3¼ gallons of oil for purpose. The second car was freed of loose scale and dirt only and spray coated, requiring four gallons of oil and ten hours labor. The third car was simply swept out, with exception of lower assembled joints about hoppers, which were dug out fairly clean, the job requiring four and one-half gallons of oil and five hours labor. Please note that car interior receiving the least cleaning, required the most oil in saturating process. As these cars are to be inspected at the end of six months if possible, we hope results will be such as confirm advanced suggestion that a liberal drench of crude oil should have enough penetration to both prevent and arrest a large percentage of the corrosive trouble of the modern steel car, which seems to be strictly attending to the business of its creation by structurally holding together, paint or no paint, notwithstanding all predictions otherwise. Respectfully submitted, etc.,

W. O. QUEST,
P. & L. E. R. R., McKees Rocks, Pa.

PRESIDENT LANFERSIEK: The third and last paper on this subject will be by Mr. J. H. Kahler, of the N. Y. C. & St. L. Ry., Chicago, Ill.

Mr. Kahler read his paper as follows:

MR. KAHLER'S PAPER.

Meadville, Pa., Aug. 11, 1905.—Subject No. 5. Preservation of Steel Cars from Decay. What New Developments Has the Last Year Brought Out.

Gentlemen: The care of freight equipment has passed from my jurisdiction, but will give you a short leter on this subject, based on past experience and present knowledge as regarding steel cars, their use and abuse, and how we can prolong their life.

This subject has grown to great proportions in the minds of railroad painters, until it resembles something of an octopus. In so thinking I believe we only borrow trouble. If our combined knowledge on preservative coatings for steel cars would prolong life indefinitely, we would be guilty of taking the bread out of the mouth of the steel trust. If a preservative coating will preserve a steel car a reasonable length of time, why that is all we should expect. We know the steel car must be painted oftener than the wooden car. If the metal car has parts of the painting burned off by hot slag, it does not follow that the car must be shopped (at least not in the mind of the railroad manager) as the car will still retain its load. But in the case of a wooden car, it would have to be shopped in order to patch up the burnt out holes or it would loose its load. In this respect the wooden car has the advantage of loafing around the shop where the painter can get a chance to remedy the evil, but in the case of the steel car, he has not the same chance unless he goes to the terminal yard or the place of loading, and doctors up the blemishes before rust sets in and does the mischief. It is folly to expect any coating to preserve metal thus treated, or rather mistreated. From this we are led to believe that the remedy lies largely in the care given, to prolong the life of the metal car. I also think the construction of these cars could be changed by strengthening those parts receiving the most wear, as around the interior offsets in openings of Hopper bottoms. Also the use of a non-corrosive felt or paper between all lap joints where in contact with sulphurous moisture.

As additional remedies against the decay of metal cars, I would add: Clean them off with sand blast to clean bright metal before painting, and use the proper paint properly applied for this purpose. Enforce rules governing the care and handling of metal cars.

The development most noticeable in the last year has been the more extended use of sand blast for cleaning the metal car previous to painting. Its use acts as an incentive to more cars being painted which in many instances has been sadly neglected. Respectfully submitted,

J. H. KAHLER.

MR. WYNN: I notice there is an absence of the American flag, and also the flag of Canada on our walls, and I move that the association purchase these banners and display them upon the walls of our convention hall.

The motion was seconded and carried.

PRESIDENT LAFENSIEK: Gentlemen, subject No. 5 is now open for discussion. We will be pleased to hear from any of the members. Has any member anything to offer in the matter of the preservation of steel cars after hearing the papers read? It seems that the papers have fully covered the subject, and as none of the members seem to want to discuss the matter, we will pass to the next.

MR. RUSSELL: I move that the papers on subject No. 5, with all the tests, be referred to the Committee on Tests, to be appointed by the incoming president.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: The next is an essay, "The Car and Locomotive Painter of Today," by Mr. Chrls. Clark, of the N. Y. C. & St. L. Ry., Chicago, Ill.

Mr. Clark here read the following essay:

THE CAR AND LOCOMOTIVE PAINTER OF TODAY.

The car and locomotive painter of today is a very different type of man than he of our early recollection. He is a product of the present progressive age, and bears about the same relation to the old time conservative painter that the twentieth century limited bears to the prairie schooner. Instead of being a man of one method, and that by the way the same method as pursued by his father and perhaps grandfather, he is now a man of varied methods, resourceful and versatile; capable of meeting any contingency that may arise, or conditions that are the outcome of modern requirements, and is ever ready to take the Atheneans of old "to tell, or to hear some new thing." We no longer dwell within our own narrow sphere, with an all-absorbing desire to maintain the traditions of our trade, preserve its ancient formulas and withal turn out of shop a creation bedecked and begilded as though it were built for the sole purpose of exemplifying the painters art, regardless of time and expense. The painter of today has emerged from his exclusiveness and in response to modern progression finds it expedient, if not absolutely necessary to sacrifice art to artfulness, tradition to dollars, and formulas to utility.

As an integral part of a great business enterprise, he feels that he has an interest in every other part and is therefore desirous of conserving and forwarding the welfare of the whole. This may sometimes be accomplished by a lavish display of his art, but more often by a studious attention to methods of saving time and money.

This is not an age of sentiment, but eminently one of facts and figures. The old fogy style of doing work, while pleasing to the painters eye, is most unsatisfactory to those who have to foot the bills. The principal item today is to get the work out of the shop. The painter is necessarily the last man on every job and, therefore, blame on account of delay arising from whatever cause is more or less reflected upon him. The fact that he may not commence upon a coach until the carpenters have prepared the surface is liable to be overlooked, and the date set for an engine to go into service is based upon the time required by boilermakers and machinists—theirs being considered the more essential part of the work and very little allowance is made for time required by the painters afterward.

Some are fortunate in having beter shop facilities than others, and I fear this is not always fully considered by our superior officers, in comparing results attained by those less favored.

All these things are against us, but still they but call for the exercise of those qualities which must be at the command of every successful man in the mechanical field of labor.

Other qualifications than that of a mere painter are requisite in a foreman. Results obtainable under certain existing conditions are largely determined by the executive ability of the man in charge. It is this quality which enables him to use the help and facilities at hand to the best possible advantage, and to overcome the various obstacles, and at times vexatious problems incidental to the business.

The matter of dealing with help is an important one. To avoid friction, and at the same time secure the maximum of productiveness from each man requires discipline, firmness and tact.

We all know the force of example, which is said to be better than precept and that our own conduct is reflected in a very marked degree in those under our charge. Only he who is himself amenable to discipline can enforce discipline, and only he who is circumspect in his own conduct can consistently require a close attention to duty in others, or inspire their respect and confidence.

The foreman of a well regulated shop should foster a certain esprit de corps for the purpose of stimulating the efforts of all in a common interest.

Malcontents and chronic kickers must be discouraged and only such men be promoted or retained, intelligent enough to recognize that their interests and those of the company are identical. We probably all have noted that one disadvantage in the present progressive industrial age, lies in the fact that men are not as a rule so loyal or reliable as formerly, but on the other hand are more or less independent and indifferent. This I attribute in a measure to the absence in many shops of an apprentice system, and it presents a problem which must be wrought out in the near future.

I am of opinion that no foreman of any other department of a railroad shop is subject to a like amount of irritation, on account of damage to finished work. Each is intent upon completing his own work as quickly as possible; heedless of wet varnish, and the fact that it can be easily marred or that it has a strong affinity for dust, and with a serene confidence that it can be touched up.

The present time limit for shopped cars requires that the various trades work concurrently as far as practicable. Therefore, we must repair the damage as uncomplainingly as possible, and cultivate the faculty of modifying our adjectives.

It is of the utmost importance that the painter strive to maintain the most cordial relations with every other foreman on the ground. We all know that disputations as to precedence and jurisdiction, or the exhibition of petty jealousies are not only undignified and detrimental to the service, but also exert a baneful influence on the men.

The car and locomotive painter of today must possess the same qualifications and characteristics as the successful business man. Having to deal with all sorts and conditions of men, he must be not only "all things to all men," but the right thing to the right man.

Business acumen and sterling integrity, with a liberal endowment of the cardinal virtues are assets as valuable today as ever. These are either the result of early training or are inherent in the man; only what may be termed the non-essentials can be acquired in later years.

Equipped with energy and perseverance, with an eye single to the welfare of the company that honors him with its confidence, he will rise superior to the vexations and discouraging incidents that are common to all.

CHRIST. CLARKE,
N. Y. C. & St. L.

MR. CLARK: Gentlemen, I have to make an apology in this way: The subject of that essay was to me a very difficult one to deal with, without being personal or attempting to moralize, and I hope you will acquit me of any desire to do either.

MR. BUTTS: I think we have all enjoyed this very excellent paper by Mr. Clark, and I would move you that a vote of thanks be tendered to Mr. Clark for presenting it, and that it be incorporated in our records.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: We will now pass to subject No. 7,—"Economy and durability considered, to what extent may enamels or varnish colors be employed as a finish for car and locomotive equipment, exterior and interior?" The first paper is by Mr. C. E. Copp, of the Boston & Maine R. R., Lawrence, Mass.

Mr. Copp read the following paper:

MR. COPP'S PAPER.

Subject No. 7: Economy and Durability Considered, to What Extent May Enamels, or Varnish-Colors Be Employed as a Finish for Car and Locomotive Equipment?

Mr. President and Fellow Members: Proposing this subject myself as a member of the advisory committee, and accepting an appointment to write a paper, I am not going to dogmatize upon it, but am in the field more for information than to impart the same. I do not know how it may be with you. I hope you have shop-room and opportunity to do all you wish to your cars, but down our way when winter is over and the birds begin to sing your people flock to our beaches and mountains in such numbers—and we like to have them with us, God bless 'em—and linger so long in the autumn, to say nothing of the cheap fall excursions that our own natives take advantage of, that the time when we can have the passenger equipment to clean, paint and varnish is growing less and less annually, it seems, until now seven months is about all we can reckon on to handle the B. & M's vast equipment. We used to run our shops in full blast up to and into July, but for the last two years they have begun to freeze us out in May, and we have fell short in that month fifty cars in our output. Therefore we have had to resort to all sorts of experiments and expedients to rush our cars through and get them out in service, and come anywhere near completing the equipment when the fiscal year ends June 30; and this is why we have been working along these lines, and why I have proposed this subject. But in order to get an intelligent and unprejudiced view, let us look at it in all its bearings; first, its history, second its present use, and third its future possibilities.

1. Let us look into the history of painting with enamels, or varnish-colors—not ancient history, but within our own recollection. First, let us state that an enamel is not necessarily a vitrifiable substance, nor one that must be baked on an article in an oven; it may be a substance made of varnish and pigment combined in such a way as to dry in the open air of a given temperature in a specified time and produce the requisite film of gloss. Such are the enamels under discussion. But the car painter of a quarter century or more ago knew little or nothing about them, and cared less. With the exception of, in some instances, combining his rubbing varnish with some of his color-coat as a last coat to rub down to a surface to stripe and letter upon, and also the use of a black varnish for iron work, he had no use for enamels. Everything was first painted and afterward varnished. The writer recollects a dozen or more years ago when the first few sample gallons of varnish-truck-color, or enamel, was sent to him from Mr. Chamberlain at Boston, to try and report upon. We were then painting and varnishing our trucks and steps. The writer regarded it with little favor at first and with considerable prejudice, but with a fair trial he became convinced that there was the saving of one operation on the job with equally good results, and so favorably reported upon the same and has continued the practice ever since.

2. What is the present status of the practice? Scarcely no one paints their trucks and steps in any other way. We began to treat our decks with Pullman enamel three or four years ago, and it has become a standard practice. Last season we began to so treat baggage, express, mail and milk cars (on which there is no striping) with the same material, in some instances cutting in and varnishing the letter-boards to save the gold letters that were good, and in other cases doing the car all over and putting on enamel paint letters and numbers the color of gold. Some were given one coat of varnish. We treated in all about eighty cars in this way, some being new cars finished with enamel instead of varnish, and there appears to have been a considerable saving of labor and material effected and the work expedited, which last was the principal reason for the experiment. We think we will continue the practice the coming season.

We also use enamels to finish interiors of mail and caboose cars, and such like. And for years all that has been varnished about an engine is the cab and tank, the rest being finished in black varnish, or enamel, possibly excepting in some cases the domes, etc.

3. Its future prospects and possibilities. All we have began we believe we will continue, and likely add more to the list. We are not talking of any so-called "four-coat method" once practiced with indifferent success on a certain western line some years ago, but of a method of painting as thorough as can be made and a finishing in color and varnish combined, instead of separately applied. Of course this is impracticable where striping, especially of gold, is in vogue, for reasons which I need not stop here to explain, but on such equipment as is not striped it seems perfectly feasable. If raised, non-tarnishable, metallic, or porcelain-enamelled letters and numbers—to be detached, cleaned and replaced after enamelling the car—can be devised, its practical success from an economic standpoint can be assured. Here is where the principal drawback exists: to replace the painted letters every

time the car is enamelled, which generally will require two coats of color, especially where a gold-colored letter is used over a dark body-color. When roads, like the New Haven, have abolished all striping and also have built so many copper-covered cars, which they enamel over the copper to match the body-color of the rest of the equipment, there is nothing against its universal adoption for the exterior of all passenger equipment, as far as I can at present see, for I believe in a wood finish painted and enameled rather than a copper-covered car so treated, and there is no reason why raised letters can not be used in both cases as well as in the case of the copper-covered car. This would, to our mind, facilitate the shopping of passenger equipment more than any one thing, and as far as the paint shop can be concerned, effect a saving in the operation of a road. I have not lost all my pride in the appearance of railroad rolling-stock, nor in our noble trade; but, under the circumstances and difficulties in handling a large equipment in cramped quarters and short time, I believe there is something in it worth considering seriously. And I am not so sure but that it is a business-like way to finish cars irrespective of any considerations of space, time or pride.

In conclusion, some may be thinking, is it durable? If anybody will offer me a reasonable argument why a varnish and pigment combined cannot be made as durable as the two materials applied separately, I will be glad to listen to him. Presently I believe the durability is on the side of the combination, if rightly combined and applied. I am not saying that the same luster and finish can be produced with an enamel as can be obtained by painting and varnishing separately, but what does that extreme luster amount to after a few weeks service and one terminal cleaning? I believe the time is coming, gentlemen, and is not far off, when cars will be universally finished on their exteriors in some such way, being divested of all striping and decoration, and will be kept clean and presentable.

Not wishing to be too lengthy I leave these thoughts for your consideration and discussion. If you have any reasonable objections let us have them. Do not spare me, nor my feelings. I have no glass house to protect. Respectfully submitted. CHARLES E. COPP.
General Foreman Painter, B. & M. Car Department.

PRESIDENT LANFERSIEK: The next paper is by Mr. E. T. Congdon, of the Northern Pacific Ry., South Tacoma, Wash. Mr. Congdon read the following paper:

MR. CONGDON'S PAPER.

South Tacoma, Wash., August 11, 1905.—Subject No. 7.—Economy and Durability Considered, to What Extent May Enamels or Varnish-Color Be Employed as a Finish for Car and Locomotive Equipment on Exterior and Interior?

Mr. President and Gentlemen: By way of introduction, you will pardon me if I digress a little from the main subject.

First: As to what extent enamels may be employed, depends the elimination of all decoration. With some, this suggestion may be met with strong opposition. Any change which is progressive has always met with opposition, and the few thoughts I have on this subject, I trust, may lead to a thorough discussion of its merits or demerits.

Changes of style and method are continually going on in this world and we honestly believe that the world is advancing in art, science and in all things that pertain to a higher civilization. Could our fore-fathers be permitted to live for a short time in this, the twentieth century, and note the changes, they would be lost in amazement. They would see in place of the old fashioned stage coach, the modern railway vestibule trains. containing the luxurious drawing room, sleeping and dining cars, comfortable and cozy cars gliding through the country with no visible indications of the power that propels them; magnificent palaces that cross the great oceans; the splendor of our cities illuminated with electricity, and more wonderful still, sit in their drawing room and hear the music of some noted band.

These are some of the modern wonders, and we expect that changes will be going on until the Millenial Day comes.

Why not the painters and foremen painters change? I believe the railway painter has been and is always as ready and willing to adopt new methods and keep up with the requirements of modern times as any other department in the railway shops. For a moment let us turn our minds backward: The first passenger train I ever saw was on the old Erie at Corning, New York. The engine was elaborately decorated, tank covered with scrolls, drivers painted vermilion and striped with gold, jacket bands, dome casings, steam chests and many other parts, brass highly polished. The exterior of cars gorgeously striped and ornamented. The interior was in keeping with the exterior, oil paintings of the far west, Indians and buffalo on the wild prairies.

In the '60's it was carried to a still greater extent when Pullman sleepers and drawing room cars were first introduced. In large medallions in the center of cars were painted portraits of the officers of the road: James Fisk, Jay Gould and others. They were elaborately decorated with gold, and when fresh from the shops they were beautiful to look upon. In the '70's Japanese ornamentation was displayed on both exterior and interior. This did not last long and as time has passed, decoration has gradually disappeared until today on some roads only name and number appear. The question may be asked: Is this change good taste, good judgment and economy. I certainly believe it is.

Our modern railway managers believe they can spend their money to a better advantage than to employ artists to display their skill and art on the exterior of passenger cars and engines which are exposed to the elements; heat, cold, rain, dust, smoke and gas in tunnels. Should one-half the money expended on decoration be appropriated to the cleaning and sanitary condition of cars, we would have far beter looking trains on some roads. Assuming then that it is the proper thing to do to abandon all ornaments and stripes, then we only have the letters and numbers to contend with. These could be made of aluminum or of some other metal. They could be enameled and so arranged that they could be removed and replaced at a very small cost, and following the method of one of our leading car manufacturers, by adopting the same color for exterior of sash as the body of car, then we have a clear swing for the enamel finish. Elevation, body, sash, trucks, platforms and irons. Two good coats of enamel should be sufficient for a newly painted car, allowing the car has a good foundation. At the end of eight months shop the car, clean thoroughly in and out, give one good coat of enamel on exterior, have trucks inspected and repaired, and floors painted and car is in good condition for another eight months. At the end of sixteen months car should have general repairs, interior repaired and re-varnished if needed, and give exterior one good coat of enamel. Following this method, at the end of five years car would have less number of coats than with the clear varnish method.

The cleaning of the exterior, while car is in service, should be done with oxalic acid and clear water. In adopting this system, cars would be kept bright and clean and in a more sanitary condition, and I believe this would do away with all emulsion cleaners and knock out the copper sheated cars, and effect a great saving in maintenance of railway equipment. On the interior of coaches enamels cannot be used to any great extent except seat arms, heater pipes and floors. Baggage, mail and express cars; the whole of interior can be finished with enamel. We have been using such a paint for several years, and find it economy both in labor and durability as many of our cars when shopped needed only a thorough cleaning and perhaps a little touching up, and then are good for another sixteen months.

Locomotives: As we only put number on tank and dome and initial of road on cab, we use this enamel process altogether with very few exceptions, applying two coats of enamel, stencil letters and number one coat with white lead, second coat run them over with pencil, using white enamel. This method has proven to be economical and durable.

Some have made objection to enamels as being more difficult to apply. The old method of finishing cars years ago; after car had been surfaced a coat of flat color was applied and then a free coat of color and varnish or enamel. Painters at that time had no difficulty in applying it. A good varnisher will readily adapt himself to its use. Another objection has been made: That in washing the enamels with soap the alkali removes the color. This can be remedied by using oxalic acid, which is far neater than alkalies and does not attack the enamel, but simply removes the dirt.

Having considered to what extent enamels may be used, the next question is as to its durability. In the wear of enamels we will admit it will not hold its gloss as long as the clear varnish, but it will stand washing and wear longer. If it is true, and I think you will all admit that it is, that oil mixed with a good pigment will wear longer than the clear oil, is it not true that a good varnish mixed with pigments will wear longer than the clear varnish? The base of varnish being gum it is not of a nature to resist the wear it is subjected to as it would if a mineral base was added to it. The light colors that will admit a good proportion of lead are more durable; yet the Pullman color contains colors that are durable. We all know that three coats of good oil paint will protect a building at least five or six years. Now, if we have a paint or enamel where a varnish takes the place of oil, we have a paint that gives protection and at the same time gives us the enamel finish, which, if washed with the proper material, will be kept clean with as little labor as if the clear varnish was used, and give longer service.

Several years ago I made some experiments with enamels which were satisfactory as to durability, but our standard ornamentation at that time made it impracticable. A great deal depends on the manufacture of enamels as to their durability. Many of the pigments acting as a dryer, a reasonably oily varnish should be used and the pigments thoroughly incorporated. In my opinion such an enamel will maintain a higher standard of durability than the clear varnish.

Our paint and varnish manufacturers have kept pace with the requirements of the painter and many changes have been made, they having employed skilled and practical men who have worked in harmony with the painter to produce the very best, and if our railroads demand enamels, the alert varnish maker will produce an article that will fill the bill.

As to economy: It takes first, less material; second, less labor; third, less time in shops, and fourth, it gives greater durability, and as a result cleaner and better looking trains.

I trust that I have thrown out some points that will lead to a thorough discussion of the subject, pro and con. It is a subject that is not new, but has been in the minds of some of our master car builders for years, and now it is up to the master painter to decide if it is practical, economical and durable.

In advocating the painting of railway equipment, plain and without ornamentation, no doubt but there will be some criticism from the ornamental painters' standpoint, but as one of our master painters has said: "If I owned a road all by myself, I believe I should adopt the enamel method and abandon all ornamentation."

There is a large field for the artist and ornamental painter, and more demands for the fresco painter than there ever was in this country before, and no machine has yet been invented to deprive him of his art.

It has been my privilege to ride over a road that has abandoned stripes and ornamentation and to hear some of the favorable criticisms from its patrons admiring the trains.

Respectfully, E. T. CONGDON,

Foreman Painter Northern Pacific Ry., So. Tacoma, Wash.

PRESIDENT LANFERSIEK: The next and last paper on this subject is by Mr. E. J. Arlein, of the C. & N. W. Ry., Chicago, Ill.

The paper was read by the secretary as follows:

MR. ARLEIN'S PAPER.

Chicago, July 31, 1905.—Mr. Robert McKeon, Secy. M. C. & L. P. Ass'n., Kent, Ohio.

Dear Sir: In answer to the request of your committee for a paper on Rule 7, I will say that in my opinion the enameling of cars on the outside is not a success. We have tested enamel paint on a number of our cars, coaches and baggage cars with the result that these cars came back in a few months in such bad condition that it was necessary to burn them off, and we therefore went back to the old system of color and varnish.

When newly painted, the enameled cars looked fully as well as the varnished cars, but after being on the road a few trips the gasses, soot and smoke with which they came in contact made them look very bad. The worst of our troubles, however, came when we tried to clean them. I suppose that every painter here knows that there is very little on enamel cars to clean, because the minute you cut through the outer enamel, you reach the color or pigment; our color being chrome yellow, we found it impossible to keep the cars looking clean.

On locomotives we use nothing but enamel black and find that we have just as good results as if we used color and varnish.

We are also using enamel on the inside of the toilet rooms in our smokers. They are sheathed with a 2 inch Whitewood and receive a primer and three coats Baking enamel, using gasoline torches to do the baking. They look very well and are also easy to keep in a sanitary condition.

We also enamel all ice boxes in dining, buffet and private cars, using three coats of Baking enamel and baking each coat about five hours with a gasoline torch, which enclosed give 135 degrees Fahrenheit; we have been doing this for the past twenty months and find the cars coming back in a very good condition. This, I believe, is one of the best improvements in the use of enamel that we have made as it gives the men employed in the dining car service notice when their ice boxes need cleaning, as any dirt shows plainly in the darkest corners.

I am not in favor of using enamel for interior decorations except on old canvass ceilings. The woods used on interior of all passenger carrying cars are generally very expensive woods, and rich in nature's own coloring; they cannot be improved in beauty of color or finish by any channel, nor can the expense of maintenance be lessened, and considering the work required to keep them in repair, as it is next to impossible to touch up the scratches and bruises on enamel, as you can in natural wood, I do not believe it desirable.

Thanking you for your kind attention, I am, yours truly,

E. J. ARLEIN, C. & N. W. Ry.

PRESIDENT LANFERSIEK: Gentlemen, you have heard all the papers on this subject. It is now open for discussion, and we will be pleased to hear from any of the members.

MR. BUTTS: I feel that this is a subject we are all deeply interested in. I consider it the most important, with one exception possibly, of those we have had before us. I want to say to start with that I am heartily in accord with many of the things recommended by both Mr. Copp and Mr. Congdon; others I am just as decidedly opposed to. I am in favor of plain ornamentation of a car. I think we are coming to that rapidly. I do not think we need do anything to hasten it. It is here with us almost now, and shortly the ornamentations on the exterior of a car I believe will be done away with, and I shall certainly welcome it. I believe it is a waste of money to attempt to decorate the surface of the car. I would take the money that is spent in ornamentation and use it in putting a solid, smooth foundation on the car. There is one thing that we cannot do away with,—which is one of the greatest problems we have to face today in keeping our cars in a presentable condition,—and that is cleanliness. It is necessary to keep a car clean, and in order to keep it clean we need a smooth, solid, firm foundation to work upon. Otherwise, it is absolutely impossible to keep it clean. Mr. Congdon says that by enameling a car he can keep it in good condition for eight months. If I should propose to the road I represent today a process that would bring their cars into the shop once in eight months, I would recommend the first year an expenditure of about half a million dollars, and I do not think it would carry if I should recommend it. I would certainly recommend that we extend the days of shopping the cars to at least fifteen months, and I am of the firm opinion that it can be practically done on a large part of the equipment to eighteen and twenty months. A car that has received a thorough painting, and is in a smooth condition, can be cleaned not with acid, but with an oil cleaner which will preserve the varnish you have got there, and be kept in good fair condition for from twenty to twenty-two months. This means a great deal to a railroad company that has got a large equipment. The expense of shopping the cars is something that interests the managers of railroads at this present time, and there is no need of shopping a car if it is properly taken care of. This I have been able to demonstrate, having had an opportunity to do so. I want to say that a few years ago I was an advocate of acid for cleaning cars. It seemed to be the best thing you could get that was soluble in water to remove the dirt from the outside of a car. I thoroughly believed myself that it would not attack the varnish, but I was compelled to change my mind. I now say without fear of successful contadiction that any substance soluble in water will attack the gum and oils that the varnish is composed of. The varnish will absorb the water itself after it has been on the surface of a car for eight months. Any acid that you could possibly use on the exterior of a car will attack the color whenever it comes in contact with it, and turn it whitish looking. If you mix a body color with the varnish, and the body color is a bright color, the moment the film of the varnish is broken it begins to absorb the acid and water and you are going to have a muddled appearance. It also will destroy your varnish after it begins to absorb the water. That is the reason I have abandoned acids. Wherever the film is broken, the acid gets under the varnish and attacks the color, and you have got something that will ruin the appearance of your car. A great many advocate cleaning cars with water solutions because of their cheapness. I have had to deal with this subject constantly for nearly seven years. Some of the divisions of our system—the Vanderbilt system—have held to acid cleaning for a considerable length of time. We have had many tests made and figures compiled to show the expense, and there is very little difference in the expense of cleaning a car with an oil cleaner as compared with an acid cleaner. After deducting the expense of cleaning a car with an acid cleaner, the difference between the two is very little. If you could extend the days of the car not more than one month, you would gain more than the difference in the expense between an acid and oil cleaner, that you can at five or six months. The expense of cleaning with an oil cleaner on the exterior of a car is so small that it is scarcely worth mentioning. (Applause.)

MR. GINTHER: Our road has been using enamels for a number of years, gradually a little more each year. We began by using deck finish for our decks, with good results, and we are using it now. Following that we took up the truck and platform color in the form of enamel, doing away with striping and using it on the interior, the heater pipes, the iron and interior of the baggage and mail cars, the mail cars, however, only on the deck. Recently we have discarded the use of varnish on our locomotives; we are using enamels on the latter parts, the cab and tender. It is pretty hard for me to accept that, but as a matter of economy we are going to give it a trial. The hardest trouble I ran up against was using aluminum letter on the enamel, or varnish black, as it might be termed. We coat the tank perhaps in the morning and by evening, or possibly the next morning, we leave it for drying and then apply the aluminum. You know what that means—the aluminum is sticky and causing trouble. I tried to talk them into using the gold color, and possibly I will finally succeed in having them adopt that, but since aluminum has been our standard color for a number of years, they prefer aluminum. So far we are giving it to them with a great deal of trouble in handling. The latest thing, however, is an order to use enamel on the exterior of our suburban cars. With what results I am going to meet, I do not know. We have not as yet painted any of them, but as soon as they are shopped, we expect to begin.

In connection with that, I would say, we have discarded all exterior decorations, using nothing but the word "Wabash" on the letter board and the number in two places on each side, and we have also discarded the words "Chair Car," or "Parlor Car," "Dining Car," etc. leaving all letering off except the letter board and the engine board. I wonder what our experience would be in cleaning cars done on the outside with enamel. A few years ago we coated two cars and I found after shipping them, that the enamel had worn rough, porous, and of course such a condition will naturally take on the dirt. The oftener you scrape that kind of a car, the more trouble you are going to meet with. I thought possibly we could use a higher gloss enamel than I used on those cars, and meet with better results than we met with in those cases.

I would like to ask the gentlemen who are using enamel, or who have been using it, for a number of years, how they build up their surface ready to receive the enamel?

MR. MILLER: I was just going to raise my voice in objection to one or two points contained in Mr. Congdon's very able paper. I can hardly agree with him when he says he is able to produce an equally good appearing surface on the exterior of a car, or any other surface, by the use of enamels. I have never been able to do it. You can closely approach it by sacrificing covering qualities or the opacity of the goods by the introduction of a large amount of varnish. You can closely approach the clear varnish finish, although not quite. I also agree thoroughly with what Mr. Butts has just stated about the inadvisability of using an enamel finish on account of the readiness with which the color is attacked during the cleaning process. It is simply a matter of the appearance desired. The subject is an old one. There is not a painter in this room but who, at one time or another, has used enamel finishes on either the exterior or interior of a car. The subject is as old as the trade. Enamels are simply varnished colors, colors to which varnish has been added to give the desired gloss. Now, some people are satisfied with a mediocre apearance only as to gloss and surface. If that satisfies them the enamel will do. You will get as equally good results from the standpoint of wear in some cases, especially where the material used is of a good nature, but roads requiring well finished surface, people who insist upon a good high gloss to the work, and keeping everything about the car of a high standard, will hardly be satisfied with the enamel system.

I cannot agree with Mr. Congdon in advocating the use of oxalic acid on the exterior of cars, or any where else, for cleaning purposes. I have used it myself extensively and I have found while the surface is new, and while the varnish or enamel has its initial gloss, the water-resisting properties of the material are not attacked, but once disintegration has begun to take place, say after five, six or eight months' wear, it is attacked quite readily and the surface turns white. As I said I used this material for a long time in cleaning cars, and we had to abandon it. It is not the thing to use. I prefer an oil cleaner, or even soap and water, to acid—in fact, acid of any kind.

MR. PITARD: Possibly I may be considered pessimistic. I always try to be optimistic about everything connected with the painter's art, but I must say that I am unqualifiedly opposed to varnish color or the enamel method of cleaning car for several reasons. It is possible, no doubt, in some instances to do a job with the enamel method cheaper than you could with cleaning the varnish, but I believe that it is generally conceded that that method is inferior to the paint and varnish method by which we are doing our cars today. I think men ought to be governed by circumstances. There are instances where a man can effect a saving for his company by their use, but I think he ought to allow himself to be governed by circumstances in the use of it, instead of adopting it generally, for the reason that if the varnish color or enamel color method is once begun on baggage and express cars, who can say how long it will be before it will be extended to the coaches and all classes of passenger equipment.

Now, the thought of using that enamel on cars carries with it the abolition of all exterior ornamentation, because we know it is impracticable to give it a varnish color. If that method of painting should be extended to the coaches, which it probably would, the abolition would naturally follow, and in that case it would be, not progression, but retrogression, and retrogression once begun, who can say where it would end? How long would it be before we would be painting the exterior of the car equipment with freight car paint, applied with an eight inch brush? It took many years for the Master Car and Locomotive Painters' Association to arrive at the degree of proficiency at which they are today by their annual meetings and exchange of ideas. We cleam we have reduced the cost of equipment painting, I believe, about fifty per cent. Now, I submit that instead of retrograding, should we not uphold our own trade instead of running it down? Should we not endeavor to maintain on our cars a reasonable amount of ornamentation for appearance sake? It is true that a car could run and make as much money without a stripe and all the elaborate ornamentation, but is that desirable? A man can walk down the street with a five-dollar suit of clothes on, and fare as well as another man with a fifty-dollar suit on. But we know that appearances count for a great deal in this world. So I maintain that it ought to be the endeavor of the Master Car and Locomotive Painters' Association to maintain their equipment up to a reasonable degree of durability and also of appearance.

MR. COPP: I submit that my friend Pitard is very gloomy. He is decidedly pessimistic. He says that the adoption of the enamel system will naturally bring the abolition of all decoration in its train. He is mistaken. The abolition of the decoration has already preceded it.

MR. PITARD: Not generally.

MR. COPP: Pretty extensively. The New York, New Haven and Hartford Road, which is second in size in the United States and Canada, has already abolished everything but the name of the road and the number. The Northern Pacific, I believe, is another, and there are others. I think the Boston and Maine will, whether the enamel system is inaugurated or not. I think the striping of cars is going to be abolished. It is simply a question whether you paint and varnish separately, or whether you put them on together. That is all. Now, replying to Mr. Ginther over there, who asked for some information as to building up a surface before enameling, the same method is adopted right straight through, whether the car is varnished or not. The car is painted in the same way and varnished with enamel instead of varnish. Now, as to cleaning I believe there are members who have a great deal of a bugbear in that respect. I believe an enamel car, with the enamel properly applied, will clean with an emulsion cleaner just as well as a varnished car; in fact, I have had cars in use more than a year that have been brought in for cleaning and varnishing, and they have cleaned with soda and pumice stone just as thoroughly and practically as though they were varnished. You would never know the difference. There is no use in talking. It is thoroughly practical, and the painter might just as well get into the forefront of the matter and proceed with the age, as to be dragged along behind, like a cat, by the tail. We cannot maintain our artistic ideas of former days. I have had my hack at it with the rest. I know the trend of the age. I believe a different method of finishing the exterior of passenger equipment is coming. I would not be surprised if paint were abolished altogether, or varnish either. I think we are getting a tremendously wholesome compromise if we get a good enamel finish.

MR. PICKFORD: I cannot say much about the matter. We have done several cars lately. I do not know how they will wear. That is something we have got to find out later. It is something we have all got to come to, and we might as well start right in. I cannot say much about the subject, but I am certainly in favor of it. We have got to do something of that kind.

MR. KEIL: When I was with the Chicago & Alton, twelve or thirteen years ago, the road running into Chicago adopted the enamel system. They also had seven terminal cleanings of the Alton. I often visited their cars and watched them very closely; I found their trains in a very short time got very dirty. The foreman of the cleaning gang said it was almost impossible to clean those cars. He said: "We are shopping them twice a year since we have adopted the enamel system." I watched that system closely, and I believe that it was the poorest equipment running into Chicago. They have abolished the enamel system and I don't think they will ever take it up again.

MR. COPP: As a member of the Advisory Committee I proposed some man from that very road, so as to get information, but I do not think we have that road represented here at all. I do not know whether the secretary wrote them or not. There were certain men on that road appointed to treat on that question, but they are not here. I would like to ask Mr. Keil if the body color of that road was not yellow.

MR. KEIL: Yes sir.

MR. COPP: That makes all the difference in the world, gentlemen. You cannot make a suitable enamel, in my judgment, for the exterior of passenger equipment, while lead is the chief ingredient in it, because you cannot introduce enough varnish into it. Pullman enamel is the only thing I would consider or something of a similar nature, because you have got to have too much pigment, or you cannot get varnish enough into it to produce a sufficient gloss. In Pullman enamel, of course, you have got a large amount of gum and varnish and a very small amount of pigment comparatively.

MR. KEIL: I would like to make the matter clearer. They also have more peeling inside of three years than they had in fifteen years before. Anybody knows that light yellow equipment is pretty hard to keep clean.

MR. COPP: The peeling was not caused by the enamel. I do not believe where enamel is used on a car which is thoroughly painted, that it will peel because enamel is adopted any quicker than with varnish.

MR. HOUSER: I would like to ask those who have had experience in the enamel system, if they do not find the enamel very much perished, so much so that when coated two years ago that it would be necessary to give it two coats. I would like also to ask while I am on the floor, Mr. Arlein to explain to us something in reference to his gasoline baking system.

MR. ARLEIN: We use regular gasoline torches in the closets which are closed tight, and then the torch is applied. We use a thermometer to get the proper heat, and at 140 with five hours' baking, the enamel becomes perfectly hard, almost as hard as porcelain.

MR. BISHOP: I do not know that I wish to say very much on this subject of enameling, but I want to say this: that glorious will be the time when two extremes meet on an intimate basis in common; and I have reference to my friend Mr. Congdon and myself, he being on one extreme, and I on the other. The question of enamel is an old one. I used enamel when I was a boy in various forms. I believe that enamel is the proper thing to use in the proper place. You are now desiring to find whether the proper place is on the outside of the body of the car. We know it is good on the deck, on the trucks, and on the platforms; we know it is good for the interior, and that there is nothing better for a locomotive. I say for locomotives, because they will take no care whatever from the time they leave the shops until they come in for repairs, and they are always painted whether they need it or not. It is not so with a car. You will secure a proper foundation on the car, which you will swear by for durability, and if you do that, it is necessary to put on material that will protect that foundation to the extreme limit. I do not believe that our people will agree to adopt a system of any kind whereby the cars should be shopped once in eight months. If we take a car in once in every eight months for the purpose of putting on an enamel coat, only one coat, those knowing the nature of enamel, insist on applying a somewhat heavier coat, in order to get sufficient body in one coat. We figure that a car in our line in the busy season is worth at least $25 per day in service, and you cannot shop a car much short of five or six days. I claim I can color and varnish that car in an almost equal time for sixteen months' service.

MR. CONGDON: I am very glad to hear this subject discussed. That is what the papers were for. It only emphasizes the fact that good things come slow. Our friend Bishop said that we have the trucks and platforms and the iron, and it is not going to be a great while before we get the body. With regard to shopping a car every eight months, on our road a car runs about two thousand miles in one run. Those cars get very dirty. They get very hard usage, and it is almost impossible to run the car twelve or fourteen months unless that car gets to the shop for something. I understand that in the summer time on the New York Central road part of their work is cleaning cars and going over them with emulsion. Now, a car has to come to the shop to be repaired. It will not run eight months without the trucks being repaired, or there is some part of the car that is going to be repaired, and that car should come in in the summer time, when you are doing that kind of work, and be thoroughly cleaned. There is always some work to do inside of a car, and you would have ample time to clean the car and give it one coat, and then it is in good, serviceable condition for eight months, with the regular cleaning it gets, at terminal. I do not claim that the roads are going to lose any time on the car by going over this system once in eight months. I claim that at the end of sixteen months the car will have less material on. It was a long time before we could get painters to use that enamel finish on trucks. We used to clean a pair of trucks, get all the grease off, sandpaper them, and give them a coat of flat color, and stripe them, and all that sort of thing. I know it was years before we could get them to use enamel on trucks. Now, we are perfectly satisfied with one coat of enamel. Gentlemen, I believe that the time is coming when enamels will be used on the body of the car.

MR. BRUNING: I want to come to Mr. Congdon's rescue on the acid question. I am an acid fiend. I cannot agree with what Mr. Butts and Mr. Miller have said with regard to the acid cleaner. I have used it for over fifteen years, and have got the cars to show for it. It is true that after I had gone over it with acid, I go over it with emulsion. We had this same question brought up on our road. The superintendent of machinery came up to me and told me that he understood that acid was ruining the varnish. We had a dining car that we scrubbed with acid every thirty days. That car ran over eighteen months.

MR. BUTTS: Mr. Bruning is doing exactly what I used to do. I think that what he has said is one of the strongest possible recommendations for an oil cleaner. I think that is the best kind of evidence. That is what I want to hear. He admits that he has to go over his car after he puts acid on, with an oil emulsion—two transactions at double expense.

MR. BISHOP: I wish to place myself on record as being in favor of an oil emulsion as against enamel. I spoke of trucks being enameled and they wore well. The emulsion, which would be used at terminal points for cleaning, would increase the life and service of the car.

MR. BROWN: I figure that there is quite a little point between our old varnish color today and the enamel. We used to get our color dry, and we would pulverize it and grind it ourselves, adding it to the varnish, which was not a very satisfactory method. Today we get the color ground right in the varnish, which gives entirely different results. We can rightfully expect that we are going to get different results, because the varnish and pigment come together in a different form than we used to put it. I have tried both ways and I get far better results with the present enamel and varnish with dry black, ground right in the varnish, than to take the Japan color and mix it with the varnish. The body color of Mr. Arlein's car is yellow. That is the reason he did not get the results out of the varnish color because, as Mr. Opp says, it is largely composed of lead, and you cannot make a very good enamel of it, or varnish color, whatever you may call it. We get far better results now with the pigment being ground in with the varnish than we used to when we added the color to it ourselves.

MR. RUSSELL: I have used this enamel, or varnish color, quite extensively, and I could not do much with it where you have bold striping on your cars, in order to use it successfully. As far as time is concerned, I cannot see anything in the time saving at all. The result was that when you tried several times putting on your varnish colors, it would crack. I am a great advocate of the repeating process. Always repeat, put on three coats in not less than three days. That is the reason I cannot see any thing is saved in the way of time, because you cannot do that with enamel; it is a little bit too quick. The best success I had was with Tuscan red. That is a strong color and makes the first coat very strong. I mix the Tuscan red with varnish, and got all the covering qualities. At the same time I am doing it with two coats, but I cannot do it in less than three days.

MR. HUTCHINSON: With reference to this enamel question, the proof of the pudding is what we are all going by, and from my experience, I cannot agree with Mr. Copp or Mr. Congdon. The question, boiled down, it seems to me, is one of time, as my friend Butts has mentioned, and getting the car back to the shop and taking care of it afterwards is the question. A car running under a varnish color, from my experience—and I want to say right here it is only from samples, I am speaking, and not from an entire car for I never thought it best to go that far—when a car is out under varnish—with one coat of enamel—as I believe one of the gentlemen advocates, you do not get the opacity in the first place to properly color the discolorations usually on a car with one coat. Then, you destroy the durability by adding more color and not having enough varnish; consequently the car comes back to the shop in a perished condition, and particularly at terminal points where the cars are cleaned the results would be disastrous to the coating. If you use, as many of us have to resort to, the soap and water process, you certainly will have disastrous results. If you use an emulsion cleaner, and that is satisfactory altogether, then I admit, perhaps, you might make a success—to suit you; it would not suit me altogether. So I think, that when you come to consider the time in getting a car—and on the Grand Trunk road, at London, we have an equipment of nearly four hundred cars to take care of on the Northern and Middle divisions of the road, and you can understand that we cannot get those cars into the shop every eight months to go over them with a varnish color. Consequently, as far as that is concerned, I could not advocate the use of varnish color, or enamel, as some call it.

I believe the proof of the pudding, as I have said, is our guide; and I cannot understand with the addition of the necessary quantity of color that you must add to the varnish, that you can get the desired durability to stand the cleaning that we have to give the cars to make them acceptable.

MR. PITARD: While the question of durability of the varnish color is under consideration, I wish to say, it is well known that color is one thing and varnish is something else. Color, as we understand it, is applied to any construction of a car or anything else to get the desired color; and varnish is to protect that color, but where we mix the two together, in order to get there a little quicker—to get the same results a little quicker—we would be apt to get into the woods, for the reason that it has already been determined that some pigments are more durable than others. Now in making a color, that is color composed of more than one color, two or three or more ingredients are mixed in order to obtain the desired shade or color. In that combination it is possible and probable in some instances that a pigment will be introduced that is very susceptible to atmospheric changes, and gas and all those things that have a deleterious effect on paint pigments. We know that solid color—that is, color that contains only one ingredient—in some instances is less susceptible to these gases and acids that I speak of, and others—take, for instance, black, that you know is composed of carbon, and carbon is considered an inert substance—carbon in some forms, such as graphite, will stand a very high degree of heat, as you know. Take lamp black, or any kind of black, black lead and those things, they all belong to the carbon family. It is a recognized and admitted fact that the compounds of those pigments are inert, and not susceptible to any kind of acid which ordinarily destroy the pigments.

Now, what I term compound enamel, in my experience, will not wear like enamel composed of only substance. My experience has been that enamels composed of red, black and yellow, which I believe are the constituent ingredients of our body color, will, in certain conditions, spot, and will not stand the wear like enamel composed of only one substance.

Now, I am reminded, in the consideration of this subject, when I think of the theories and opinions advanced by some brother members here, in order to obtain quick results, of the Irishman and the curry comb. An Irishman bought a curry comb to curry his horse, and the man selling it to him, praised it highly, told him to use it and it would amount to half a horse's feed. "All right," replied the Irishman, "I will buy two curry combs, and I won't have to feed him at all." (Laughter.)

MR. COOK: This subject is divided into three headings—economy, durability, and quality. It seems to me that the question of enamel painting has its place. It looks well in its place; it fits its place beautifully, but there is a possibility of it being out of its place, and that is the question we seem to be considering at the present time—to what extent we can use enamel paint and get economy and durability. There has been a diversity of opinion already expressed, and I think there will be if we sit here for another twenty-four hours. I do not think we have evolved out of this question what there is to be evolved and it will take a great deal of more efforts on the part of every master painter before we can determine as an association to what extent we can get durability and economy out of enamel paint. I think all of us will agree that to get an A No. 1, first-class job of painting we are not yet satisfied with enamel paint. (Applause.)

I have used it to some extent and when it comes to passing a job out of the shop, I have been compelled, with the best enamel I have so far used, to add a coat of varnish before I felt I was perfectly justified in submitting it to the wear and tear of service.

MR. BROWN: I see we have a good friend of ours, a member of the supply men, with us, and I have no doubt at all but that he would willingly give us a little of the outline of the preparation of enamels. I would respectfully, on behalf of our gathering, beg permission to have Mr. Marshall say a few words to us.

PRESIDENT LANFERSIEK: If there is no objection, Mr. Marshall will have the privilege of the floor.

MR. MARSHALL: In the capacity of varnish maker I have tried to keep up with the race, and in that connection think I have kept fairly well posted as to the manner and methods of how things are done. My earliest recollection of coloring varnish is, as Mr. Brown said a short time ago, grinding the dry color in the varnish. That was something like forty years ago. That particular color was a bright English vermilion, ground in a good, serviceable, durable and elastic varnish. I emphasize that because a great deal depends upon that proposition. Another thing was, it was not for outdoor exposure; it was for some trimming on the inside, or in the stock room, where it was kept very pretty. For a number of years that vermilion and varnish background together worked well. It was about probably twenty-five years ago that the subject of enamels was brought before the public, not for railway cars, but for what is largely used for household purposes. I think any of you will remember when it first began to be put upon the market by catchy advertisements in the magazines and papers, showing how a man, woman or child could lay it on and produce beautiful results. I need not enlarge upon the thought, from your standpoint as practical painters of cars, that what would do for the kitchen or the baseboard around a dining room would not do for the outside of a car. Mr. Pitard has brought out some very good points when he spoke of the difference between having the color in the varnish of one pigment, and having it of several. The principal point brought out by that is the disturbing effect of one color upon and over another. Some are very fugitive and the color might be green, blue or yellow at the start and turn brown, black or white in a very short time.

What I want to say first about this thing is—and we need think of it only for a moment—when you put on enamel, so-called, you are putting it on for economy in time, for economy in material, and for economy in labor. You get any of the celebrated enamels advertised so much, and you get two in one, and you put on in one application what takes two—saving labor and material. But you have got, as someone remarked, a small part of varnish and a large part of pigment, and, as is well understood, varnish is not only a beautifier and gives lustre, but it should be, above all things ,a protection to the colors that are under it. You have these two ground together between two stones. I want to say to Mr. Brown that the difference in grinding between now and the time he referred to, is very great. In those days they had a muller and a flat stone. Of course that is now done with very much skill between two heavy water-cooled stones, and by that process they get their pigment infinitely fine, when the varnish is being ground in it, and you have a much smoother and much more brilliant surface than you could get by the hand-mill or the old muller stone; the fact remains, however, that you have in ounces and pounds more color than you have of varnish, the object being to get the covering qualities first. That is necessary, and the next object is to get it out with as much dispatch as possible. The moment that question comes up you defeat the object of durability, because the manufacturers must cater to that primarily in making their enamels. The quick varnish is not durable, and in a short time, naturally, with the hardening of the pigment, you will have a brittle surface. If the color and varnish is to be used simply for the saving of labor, and not considered from the standpoint of saving the material, you will get better results. If you insist upon a quick drying color you defeat your object. There are other points that I could enlarge upon, but I am not here to tell varnish secrets. I will say this much: It some times happens that certain pigments will not take a great deal of varnish or oil, and after you get more than a certain percentage of varnish or oil in, you have a coagulation, and, some times, a separation. So in a large measure, if you will insist on having a quick hard-drying gummy varnish, as I have already said, that defeats the object of durabliity. I believe, all things being equal, if your superior officers would permit it, the old-fashioned way of putting on paint for platforms and trucks and then put on a good durable varnish, you would have much more service out of it. If you are on the platform or floor of a car, you are walking on the pigment and varnish. and no matter how finely the pigment has been ground, the abrasion of your foot will more or less disturb the pigments, but if the pigment is protected with varnish, you have first to break through the varnish. If the varnish is good, you all know how long it will last. Continual stepping on it will break through the best varnish made, but you cannot get down to the pigment until you have gone through that varnish. (Applause.)

Mr. Brown: I think I voice the sentiment of every one here when I say that we are very much pleased that Mr. Marshall has consented to say a few words to us, and I would move that we tender a vote of thanks to him.

The motion was seconded and carried.

MR. GOHEN: Mr. President and members of the association: I was not in the room when the papers were read and I regret very much that I was not. Perhaps some of you have noticed that for once I have not talked much during this convention, and it has been quite a severe task. By making a few inquiries I find that two of the papers read here favor the varnish color, or enamel process, and one rather does not. Now it occurs to me that this association some years ago—and I think it was at Detroit—almost unanimously decided that the enamel process was not the proper thing for the railways to adopt, and before I get through I shall say a few words personal and pertinent to this question only. There was a certain road in the middle west that some six or eight years ago took up the question of the enamel process and exploited greatly what economy there was going to accrue to that railroad. I want to say to you that if there was a railroad in this country that had cars less ordinary looking than that railroad, I don't know where it is.

Now I wish to say to you that there is some pride in railroad car painting. There is a quite a difference now in the painting of our equipment than what it was forty years ago. It is not quite forty years ago since I got into the railway business, but it will soon be, perhaps fifteen or twenty-five years from now (laughter) I am not going to tell you how old I am. But I remember that at that time there were hardly two coaches painted alike on any railroad in the country. They did not have dining cars in those days, but the parlor, or chair cars, as they were called then, were very elaborately ornamented. If you had a private car, the same thing was there. If you had a second-class coach which ran adjacent to a first-class coach, its ornamentation was not so elaborate as the first-class coach; and the foreman painter—I am looking at him right now, Mr. Marsh, the first man I ever worked for on the railroad—used to sit up nights thinking how many different styles of ornamentation he could put on his coaches, yet the object was not to get two coaches ornamented alike. We have learned as we go along. We are always learning. We have found out that it is a good thing not to put elaborate ornamentation on our first-class cars, but to put the same ornamentation on these cars that we put on the second-class cars, but when we come to baggage or postal cars, which are subjected to severer strains of weather and service, there we probably omit all ornamentation, which is all right; but the general public will choose a nice, plain, clean, beautiful car, rather than one that is dirty, dingy and old, such as you will put up with your enamel process. (Applause.)

I will say to you that you can go into any union railway station in this country, and if there is one railway running in there that is competing with another one, and they have fine equipment, and the passenger has his choice between that and one which has the enamel process on, nine out of ten of the traveling public will take your nicely painted car in preference to the other one, and let them be built exactly the same.

In St. Louis, there are some fine trains running there. I am not saying anything about our own now, but I am going to mention one road that has a train running in there, gentlemen, that is a credit to that railroad, and that is the train running between Chicago and St. Louis on the Chicago and Alton, and I have heard innumerable compliments paid that, simply because they have finely painted cars. If this association, knowing well in their hearts the difference between the enamel process, and I will say even to looks, to say nothing about economy or durability—even to looks, this association knowing well in their hearts the difference between those two styles, I will say to you, boys, don't go back on varnish. It is the salvation of your company. This railroad which I referred to, which exploited this enamel process so loyally, telling how many thousands of dollars they were going to save that company in years to come, in using the enamel process, is not using the enamel process today. It did not take them more than two years to find out that in the end it cost them pretty near twice as much money to keep their equipment up, and they never had good equipment at that. The result was that they went from one extreme to another, and having their stomach full of enamel process, they went to varnishing and ornamentation too far. That shows you they were tired and sick of that enamel process. There are some places that it can be used; it may be used on the trucks, may be used on the platform, may be used on the engine, which is never clean from the time it goes out until it comes back, but, boys, for your own reputation keep it off of your coaches. (Applause.)

Now, I am sorry I was not here when those papers were read because they might have enlightened me as to some points that were brought out in favor of this enamel process, but I am going to make a little statement which will explain to you why I have spoken on this subject alone. I am going to leave you. I am going in the supply business. I cannot get an interest in a railroad, but I can get an interest in a supply company, and while I regret that I am going to leave you, yet it is to my personal benefit, and for that reason, knowing I was going to leave you, and that some of you might construe a personal motive in my speaking here upon some of the subjects that were brought up, I refrained from doing so. I shall enlighten you all tomorrow about the subject, but keep enamel off your coaches.

MR. COPP: I am very much pleased, as the father of this subject, with the generous and spirited discussion it has received, and I am very well satisfied with the drift of it.

MR. GOHEN: As a member, I move you, that it is the sense of this association that enamel on passenger cars is not the proper thing for the railways to adopt.

MR. BUTTS: "As a finishing coat." Would you accept that? It is all right on a car covered with varnish.

MR. GOHEN: Certainly I have no objection to putting on a coat of enamel if they will only beautify that enamel.

MR. COPP: How about the decks?

MR. GOHEN: Decks will be all right, because nobody ever looks at them; but when a car is going into the station, you want to say, "There goes a nice car." You want to see a car coming out of the Pullman shop from your road a nice car. One of the most prominent railway men in this country, Mr. James J. Hill, who, ever since the time he first began to be connected with the railroad, which he now controls, did not consider the passenger business on his road as worth thinking about. He said, "I do not get any money out of passenger trains; and I don't care. If the people do not want to ride in my cars, let them walk. I get my money out of the freight trains." It is not more than thirty days ago that Mr. Hill changed that opinion, and has now ordered the finest equipment in the United States for his passenger cars. Now, evidently, he has come to the conclusion that there is something in the passenger business, or why would he get the finest trains? It is said the trains that he is going to put on his road—ten complete trains—are the finest passenger trains that are on any railway in the United States. That shows, gentlemen, that Mr. Hill has woke up to the idea that there is something in having a fine passenger car.

A man that cared nothing for passenger cars, now gets the best there is in the country. Let me say in this connection to Mr. Gohen that the income of the Boston and Maine is about forty-five million dollars annually, about equally divided between the passenger business and its freight.

PRESIDENT LANFERSIEK: It has been moved and seconded that it is the sense of this association in convention that enamel on passenger cars for a finish is not the proper thing.

The motion was carried.

PRESIDENT LANFERSIEK: The next subject is No. 8—"Are locomotives properly cleaned while in service? If so, by what method and material?

The first paper is by Mr. J. B. Shuttleworth, of the Boston and Albany Railroad, Springfield, Mass.

MR. SHUTTLEWORTH'S PAPER.

Subject No. 8: "Are Locomotives Properly Cleaned While in Service? If So, by What Method and Material?"

Mr. President, officers and members: When informed by our estimable secretary that I had been chosen to prepare a paper on Subject No. 8, viz: "Are locomotives properly cleaned while in service? If so, by what method and material?" realizing my inability as a writer, my first impulse was to decline, but on second thought concluded that a poor attempt would be a little better than none.

The first question in the subject: "Are locomotives properly cleaned while in service?" In answering I think it can be truly said, taking them as a whole, they are not properly cleaned. The failure to remove thoroughly and evenly all dust and grease, also the using of oils which have a tendency to rot the paint and varnish instead of preserving them, I deem sufficient ground for the assertion that they are not properly cleaned. The increase in number of locomotives and the decrease in the number of the cleaning force, would, in all probability be the principal plea in any excuse that might be offered for the failure of not having properly cleaned locomotives.

As to the method and material. You will generally find that the few railroads who are exceptions to the prevailing habit of not having properly cleaned equipment, that they have first, a sufficient number of cleaners, second, that each man is assigned a certain portion of the work to attend to and is held responsible for the appearance of that portion. The result of such a method is a nice clean set of locomotives. The material, from personal experience, I think should be an oil emulsion free from alkali, or acid. Such material not only cleans, but preserves the paint and varnish, and, as far as condition of paint on equipment cleaned with such material is concerned, will permit a longer time of service between shoppings, also reduce the cost of preparing and painting equipment when it is shopped. Compute the gain in time of service between shoppings and the amount of labor saved in re-painting equipment when shopped, and I think it safe to say that the difference in cost of an Emulsion cleaner above the cost of illuminating or lubricating oils, which have been and are still used to a great extent, would be equalized.

Trusting that the members will not hesitate in pointing out any errors or short-comings in my attempt as a writer, I am; Respectfully, J. B. SHUTTLEWORTH,
F. P., B. & A. R. R., Springfield, Mass.

PRESIDENT LANFERSIEK: The next paper is by Mr. David Murray, of the Pennsylvania R. R., Pittsburg, Pa.

The paper was read by the secretary as follows:

MR. MURRAY'S PAPER.

Subject No. 8: Are Locomotives Properly Cleaned While in Service? If so, by What Method and Material?

The first part of this question naturally opens up a subject that might perhaps be better considered by officers directly in charge of locomotives on the different railroads, than by the master painter, because the duty of cleaning locomotives, while in service, devolves upon the round house foreman and a portion on the fireman. I cannot at this time, however, refrain from advancing an opinion on the subject based upon my observation of the different methods employed in using the locomotives. The duty of properly cleaning a locomotive while in service and keeping it neat and tidy as stated before, belongs to the round house foreman and fireman, when power is scarce and it becomes necessary to pool the locomotives, supplying a different fireman for the locomotive on every trip. The inducement to clean it properly is removed and we see locomotives coming to the shop in a very unclean condition. The fireman will not clean them because somebody else gets the locomotive on the next trip. On the other hand if a road has a sufficient number of locomotives to permit them to be used on so-called "assigned runs," where each locomotive is in charge of say not more than two firemen, one on each alternate run, these firemen would take great pride in keeping their locomotives clean. I notice that the locomotives are maintained at all times in a better condition and may then be said to be properly cleaned while in service. With us, the painters duty on the locomotives commences while it is in the shop undergoing class repairs, and it is then that the painter may readily notice the difference in the conditions of the locomotives which have been "pooled" from those assigned. Our method of preparing the locomotive for re-painting, while it is in the shop, is by no means a novel one, but is, I believe, in quite general practice. As a matter of possible interest, however, I will state that all grease and dirt are first scraped and removed from the locomotive. When the locomotive is found to be in bad condition and the grease and dirt do not yield readily we use carbon oil to cut them. Next the locomotive is carefully scrubbed with a solution of soap with a small percentage of lye, which thoroughly removes all grease and dirt, and prepares it for painting. The painting of locomotives is so familiar to all that it is unnecessary for me to go into details; I would, however, digress from the subject of this paper to suggest that much better results in painting locomotives might be obtained if a more suitable place than a round house for doing this work were provided, as we well know that the soot, steam and dirt to be found in all round houses injures the work when the painting is completed. In cleaning locomotives and tenders, which do not require re-varnishing, which work is usually performed by round house employes and not painters, the material used for such cleaning should not contain lye or other ingredients that will effect varnish, but will preserve the same.

Respectfully submitted, DAVID MURRAY,
Master Painter, Pittsburg, Pa.

PRESIDENT LANFERSIEK: The third and last paper on this subject is by Mr. E. R. Clare, of the Southern Railway, Birmingham, Ala.

MR. CLARE'S PAPER.

Birmingham, Ala., Aug. 26, 1905.—To all officers and members of the M. C. & L. P. A.

Gentlemen: With a view of perhaps being of some service to the convention, and in hopes of something, or everything, I say, calling forth abundant criticisms, thereby inaugurating a debate that will develop points and facts which will be helpful to all interested, I have accepted the invitation of the Advisory Committee to take up Subject 8, viz: "Are locomotives properly cleaned while in service; if so, by what material and method?"

When I considered the above question, or rather questions, as you will notice there are two separate and distinct ones contained in the subject, I found that I could answer but one of these, as they now read, because I do not think locomotives are properly cleaned, which, as an answer to the first question, would debar me from taking up the second, so I take the liberty to reconstruct the subject, thus: "Are locomotives properly cleaned while in service; if not, what is done as a remedy?"

Now understand me clearly. I am not condemning the foreman painter as neglecting his duty, nor being ignorant of same, when I say the engines are not properly cleaned, for I do not consider he should be responsible for abuses to painted work by road men while engine is away from the division terminal; and I know of no other name than "abuse" for attempts at cleaning by them, and this same abuse is the handicap to the proper cleaning at terminal by the foreman painter or whoever may be in charge.

You may ask: "What has been done to so seriously interfere with the proper cleaning?" Simply this: As every fireman is held responsible for the looks of his engine, he will try to have it looking nice with just as little work as possible, and the consequence is a good, generous application of oil, of any kind handy, with very little wiped off—the result can readily be seen: a coating of gum and grit which cannot be removed by an ordinary process of cleaning, but requires extra work, which is both costly in time and injurious to paint and varnish; furthermore, a percentage of the oil penetrates to the metal, and it is but a matter of time until scales or flakes of paint can be detected raising.

It is hardly necessary to state that this practice is not permitted by the management, but is one of many labor saving tricks. I do not mean to say all foremen have this evil to contend with, but am satisfied that some do, and others, no doubt, have something else equally as bad to call for a too vigorous process of cleaning, if anything like a good appearance is obtained.

When engines are in this condition I usually go over worst parts with benzine enough to remove grease and gum, then wash with soap. If parts thus cleaned have an ashy or dull look, brighten with car cleaner. As to engines in ordinary condition—by this I mean those that have not been "doped" with oil, etc.: I cannot say that I follow any set rule for cleaning, but make each engine a class in itself, and each part according to its needs. If dusty, use dry waste, being careful that wires, straws, etc., are removed from waste so as to prevent scratching of varnish; where there is a deposit of soot, mud stains, etc., use car cleaner, but at times I find it necessary, after repeated applications of this, to use benzine first and then follow with car cleaner, and, by all means, see that parts are wiped thoroughly dry—if this is not done there will be trouble galore when cleaning after the next trip; furthermore, the car cleaner, if left on, will have a tendency to bring about bad results.

On tanks and sides of cabs, wiping with dry waste, with an occasional washing, will generally suffice and be preferable to most any other mode of cleaning.

Respectfully submitted, E. R. CLARE,
Foreman Painter, Southern R'y Co.

PRESIDENT LANFERSIEK: You have now heard all the papers on the subject No. 8, and it is now open for discussion.

MR. BRUNING: I notice that Mr. Clare states in his paper that it is vital for the painters to clean the engines. We all admit that. But is your management liberal enough to allow you enough help to go into the round house and clean the engines. We know it would be nice if we could have the engines cleaned in the roundhouse, but I do not think it would be advisable for us to take hold of this, with the limited amount of help we get nowadays. We are not allowed to have an extra man, and you are probably short in the shop, and then to go out into the round house and clean these engines—I don't agree with him.

MR. CLARE: It was formerly done under the supervision of the grease wiper boss, but they looked over the work about like they would the under part and it was very carelessly done. The management recognizing how necessary it was to have better care over them, they put it under the foreman painter, while the men were carried on the round house pay roll. There was quite a controversy came up and they turned it over to the foreman painter, and now I look after that part of the work.

MR. BRUNING: That is about the way we do. We have the foreman of the wipers educated, so he can do it equally as well and I supervise the work, furnish the necessary material and instruct him, but I would not be in favor of taking a lot of painters out in the round house.

MR. CLARE: No, not as painters.

MR. BURTON: Brother Clare failed to state that the engines on our road are striped with a gold leaf. The question of cleaning in the roundhouse has been placed under our care, but not at our solicitation, and we feel that we are here to get information, if possible. We take care of only 201 engines at our terminal. I cannot tell what percentage of passenger engines, but our master mechanic has stated that we must clean these engines. We are here to get information. If we are not doing it right we want to get right. We use an emulsion cleaner and, as he said, we have different applications, and get different results. Our freight engines are not varnished. Of course we run up against similar processes very often, and I listened very attentively to that question here today. Our passenger engines have two coats of locomotive varnish. As I say, we are here for information. This is a subject particularly that brought me to the convention. I did not ask to come to the convention. I submitted to our master mechanic the subjects to be discussed here, and I have recently taken up this subject, which we think is a very important one. I infer from the talk here today that engines are not given much consideration. If there is anything better than an emulsion cleaner we want it. We have tried soap in some places and that answers the purpose very well. I would like to hear some discussion on this subject.

MR. BUTTS: I have been interested in this subject, from the fact that I have had this department to look after for a long time, and have tried almost every known method to keep paint clean on a locomotive, but for the past year and a half or two years I have settled down to cleaning our paint on the locomotives practically in the same way that we do on our passenger equipment, and we are getting splendid results. Our equipment certainly looks very much better than it ever did under any other process. We aim to get them to our large round house and have a man at the head of the cleaning force, acting as a working foreman, so to speak, and our policy is to instruct him in the use of these materials, so he can instruct his men how they should be used. The material we are using is made in two forms—a thick emulsion—you might call it a semi-paste—and a thinner that goes with it, which is a thin oil. We use the thin oil in cleaning our tanks and other varnished parts of the locomotive every trip, instead of trying to wipe the parts of the engine with a separate piece of waste with these oils, but you will find that after doing that for an indefinite length of time, that the tank especially becomes very dirty and you will have to resort to giving it a more thorough cleaning with an emulsion. We have no set time as to when this heavy cleaning shall be done. We leave that to the judgment of the man in charge of the cleaning force. Whenever he thinks the tank is getting so dirty that he cannot get it off with the thinner, he goes and cleans it thoroughly, and follows it up with an oily waste. We think we can wipe off the tank with oily waste in very near the same length of time that we could properly wipe it dry. If you will resort to the various kinds of oils commonly to be had about the round house, you will find you will not get good results. A great many oils will soften your paint and injure your varnish, and practically destroy it in six or eight months. We find it pays to use the proper material. You need to carry it out systematically, and if you do you will find this system will pay, and you will not need painters to wipe the engines. Our common rate for labor of this kind is fifteen cents per hour for help to wipe the locomotives. We find where there are four or five men doing it, it pays to have one man who has had experience and intelligence enough to direct them in their work.

MR. CLARE: After several applications in oils or fillers mentioned, you have something of a gummy nature to contend with.

MR. BUTTS: The material we use does not form a gum. It is absolutely non-drying. It will never dry and never injure the paint, no difference how long it remains there. I will positively guarantee that it does not harm the paint, but for all that, there will certainly be an accumulation of dirt. You leave a little deposit each time, and in the course of a week or two your tank will become dirty. Then we give it a heavier cleaning, which takes off all the dirt down to the paint.

MR. CLARE: I attempted the same thing, and found it would be almost impossible without extra long efforts. Therefore I mentioned in the paper that I used at times a little benzine in the waste to cut this gummy dirt.

MR. RODABAUGH: My experience has been, especially with a freight engine, that when it goes out from the shop painted that is the last it gets until it comes into the shop again to be painted. Passenger locomotives we do clean occasionally. I would be glad if we could get them every two or three weeks, but if I get them every two or three months I will be in good shape. We clean the passenger locomotives whenever we get an opportunity, but the opportunity does not come very often, and we clean them with crude oil. I believe those engines will compare favorably with engines cleaned with anything else. I do not use anything else. We do not clean anything but the drivers, cabs, domes, etc.

MR. KEIL: If any of the members like the job of cleaning an engine, I hope they will get it. I have had it for nearly two years. I have a force of thirteen men who do nothing else. They work on piece work. They worked at day work for six months, and we found the best plan was to adopt piece work. The first plan was simply to clean the cab, upper works, etc., and after running one year that way the management found that part of the engine was all right and were well pleased with it, but a short time ago they thought the jacket, wheels and pilot, as well as the rest of the engine, should be turned over to us, because we were doing so well. Now, we have got that, and if any of you want it ask for it when you go home. I believe we have made improvements since we have taken hold of it. I don't work the men over the entire engine. I keep a man on the tender and cab separate, and they do better work that way, and can keep track of the piece work better. Our cleaner is an oil cleaner or emulsion, as they call it. Our system is to clean every engine once a month thoroughly. Three of the men do what we call drying and wiping. The gang foreman watches the board and when the dispatcher writes up an engine, they pick that engine out and clean her. We aim to get every engine that goes into service that day. After the passenger engines are cleaned down they devote the balance of time to the other work. We stencil the frame once a month, but if we find an engine has been in hard service, and each time it ought to be cleaned again, the gang foreman calls my attention to it, and I order her re-cleaned, or thorouhly cleaned. I favor an emulsion cleaner for locomotive work.

MR. ALBRIGHT: Why the cleaning of an engine should come under the work of a foreman painter in a railway shop I do not know. Brother Clare says he has charge of the cleaning, and I would like some brother to explain why cleaning an engine should come under the work of the foreman of a paint shop?

MR. QUEST: I would like to ask Mr. Albright who would be better qualified than the foreman painter if he had the time and force of men? He has usually got a great deal to do and it is a matter of just adding a little more on. (Laughter.) The painter is a pretty tough proposition and it would be a long while before the last straw would do any breaking. I wish to say that on the Pittsburg & Lake Erie we have some such system as Brother Clare has, round house cleaning of engines under the supervision of the foreman painter. We have two tank wipers and two men do the top work, and we have something like 184 engines at present. There was a time when we had 205 that were taken care of by the six men—that is, four wipers and two front-end men. Now, I want to say that they are leading a strenuous life—the six of them. They are doing the best they can and if any of you folks are acquainted with the Pittsburg & Lake Erie engines you know what the results have been . We aim to do the best we can with that force. Four are on the paint shop rolls, and two on the round house rolls, but I do not see that that cuts any figure. The railroad company pays them their salaries. While the cleaning is not done by the painters it is done by the wipers. We use emulsion, and when it is dirty give it a scrubbing.

A motion at this point to have the delegates photographed in a body was carried.

The convention here adjourned until 9 o-clock a. m., Friday, September 15, 1905.

FOURTH DAY.

Friday Morning, September 15, 1905.

President Lanfersiek called the convention to order at 9 o'clock.

PRESIDENT LANFERSIEK: The first business this morning will be to answer queries. No. 1 is, "How do you remove old paint from front ends of repaired locomotives?". Does any gentleman desire to give any information with regard to that matter?

MR. DANE: In answer to that question, I would state that on our road, when the engines are in for general repairs, the front end and stacks are scraped, and one thin coat of engine finish applied. They are taken care of afterwards at the roundhouses. That is what we do with our front ends when the engines are in for general repairs.

MR. HOUSER: You do not have anything to do with the front ends after the engine leaves the shop?

MR. DANE: No. sir.

MR. HOUSER: Do you know how they remove black from the front ends in the roundhouse?

MR. DANE: I do not think it is removed on our road unless it it burned off.

M. HOUSER: We remove ours with a good scraper and plenty of elbow grease back of it.

MR. DANE: In your shop?

MR. HOUSER: Sometimes we do a little work on them in the enigne shop, but we have no control over the men in the engine house. When the engine leaves our shop it is practically out of my jurisdiction, or inspection or anything of that sort.

PRESIDENT LANFERSIEK: As far as we are concerned, we use elbow grease and a scraper.

MR. LITTLE: It costs about $5.00 to take it off right.

PRESIDENT LANFERSIEK: No, it does not cost that much. That is our method and the only method we ever had,—scrape it all off during the time the engine is in the house for repairs. We also do as Mr. Houser says, in the roundhouse, at stated periods.

MR. LYNCH: It is our practice at Dennison to scrape it all off and renew it.

MR. BROWN: I have had the pleasure the last year of working more on locomotives than on cars, having that matter in charge, and I find that the material gets on there so hard that we take what might be termed a pening hammer and pound it. The front end is the worst part. The upper part is not so hard, but underneath the only thing we have employed yet is what might be termed a pening hammer and pound it off.

MR. SHUTTLEWORTH: I leave the front ends go until the last, for while they are working with the pneumatic hammers, I find it causes a vibration. The lower part that requires a good solid elbow grease.

MR. BROWN: I think for that purpose something in the form of a chisel could be utilized. I think it could be used very advantageously, because it would everlastingly rap away there—something in the form of a chisel.

MR. SHUTTLEWORTH: It would cut steel, I do not see why it would not cut that.

PRESIDENT LANFERSIEK: Mr. Rodabaugh, we are trying to answer the first query, "How do you remove old paint from front ends of repaired locomotives?"

MR. RODABAUGH: Scrape it off with scrapers made out of old files.

MR. WHITTINGTON: Take old files and scrape it off. That is the best way I have found of doing it.

MR. JAMES: I have tried several solutions and always failed. We find you have to chip it off and scrape the balance.

PRESIDENT LANFERSIEK: We will now pass on to query No. 2—"What oil do you use for rubbing down car interiors when newly varnished?"

MR. SHORE: On our line we do not use any oil for rubbing. We use pumice and water. For the interior finish we use OO finish. I think it is manufactured by the Pennsylvania people.

MR. BAILEY: What is the question?

MR. LANFERSIEK: "What oil do you use for rubbing down car interiors when newly painted?" Mr. Shore rubs with water. His method is not pertinent to this question. After the car is varnished you rub with oil.

MR. BAILEY: I have always used what we call raw linseed oil. The Lord only knows what it is made of, but that is what it is called. I never used anything better. I don't know what we get now, but it is called raw linseed oil.

MR. HOUSER: We have been using linseed oil, and a certain percentage of good petroleum with it.

PRESIDENT LANFERSIEK: Why don't you use petroleum altogether?

MR. WILKINS: We use olive oil.

MR. SCHUMPP: I use non-drying oil for all new or old work. The oil is called machinery oil. We have no trouble whatever.

MR. BUTTS: We are using a non-drying oil. It has a percentage of mineral oil in it, a special mineral oil, with also a percentage of turpentine and benzine. It is very thin and acts very nicely. I am in favor of a non-drying oil. The fact is if it should occur in hurried work, which is not properly wiped off, which is sometimes the case, there is absolutely no harm to come from a non-drying oil. For instance, if you have rubbing down work to do, and the man did the work hurriedly, and it was necessary, for some reason, that it should stand over until the next day before it is entirely completed, if you have a non-drying oil no harm results, while if you use a drying oil, you have got to complete the job while you are at it, and be careful to get it all off, or you will have a gummy substance left. In these days of rapid work we have got to guard against everything of that kind, and we have an advantage in using a non-drying oil.

MR. BAILEY: If your raw linseed oil was wiped off thoroughly dry, wouldn't you consider that better for the varnish than the oil you are using?

MR. BUTTS: I am not prepared to say that I would. For many years I was of that opinion, but from the fact that we had the difficulty I spoke of on cars where there is considerable carved work, and we would find places here and there where the linseed oil had not been thoroughly wiped. So we experimented with the non-drying oil, and the result appears to be equally as good as when we used the linseed oil. It wipes off more readily, takes less labor, and we have no trouble drying in the corners here and there, where the work might be carelessly done.

PRESIDENT LANFERSIEK: We will now pass to query No. 3—"Is not there some other way that can be devised to clean car glass in shops than by hand?" The custom now is to clean the windows in the car and do it by hand, a man inside and one outside, so as to get all the dirt off. The object of this query is to know whether there is not some other way to do it, in order to lessen the labor. Has any member got anything to offer?

MR. BRUNING: We never had much of that trouble, because I always insisted on the glass being thoroughly cleaned while they were cleaning the sash. After going after the men for about a year we finally got that thing done, so there was no trouble.

PRESIDENT LANFERSIEK: Suppose the carpenters would dirty them up?

MR. BRUNING: That would wipe off readily. I have been in shops where it has really cost more to clean the glass than it did to paint the sash—carelessness on the part of the men. My past experience has been to make the men be careful, and you will find you will have very little varnish or paint. If a man is a practical mechanic, there is no reason why he should get any paint on there.

MR. BUTTS: When you get to working piece work, the men are apt to be a little more careless when an inspector is not around, and we have adopted a plan which has been a great benefit to us in the way of cleaning glass and saving labor. Every practical painter will admit that it is quite a difficult thing to keep in close enough when you are putting on the various coatings on the frame of the sash—that is, it is difficult to keep off the glass, and the paint and varnish that you get on the glass is quite difficult to remove, and, as Mr. Bruning states, it often times costs as much as to paint the sash. We have adopted this plan: Graining our sash imitation mahogany, that brown coating is practically a flat coat. We allow the painters to cut right out onto the sash, and paint with a brush and take no precaution whatever to keep off the glass. Then in our varnish and graining coats we come on top of the flat coat on the glass, and when you come to clean the glass, you can take a sharp putty knife—that flat coating does not adhere like varnish—and you can scrape it off easily. All that is left you can wipe off very easily with water, with a weak solution of wood alcohol that we use. By pursuing that we are able to get our glass cleaned very cheaply. We clean the glass coming from the sash room before they go into the car.

MR. MARSH: We use the same method.

MR. SHORE: At the Collingwood shops we adopted the same thing. As Mr. Butts says, if you will take a sharp putty knife, it will do it. We clean them before they are put in the car.

MR. FRANK BAILEY: We have a man inside the car and one outside. We use fine pumice stone and water, and find it cuts all the dirt off.

MR. MANN: With regard to cleaning cars, my custom has been in the past, after the sash leaves the sash room, where they are thoroughly cleaned, we caution the men to get as little paint on as possible; then I do not have much to clean afterwards.

MR. BUTTS: There is one point I intended to speak of, and that is, in painting the sash, and not being careful to cut in, you have this advantage: There is often times a very fine crack or opening scarcely discernible between the wood and the glass. By flowing your paint on freely, you get paint into that crack, which is a benefit, as it prevents the water from soaking through, especially on the lower rail of the sash. You have the advantage of getting that thoroughly filled with both paint and varnish, and we find our sash wear better than they did before, because it is quite a difficult thing to get that opening filled, without going outside on the sash with a brush.

MR. HOUSER: I would like to ask what they clean glass with in the car-cleaning yard? What is used?

MR. RODABAUGH: After our sash leaves the wash room and goes into the painting department, the workmen have a piece of tin or sheet iron, and paint the sash; after they are painted we clean them with material called "Clean-it," manufactured in Akron, Ohio. It not only polishes it, but cleans it at the same time, using nothing but water. I never had any trouble cleaning the dirt off, and get it off nicely with that. Sometimes we use waste and sometimes use cotton flannel.

PRESIDENT LANFERSIEK: You are of course giving your experience as to what you do yourself. The object of this query is to find out if there is not some other way than can be done by hand. You are all telling what you do by hand. Is there any other way it can be done, by machinery or some other way, besides hand work? That is the object of this query.

MR. BRUNING: I was thinking we might have experimented a little and used one of these pneumatic hammers? I am going to try it when I get back. We use tripoli for cleaning, mixed up in a paste form, and put a little on a sponge. One man goes around with the sponge and dips a little on, and another fellow goes around and wipes it off.

PRESIDENT LANFERSIEK: The next query—"Is paint removing from car exteriors by chemicals practicable and economical?"

MR. WHITTINGTON: I have experimented a great deal on this line, and I do not think it is practicable.

MR. HOUSER: I think in removing the paint from the exterior of a car with a chemical, for instance a varnish remover, I believe the material would cost more than the labor of burning it off. I believe I can burn a car off for about the price of the varnish remover.

PRESIDENT LANFERSIEK: You do not consider it practicable, then?

MR. HOUSER: No, sir; I do not.

MR. COOK: I was going to say I think we can answer that both in the negative and affirmative. What I mean is we can say it is practicable, but not economical. I think, as Mr. Houser does, that it would cost more for the material and would render the point of economy out of the question, but I believe some of the varnish removers we have at the present time we would find practicable from that point alone. I move that we consider it practicable, but not economical to use paint and varnish removers on the exterior of our cars?

The motion was seconded.

MR. BUTTS: I will give a little experience that we have had: We have had several parties approach us on that subject, claiming they could remove paint and varnish from the exterior of a car and do it successfully. In every case we have given them a chance to demonstrate what they could do, and invariably I have laid this proposition before them: I would give them a statement showing what it cost us to burn it off, and I have said, "There is the car. You can take the paint off, and if you can come below those figures, you can interest us; otherwise, you cannot." I have never heard anything more from them after they made an attempt to do it, so far.

The motion of Mr. Cook at this point was carried.

PRESIDENT LANFERSIEK: We will now pass to query No. 5—"Does your road use metal train numbers in front of headlights? If so, what color are they painted, and why?"

MR. BAILEY: Our road uses metallic numbers in front of the headlight, and they are painted red, but I do not know why. I do not know by whose orders or anything about it, but I know they furnish a very poor material. It will dry in twenty minutes, and they have to be painted very often, but I am sure I do not know why they are red.

MR. BROWN: I think that method has been discarded by a number of roads. I know it has been by the road I am on. The numbers are on each side of the cage, as we term it, where the light is in, have number plates on each side. But putting the number in front over the glass—that has been discarded.

MR. BAILEY: Can you tell me who asked that question?

PRESIDENT LANFERSIEK: I could not say who originated that question.

MR. DANE: I think Mr. Copp, of the Advisory Committee, introduced that question, but I will not be sure. It was some member of the committee. On the Boston & Maine the metal numbers of the train are placed on the iron wire that runs through in front of the glass to designate the number of the train. That is for the benefit of the conductor and trainmen. Now, they are painted a bright vermilion, for what reason I never understood, and never could find out. I do not see but what black would be just as well as red, for the reason that in the night they look black, even if they are painted red.

MR. HOUSER: Do I understand that this is the number of the train, instead of the number of the engine?

MR. DANE: The number of the train.

PRESIDENT LANFERSIEK: We will now pass to the last query, No. 6—"What is your opinion of painting the exterior of car sash body-color?

MR. LITTLE: I think if you want to imitate an old hearse or something, it is a good idea to paint the sash the same as the body color.

MR. RUSSEL: There is no more labor attached to painting the sash some other color than the body color. A man can paint it one color as well as another. In my opinion, it adds to the beauty of the car—being painted a different color—most any color.

MR. COOK: Gentlemen, the tendency now is toward plainness, but I think there is a point beyond which we could get. It is my opinion that to paint the sash the same as the body of the car is going too far. It gives it that dull heavy appearance and makes it naturally unpleasing, and it seems to me it would be a mistake to do it.

MR. SHUTTLEWORTH: I think painting the sash the same color as the body is a good deal like that song sung so much—"All Coons Look Alike to Me."

MR. PITARD: I think the idea of painting the sash the same color as the body gives the car a very unattractive appearance, and I do not know of any reason for it, unless it is just as a measure of economy. It gives the car a very monotonous appearance, it gives it a very gloomy appearance, and makes it very much like a hearse, as one of the members suggested. I think it is very undesirable to paint the sash the same color as the body of the car.

MR. QUEST: I do not see where it would be a matter of economy. That is, where the sash is grained imitation mahogany. It takes more work than the ordinary coating, and I do not see where the economy plea would come in. You would simply paint the sash, in a large majority of the roads, and as our friend says, I think having the second color makes it a little more attractive, and if we are going to abandon stripes and all that sort of thing, I think we ought to have something there to take off that funeral appearance. I think we ought to hold on to the different colored sash.

MR. BAILEY: Our road paint and grain the sash, and if we should paint them body color we should certainly save the expense of graining, and I rather favor painting the sash. I think after a time we will get used to it, and it would never be noticed. The same as we have changed a good many other things in car painting. The decorations are nearly all left off, and after awhile we would get so accustomed to it we would not think of it. We are so used to seeing locomotives painted black today that we never criticise them, and I think it would be the same with the sash.

MR. BUTTS: I disagreed with Mr. Bailey as far as the expense is concerned. The expense of preparing the foundation for the painting of the sash is precisely the same as preparing it for graining, and two coats of body color, which you are obliged to put upon that foundation already prepared, must stand as far as the expense is concerned with the expense of graining. We make our foundation with the coat. You have got to have something to form the foundation. You have got to have a lead coating under there. We get our foundation for graining in that lead coating; consequently there is no additional expense after the foundation is made. We grain it. We put on two coats of body color, or grain it. We grain the sash cheaper than we can put on two coats of body color. We finish up the sash and grain them, and the expense for that is four cents cheaper for the sash than if we put on the body color.

MR. BISHOP: I agree with Mr. Butts in every detail. We grain our sash regularly every year. I would go further than Mr. Butts has gone. I agree that the sash when properly done with the proper foundation, does not require to be grained every time the car comes into the shop for repairing. We merely touch it up. A car that has the sash painted a body color—the same as the body of the car—will require equally as many times coloring as the body of the car itself. Our sash that have been grained are running in good satisfaction, but that cannot be said of the body color sash. I don't care what color you put on, the same as the body of the car or another color. For that reason I consider graining economical.

PRESIDENT LANFERSIEK: It seems to me that there is some diversity of opinion, and I believe we could give expression by having a vote on the subject. I will entertain a motion to that effect.

MR. LITTLE: I move that it is the sense of this meeting that the sash should be painted a different color from the body of the car.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: We will now have the report of the Committee on Tests.

REPORT OF COMMITTEE ON TESTS.

To the President and members of the Master Car and Locomotive Painters' Association:

Your Committe on Tests beg to submit their report as follows:

Tests samples furnished by previous committee have been exposed since last convention and therefore show the additional wear.

The samples submitted consist of minerals, graphite, red lead, lamp black and asphaltum.

The choice in our opinion undoubtedly lies between mineral of Sherwin & Williams Co., or National Paint Co. and graphite, there being a wide distinction between these and the other materials.

We have added four more samples to these tests, the whole of which including key to same, we will hand to committee for 1906.

We will thank the members to examine samples in order to verify our report. Respectfully submitted,

W. J. RUSSELL,
GEO. WARLICK,
F. A. WEIS.
CHRIST. CLARKE,
Committee.

PRESIDENT LANFERSIEK: I would ask Mr. Wright if the Committee on Information has anything to report.

MR. WRIGHT: We have no report.

PRESIENT LANFERSIEK: That concludes the regular business. Is there any new business?

MR. RODABAUGH: I move you, sir, that we continue Railway Master-Meechanic as our official organ for the next year, and that Mr. J. H. Pitard be appointed the official editor of the Painting Department, as our worthy, brother, Copp, has resigned.

The motion was seconded.

MR. DANE: I think that motion as it is put now includes two motions. I think the motion on the official organ that we select should be made a motion by itself, and then a recommendation, perhaps, of some gentleman of the association to act as its editor. That is, a recommendation to the proprietor of any organ that we may select.

PRESIDENT LANFERSIEK: If it is satisfactory to Mr. Rodabaugh to divide that motion, it will be all right.

MR. RODABAUGH: I am perfectly satisfied.

PRESIDENT LANFERSIEK: Gentlemen, it has been moved and seconded that the Railway Master Mechanic be continued as the official organ of this association.

MR. COOK: It seems to me that is a pretty broad subject and needs considerable discussion. It is a matter which needs very careful and deep consideration, as to what shall be our official organ for the coming year. I am not prepared to say anything about it just at present, but I know there are men here who can, and it ought to be thoroughly discussed. I will say this, I spoke down in the lobby of the hotel this morning to one or two gentlemen who know about as much about it as anybody in the association and my expression was to the effect that I thought the Painters' Magazine would be a good paper for our official organ, but there were features about it that changed my opinion. The principal one was that it would not reach our superior officers, while the Master Mechanic does. It goes into the office of practically every master mechanic, and our proceedings, opinions and assertions come to their notice. In the Painters' Magazine, of course, that would not be the case. Now, the Painters' Magazine and some other railway magazines have a great deal about painting matters and a little too much of some matters that do not interest us, and it is a question just which we should choose.

MR. BROWN: I would like to hear from Mr. Copp as to whether it would be advisable to continue the Railway Master Mechanic?

MR. COPP: I certainly should recommend continuing that same paper, of course, disinterestedly. For the good of the association I recommend it. I believe that you ought to be represented in a railway paper by all means, and I know of no other so enterprising and practical in all its bearings. I should recommend you to continue it and have somebody, of course, to carry on that department in a good way, which would be to the interest of the association. Of course that largely depends upon the man who does it.

At this point the motion to continue the Railway Master Mechanic as the official organ of the association was carried.

PRESIDENT LANFERSIEK: Now the question of selecting an editor will be in order.

MR. MILLER: Do I understand that Mr. Copp has tendered his resignation?

PRESIDENT LANFERSIEK: If you read the last issue of the Railway Master Mechanic, you will see his valedictory there.

MR. MILLER: I move we say "no." I think we have got something to say about that ourselves. I think Mr. Copp has given us very good service. He certainly has given much better service than we have given him support, and I think if we pledge a little better support in the future, perhaps Mr. Copp can be prevailed upon to continue the editorship of the Painters' column in the Railway Master Mechanic. I really hope that this can be brought about. I have not contributed any more than anybody else, not as much as others, but I for one will pledge myself to do what I can to help Brother Copp out. I think we owe it to Brother Copp to give him this support, and I really hope that Mr. Copp can see his way clear to alter his position and stay with us. I move that Mr. Copp be requested to continue the editorship of the "Railway Paint Shop."

The motion was seconded.

MR. PITARD: I have been speaking to several on this matter, who stated that they desired to have me succeed Mr. Copp in this position, and were it not for the fact that Mr. Copp had already informed me of his intention to resign, I would not entertain the proposition, but I wish to say this, that whatever action is taken in this matter I desire to be unanimous. If it is the desire of the association to continue Mr. Copp in this position, it is perfectly agreeable to me and I pledge him my hearty support.

MR. BROWN: I for one certainly hope, if Mr. Copp is willing—I would not attempt to compel him, because he is bigger than I am—but I certainly hope if he is perfectly willing and everything is all right between him and the other parties, that he will continue for another year at least, his experience is valuable to us and probably of a little value to himself. I certainly hope he can see his way clear to serve us another year in that line.

MR. BUTTS: I do not wish to embarrass Brother Copp, but I would really like to ask him if he feels he could possibly withdraw that resignation and serve us for another year. I for one feel that I should very much dislike to see him resign that position. I believe he has the moral support of every member of this association. While there are other men who could take that position and fill it creditably, no doubt, he has been there so long that we kind of look upon him as one of the family, and we do not like to lose him. I should like to see him, if he can see his way clear, to withdraw his resignation.

MR. COPP: Mr. President: I hardly know what to say under the circumstances. I will say, first of all, I thank you for your good words and confidence in me, and your esteem of my past work. That is very pleasant to me indeed. If you had undertaken to call me down, or perhaps turn me down in some things I have done, I could not much blame you; still I meant to serve the association to the best of my ability. I will not allow any man to say here that he has the interests of this association any more at heart than I have. (Applause). It has been my twelfth annual convention that I have attended consecutively, and I have worked early and late with my pen in this way. The reason I resign was not on account of dissatisfaction, ill-feeling, disinterest or anything of that sort, but I conducted that department, you know, for twelve years in the Master Mechanic and in other publications eleven years of which it has been our official organ and I felt as though I needed a vacation—a rest on it. I have canvassed about every subject in all its phases that I could think of that related to car and locomotive painting. Of course it has not all been told yet, by any means, but I felt as though it needed a new broom, and that is the reason I resigned. Of course the compensation is comparatively small and comes kind of slow a good deal of the time; yet it has been a labor of love for me. I don't know hardly what I shall do without it. I have not tried that yet. I am afraid I shall be apt to get at it before I am aware of it. I think Mr. Pitard would serve you well. I think you had better try him for a year, and if he makes a failure of it, if my health holds out, I will come to his rescue a year hence. I think I am due for a year's vacation in this matter. My duties have increased, and are still increasing in the railroad I represent. I also have another office which I hold, which I intend to throw up at the next annual meeting. For six years I have held the presidency of the Boston and Maine Relief Association, of about 2,000 members. It pays death benefits of a thousand dollars, and six dollars a week sick benefits. There is no salary attached to it whatever, and it has been quite a burden to me, and that position I intend to resign in January. Of course I will not see this association suffer for anything that I can do for it while life holds out, and I do not think it is in any such condition. If anyone else has not done it, I will second the nomination of Mr. Pitard for the editor for the year to come. If at the end of that time he wants to throw it up, and if nobody fills it at the end of the year, I will come to his rescue.

PRESIDENT LANFERSIEK: It has been moved and seconded that the association request Mr. J. H. Pitard to act as the editor for this associaion in the Railway Master Mechanic.

The motion was carried.

PRESIDENT LANFERSIEK: I will request the secretary to notify the proprietor of the Master Railway Mechanic of our action in this matter.

MR. PITARD: Mr. President and Gentlemen of the convention: I desire to thank you for the honor you have just conferred upon me. I fully realize what the work involves, and I do not believe that any man who has never undertaken such work can fully appreciate what the work involves. I will endeavor to serve the best interests of this association to the fullest extent of my ability, but in so doing I want your help. I want the help of every member of this association. We want to make it as interesting as possible. We can use the official organ for anything on the discussion of questions which we could not discuss here in convention, for the reason that we do not have the time, but now if you should receive a letter from me—and do not wait for me to ask you—but if you should receive a letter, requesting an article from you on this or that subject, I hope you will respond cheerfully. If your writing is not in the shape you would like to see it appear in the organ, just give me the substance of your thoughts, and we will fix up the balance, but do not hesitate. In that way I think we can increase the interest of all the members of our association.

While I am speaking, I think you will all agree with me that Mr. Copp, my predecessor, has served the association well. I think it has been benefitted by his labors. I think you will agree with me in that, and I think it is but fitting that we should show our appreciation of his services in a proper manner. And that I propose to do by the vote of this convention. So I make the motion that we tender to Mr. Copp a vote of thanks for his labors in the past in this direction.

MR. HUTCHINSON: As a member from the other side of the line, I take extreme pleasure in seconding that motion.

PRESIDENT LANFERSIEK: We will make it a rising vote. The gentlemen will please rise.

The entire convention arose in voting on the motion.

MR. COPP: Gentlemen, I appreciate your action most heartily, and it touches me most deeply. You have honored me with repeated election as your president, but this touches me most of all, and I thank you heartily.

PRESIDENT LANFERSIEK: We have the report of the Committee on Next Place of Meeting, so I will ask Mr. Miller to read it in the absence of the secretary.

The report was read as follows, the committee recommending New York, Washington and St. Louis.

REPORT OF COMMITTEE ON NEXT PLACE OF MEETING.

To the President and members of the Master Car and Locomotive Painters' Association.

We, the committee appointed on the next place of meeting, beg to report as follows:

New York, N. Y.; Washington, D. C.; St. Louis, Mo.

We further recommend that members be permitted to suggest such other places as they may desire, and that in balloting, the place receiving the lowest ballot be dropped after each succeeding ballot, until a majority vote is reached.

D. A. LITTLE, Chairman,
T. J. RODABAUGH,
J. H. PITARD, Committe.

MR. BRUNING: I offer Indianapolis.

MR. SHORE: To all those who are going on the excursion to Buffalo, I will say that the tickets will be handed out about twelve o'clock; the train will leave at three o'clock this afternoon, and they will have cars so that we will all be together. You can return any time you desire, and those who do not want to return will be kind enough to give me back the return ticket. Mr. Ball, the superintendent of motive power, has been very kind to us, in making this offer, and we want to see that you will all have a good time.

PRESIDENT LANFERSIEK: Before we proceed to further business, I would like to say that I am requested by the chairman of the Supplymen's Committee to announce that all those who will not leave town before 2:30 are invited to go to Luna Park in a special conveyance at 2:30 sharp.

Assistant Secretary Dane announced that the cities thus far nominated for the next place of meeting were New York, Washington, St. Louis, Indianapolis and Toronto.

MR. COOK: I would like to suggest Saratoga.

MR. BISHOP: I would suggest Denver.

PRESIDENT LANFERSIEK: Any other suggestions? If not, we will proceed to ballot for the next place of meeting. I will appoint as tellers, Messr. D. A. Little and B. E. Miller.

Upon motion of Mr. Copp, duly seconded, the report of the Committee on Next Place of Meeting was accepted.

MR. GOHEN, at this point, made the following remarks with reference to Secretary McKeon:

Mr. McKeon's daughter is here, and I have asked her how her father was. She said he was somewhat better, but she could not say how long he would live; he was in a very bad state, and she came here for the purpose of saying, or have some one tell the members of the association that neither her father nor herself wish to accept the secretaryship of this association. I said, "Now, Mrs. Farrell, that is none of your business. This association has decided to keep Mr. McKeon as the secretary of this association just so long as he lives, and when he dies, we have got a man to take his place." She said, "Mr. Gohen, that is all right, but neither father nor myself feel we would like to accept the position unless we did the work." I said, "You must do the work until your father dies; you go right along and do whatever there is to do." I did not tell her I supposed there would be very little to do. I said, "You probably have been doing the work for three or four years," and she said, "Yes." "Now," I said, "You go ahead with that work as long as your father lives, and when he dies, it will be taken away from you and given to Mr. Dane." She said, "I would take it as a compliment the association paid to my father, and under those conditions, I would accept." I told her she could feel perfectly satisfied, we would expect her to do the work as long as her father lived. Under those conditions she was willing to take it. She said she had the money to turn over. I said, "No, you don't do that." I said, "Your father is secretary and treasurer of this association and until your father dies nobody handles that money but your father. You can rest assured of that. This association feels that money is just as safe there as in the bank." While on this matter, she said, one thing in particular that brought me down here was, if you will examine last year's report, you will find a discrepancy in the financial report. There was an item of $3.35 which was paid to Mr. Cook for typewriting or something, which was in the original report, but in the printed report that item of $3.35 paid to Mr. Cook was omitted by the printer. While the footing shows the exact balance as upon the original report, there is a discrepancy in the adding up. The balance is right, but there was one item omitted. I told her she could feel perfectly satisfied, and that this association would leave the matter in her hands so long as her father lived. I don't believe I made a mistake in telling her that, did I?"

(Cries of "No.")

At this point the tellers reported the result of the first ballot on the place of next meeting, as follows:

Washington	26	Indianapolis	7
New York	7	Saratoga	6
St. Louis	4	Denver	17
Toronto	12		

No city having received a majority of all the votes cast, it was necessary to take another ballot.

Mr. Pitard moved that the two cities receiving the smallest number of votes be dropped from the ticket.

The motion was seconded and carried.

Saratoga and St. Louis were therefore dropped.

Mr. Sheerin moved that Indianapolis be dropped from the ticket.

The motion was seconded and carried.

The convention then proceeded to vote upon Washington, New York, Denver and Toronto.

MR. GOHEN: Gentlemen: It has been our custom for a number of years at the opening of the convention to have a minister come here and open the proceedings with prayer. I do not know what is the custom with other people. Of course it would be too cold-blooded to offer him some money, but I think there ought to be something given to the gentleman who so kindly came here, and I move you, Mr. President, that the assistant secretary procure a single souvenir of some kind for the Rev. Mr. Foote, that it be sent to him with the compliments of this association, and that an order be drawn on the treasurer for the amount of the souvenir.

The motion was seconded.

MR. BUTTS: I agree with the sentiment, but would like to make an amendment to the motion, that, instead of making it an actual souvenir, you call it a souvenir, and let the souvenir be money. I have never known of any minister having a surplus of funds to be used, and I do not believe he would take any offence whatever, if it were put in the proper light. Call it a souvenir, but let it be money.

MR. GOHEN: I will accept that amendment.

It was agreed that an order be drawn on the treasurer for the amount of $5.00 for the Rev. Mr. Foote.

MR. DARE: With regard to this matter of the secretary and treasurer as it has been presented here this morning, my feelings are just the same as Brother McKeon and his daughter. I do not care to be the assistant secretary of this association with no labors to perform, even with a remuneration, and for this reason, if the suggestion that Mr. Gohen has given you in regard to the disposition of the funds that have been received in this association, the worok of the secretary and all that, is accepted, I shall certainly be obliged to resign the position of assistant secretary and treasurer, having the very best feelings and friendship for Brother McKeon, and hoping with all that he will recover and be our secretary and treasurer for years to come, but gentlemen, I decline to take the position you have offered and elected me to, under the sircumstances.

MR. BAILEY: We have got a secretary that is unable to perform his duties, and in that case we have elected an assistant. This association or Mr. Gohen, or any individual member of this association has no business to delegate his business to anybody else. It falls wholly to the assistant secretary to perform the duties in case of the disability of the secretary.

MR. BROWN: It is the law and order of every organization that has ever been created and still exists, that in case of the absence or sickness or death, or otherwise, the assistant secretary shall perform the duties fully in everything. If I were capable, I would never take a position under any such circumstances whatever.

MR. GOHEN: While that is true, yet there is a little bit of sentiment in this thing with me. Here is a man, as I said the other day, who kept our association alive when it was on its last legs. Now, there are some corporations in this country who are so cold-blooded that when a man gets old and decrepit, they let him go. They do not think of his past service. Do not let that be said of this association.

MR. DANE: This association has acted honorably, I think, in regard to this matter. We have tendered him the secretaryship and treasurership as long as he lives, with remuneration. If he is unable to perform the duties, that has already been provided for. We do not turn him out. We all love him. For that very reason we object to anybody else but the assistant secretary doing the work. I do not think we are casting any reflection on Mr. McKeon. It is merely a matter of courtesy.

MR. BROWN: I fully hold that it should be the assistant secretary's duties to carry on the whole business and receive a salary, and if my good Brother McKeon should be in need —and I would not want him to be very much needy—I am the chap that has got a ten-dollar note, and more than that, if he should need it.

MR. COPP: I cannot help but think that you have been making a serious mistake. I thought so when you took the ballot, although I did not speak of it, but wanted to. I fully agree in what Mr. Bailey said when the question of the election of the secretary came up. I also fully agreed with what Mr. Gohen said. I do believe we should separate business from sentiment in this question. Of course it is too late to reconsider; you cannot reconsider a ballot. I think this association should have passed some good resolution on the spot and have gone to work and elected a secretary who was able to do the work. That is my position in the matter. You have elected him in violation of your constitution for two or three years already.

MR. GOHEN: In what way, Mr. Copp?

MR. COPP: Because he is not an active member. A man who is not an active member shall not hold office in this association. His daughter has no more right to perform the duties of secretary in his disability than the daughter of Mr. Lanfersiek, or Mr. Butts' son, when you come to that. At the time the ballot was taken it was uncertain whether the man was alive or not. He was not present to accept or decline. I think it was carrying sentiment too far. I think I have got the heart to feel as much sentiment as any other man, and I think I love Mr. McKeon as much as any other man, and will put my hand in my pocket, as I have done every time a collection has been taken for him, but I believe in business, as well as sentiment, and I think Mr. Dane, who has done the work for two or three years without any compensation whatever, not even the thanks of this association, should be put on the right footing now and be allowed to perform the work of this association.

MR. HUTCHINSON: Another thing I think the members ought to remember—I agree with Mr. Copp as far as sentiment is concerned. If Mr. McKeon—and we all love him—were to leave us today, the question for us to consider would be, is his daughter sufficiently familiar—even if it were customary—with the matters of this association, for her to satisfactorily perform the duties?

MR. GOHEN: Miss McKeon is able to perform the duties, and has been for four years, but in order to settle the thing, I am authorized to tender Mr. McKeon's resignation as secretary and treasurer of this association. Now take it.

MR. COPP: I move that it be accepted.

The motion was seconded and carried.

PRESIDENT LANFERSIEK: I will say that under the conditions which we elected the assistant secretary, he will accede to the secretaryship. I think it would be well for him to procure the funds in Mr. McKeon's hands, because if he should die today, we do not know how long it would take to get those funds. The estate would be placed in the hands of an administrator, and it would probably take two or three years.

MR. GOHEN: I move you that a committee be appointed to audit the secretary and treasurer's accounts before that money is turned over, and that it should be done immediately. The money is available within twenty minutes. That committee should be appointed immediately and audit the accounts.

PRESIDENT LANFERSIEK: I will appoint as that committee Messrs. Copp, Bailey and Cook.

MR. BAILEY: I think this association should give Mr. McKeon some suitable present, something that will be an heirloom. How to do it, or who shall do it, I leave that to someone else, but I hope some action will be taken toward giving him some suitable present.

PRESIDENT LANFERSIEK: I would suggest that the committee appointed to audit the accounts, if they find them correct, they be authorized to procure a suitable memento.

MR. BAILEY: How would it do to have a set of resolutions adopted, engrossed in the best possible manner, framed and presented to Mr. McKeon. You cannot make them too strong for me.

PRESIDENT LANFERSIEK: If there is no objection, that matter will be left with the Auditing Committee.

At this point the tellers announced the result of the second ballot, as follows:

Washington	36	Denver	21
New York	6		—
Toronto	24	Total	87

Neither city having received a majority of all the votes cast, it was necessary to take another ballot. New York and Denver, being the two cities receiving the smallest number of votes, were dropped from the voting list.

PRESIDENT LANFERSIEK: I will now ask the secretary to read the names of those who have become members of this association at this convention.

LIST OF NEW MEMBERS.

Active members:

W. H. Baldwin (re-instated), Texas & Pacific Ry., Marshall, Texas.
E. S. Butcher, Ft. W. & Denver City R. R., Childress, Texas.
Harry Ball, T. W. V. & O. R. R., Columbus, Ohio.
A. J. Bush, D. & H. R. R., Oneata, N. Y.
W. H. Burton, Southern Ry., Spencer, N. C.
Geo. Durnbaugh, L. S. & M. S. Ry., Collinwood, Ohio.
A. C. Everist, Iowa Central Ry., Marshalltown, Iowa.
William Kreuger.
J. F. Moore, Erie R. R., Cleveland, Ohio.
A. C. Moxey, Standard Steel Co., Butler, Pa.
F. C. Macomber, Pere Marquette R. R., Muskegon, Mich.
N. L. Mann, C. C. C. & St. L., Urbana, Ill.
Edward Mathews, D. & A. A. A. & J. Ry., Ypsilanti, Mich.
John F. Roscoe, I. & G. N. Ry., Palestine, Texas.
Frank L. Robbins.
L. G. Smith, C. C. C. & St. L., Wabash, Ind.
C. O. Smith, Bessemer R. R., Greenville, Pa.
O. P. Wilkins, N. & W. Ry., Roanoke, Va.
E. C. Woodruff, Pullman Co., Pullman, Ill.

Associate members:

E. L. Aquart, Aquart Eureka Comp., St. Louis, Mo.
H. G. Kittredge, Kay & Ess Co., Dayton, Ohio.
J. T. Hartnagle, Eureke Solvent, Chicago, Ill.

PRESIDENT LANFERSIEK: I welcome to this association the names of the members just read, and hope they have been enlightened to some extent at least, and also hope they will be present with us at future conventions.

We will now have the report of the Committee on Resolutions.

Mr. Wright, chairman of the committee, presented the following report:

REPORT OF COMMITTEE ON RESOLUTIONS.

To the President and members of the Master Car and Locomotive Painters' Association, assembled.

Gentlemen: Your committee on resolutions have to report as follows:

Whereas, The ruler of all things, Almighty God, has in divine wisdom seen fit to remove from our midst during the past year, three of our members, J. P. Waggoner, Henry F. Laidler, George H. Rattenbury.

We bow to the Divine will. Therefore, be it resolved:

(1) That the sympathy of the members of the Master Car and Locomotive Painters' Association be tendered to the families of the deceased members.

(2) That a copy of this resolution be forwarded to the bereaved families. Furthermore, that it be spread upon the minutes of the association.

Whereas, the proceedings of the thirty-sixth annual convention of the Master Car and Locomotive Association have been most beneficial and enjoyable to all present, we desire to express our high appreciation of the efforts of all who have in any way contributed to its success. Therefore, be it resolved:

(1) That the thanks of the members of the association are hereby tendered to the president and all other officers of the association for their efficent and self-sacrificing services.

(2) To Mayor Johnson of Cleveland for favoring us with his presence and welcoming us to this beautiful city.

(3) Also to the chairman and members of the various committees for the manner in which they have performed their duties.

(4) To all those who have prepared papers on the various subjects presented at this convention.

(5) To the ladies, who, by their presence and influence, have added so much to the refinement and happiness of the occasion.

(6) To the supply men, particularly the workers on the entertainment committee and the local manufacturers, who have provided entertainment of so refined and pleasant a character.

(7) To Mr. Ball and the Lake Shore and Michigan Southern R. R. for courtesies extended to those wishing to visit Buffalo and Niagara Falls.

(8) To the Sherwin and Williams Co. for the instructive trip through their factory.

(9) To the proprietors of the "Hollenden," the headquarters of the convention, for their efforts in our behalf.

(10) That the above be made part of the records of the association, and that the secretary be instructed to send a copy of this resolution to those interested, who are not members of the association.

In addition to the above resolutions we would recommend that an expression of sympathy be tendered to Mr. Robert McKeon, ex-secretary of the association, also to Mr. F. S. Ball, ex-president and one of our most active members, both of whom were unable to be present at this convention on account of ill health.

J. D. WRIGHT, Chairman,
J. J. SHEERIN,
EUGENE LAING,
Committee.

Upon motion, duly seconded, the report of the committee was adopted.

At this point the tellers announced the result of the third ballot on next place of meeting, as follows:

Washington ....41 Toronto 46

PRESIDENT LANFERSIEK: Toronto having received a majority of all the votes cast I declare this association has selected Toronto for their next meeting, in 1906.

Gentlemen: I believe this concludes the business for the meeting of 1905, and we are now about to enter upon the closing ceremonies. I desire that the ladies be called in at this time.

(The ladies at this point entered the room.)

PRESIDENT LANFERSIEK: It now becomes my last duty as the presiding officer to install the officers for the ensuing year, and before that duty is performed I desire to say to the members of this association that I feel very grateful for the confidence they have imposed in me, and for the kind and courteous treatment they have given me. I shall always have a warm spot in my heart for the Master Car and Locomotive Painters' Association of the United States and Canada, and I will endeavor at all times to do my best to advance its interests. Gentlemen, I thank you.

I will ask Mr. Miller and Mr. Orr to escort the newly-elected president to the chair.

(Upon Mr. Butts taking the chair)—

PRESIDENT LANFERSIEK: Mr. Butts, you have been elected president of this association. Your duty is to preside over its destinies during the coming year, and that you may be properly equipped to perform the arduous duties which will become your part during the coming year, I have the honor to turn over to you this gavel, presented to this association during this convention by our fellow member, Sam Brown. It is made of a part of the flagstaff of that famous Admiral Dewey's flagship "Olympia," when she was so nobly defending the honor and integrity of this great Republic, in Manila Bay, on that memorable Sunday morning, May 1st, 1898. Accept it, use it with firmness, but with discretion; it is the emblem of your authority, and I now welcome you to your seat. (Loud applause.)

PRESIDENT BUTTS: Mr. President and members one and all: I thank you heartily for the honor that you have conferred upon me. I am not unmindful of the responsibility you have placed upon me, but I assure you that I will do my best to serve you impartially. I take this position with fear and trembling, for fear that I may not be able to anywhere near measure up to the ability of the man who has so ably presided over our sessions and our association for the past year. This is your society; I am simply placed here as the executive head. I want you to feel at all times that you can approach me and consult with me on any matter pertaining to the interests of this association, for upon your support I shall depend for success, and without your support certainly it will be a failure, because it is not within the province of the president to do anything but to carry out your will. This I shall endeavor to do to the best of my ability. I thank you one and all.

MR. LANFERSIEK: Mr. Cook and Mr. Pitard will please conduct the first vice-president to the chair.

(Upon Mr. Kahler being escorted to his seat)—

MR. LANFERSIEK: You have been selected as the first vice-president of this association. Your duty is to assist the president and preside during his absence. I welcome you to your chair.

FIRST VICE-PRESIDENT KAHLER: Mr. President and fellow members: I feel very grateful to you for the high honor you have bestowed upon me in electing me to this office. It is something I never aspired to. I rather preferred to remain in the ranks and to help do the hard work, but I will pledge you my support in the future, as I have done in the past. I thank you.

MR. LANFERSIEK: I will ask Mr. Cook and Mr. Pitard to conduct the second vice-president to the chair.

(Upon Mr. Houser being escorted to his chair)—

MR. LANFERSIEK: Mr. Houser, you have been elected second vice-president of this association. Your duty is to assist the first vice-president and president in their duties, and in their absence you are to preside. I welcome you to your chair.

SECOND VICE-PRESIDENT HOUSER: Mr. President and gentlemen: I cannot help but feel, in thanking you, that there has been an error made in my election. I did not aspire to the honor, which I consider a very great one. Like Mr. Kahler, I believe I should have remained in the ranks, but I will endeavor to do my very best in advancing the interests of the association, and in assisting the president and vice-president in whatever duties I can perform. I thank you.

MR. LANFERSIEK: I will ask Mr. Quest and Mr. Miller to conduct the secretary to his station.

(Upon Mr. Dane being escorted to his chair)—

MR. LANFERSIEK: Mr. Dane, you have been elected secretary of this association for the ensuing year. It is your duty to keep a correct record of the proceedings of this association, receive all moneys, and pay them out only on orders of this association. I welcome you to your station.

SECRETARY DANE: Mr. President, gentlemen and ladies: It gives me great pleasure to be selected for this honorable position of trust. I assure you I accept it reluctantly, though, on account of our beloved ex-secretary and treasurer, who has been with the association some 32 or 33 years, through illness is obliged to retire. We all feel very kindly toward him and hope that he may be spared to us many years to come as an associate member. I shall endeavor, Mr. President and gentlemen, to fill the place now vacated by Mr. McKeon, to the best of my ability. If any errors arise, they must be counted errors of judgment and not of the heart. I thank you again for the honor that has been conferred upon me.

MR. LANFERSIEK: I now declare the newly-elected officers to serve for the year 1906 duly installed, and with that ends my administration of the business of this association. Gentlemen, I thank you. (Applause.)

PRESIDENT BUTTS: The first duty devolving upon the incoming President is one that is considered the most important, and that is to appoint the standing committees for the year. We have such a large number of men who are so abundantly competent to serve us in any capacity, that it is a very difficult thing to select only a few to fill these important positions. I want to say that no doubt there will be many members here who may feel that perhaps they have been passed by without consideration. I wish to say that this is certainly not the case. We have done our best to select those whom we think would fill the positions. We wish we had a place for every member of this association. I will now appoint the standing committees for the year:

Advisory Committee: B. F. Miller, A. J. Bruning, J. D. Wright, D. L. Paulus and J. H. Whittington.

Committee on Tests: W. O. Quests, George Warlick, Chris. Clark, G. J. Ginther, S. H. McCracken.

Committee on Information: C. A. Cook, J. H. Pitard, F. W. Bowers, J. G. Keil, Geo. W. Lord.

Hotel Committee: E. L. Richardson, J. J. Hutchinson, Joseph Maycock, A. Gamble.

PRESIDENT BUTTS: It has always been our custom to close the last session of our convention with a little entertainment, but I shall have to make some apology and say that we have not prepared any programme whatever, but still we have some with us that we are always very glad to hear from. You will consequently pardon me if I call upon them without giving them any chance for preparation. We are always lad to hear from Mr. Sam Brown. I do not need to introduce him. When we say "Sam Brown" we always know there is something good coming, and I should like to hear from Mr. Sam Brown.

Mr. Brown responded cheerfully and delivered a very pretty recitation, which was received with loud applause.

Following Mr. Brown, Mrs. Lynch presented a humorous recitation, and upon receiving generous applause, made the following remarks:

It is seldom I respond to encore, but I will do so on an occasion of this kind. Mr. Gohen is a particular friend of mine, and I want him to get the full benefit of my remarks, and therefore will ask him to kindly take a seat forward. Since coming to these conventions for years it has been a problem to know who is the most popular man. That one question I think has been solved at this convention. Mr. Gohen has endeared himself to the ladies by his beautiful souvenirs this year that we concluded we would kind of hit back at him for once anyhow. Since this is his last appearance among us as a member of the Association, and on behalf of the ladies of the Convention of 1905, I have been selected, and have the honor to present this clock to Mr. Gohen from the ladies of the convention. It only has to be wound up once a year, and if he will bring it every year, some of us will be here to help him wind it up. Mr. Gohen, on behalf of the ladies of the convention of 1905 I leave the clock in your hands (loud applause).

Mr. Gohen arose to respond, but was so overcome by emotion that he was unable for the moment to do so.

PRESIDENT BUTTS: It is customary for the President in addressing any body to say " Gentlemen and Ladies," but in looking over the audience just now I should think it would be far more appropriate that I should say, "ladies and gentlemen," as the ladies are very largely in the majority. Ladies, I want to thank you for your presence. At the opening of this convention I cast my eye over the audience and I said to myself "This convention is going to be a success," and I came to that conclusion from the large number of ladies here. When a man goes away from home and takes his wife with him, we have every reason to believe that he is going to have a good time, and to see so many ladies here warrants that we are all bound to have a good time. I think you will all agree with me, in looking back over the last four days, that my prediction has been verified in every respect. Your presence has strengthened all of us, and I know I voice the sentiment of every body here when I say this. This, I think, concludes all the work of this present session, and I have simply now to announce that our next meeting will be held in Toronto, beinning on the 13th day of September, 1906. I hope to meet you there one and all, and sincerely hope that we shall have as good a time in Toronto as we have had in Cleveland.

Mr. Gohen at this point responded to the presentation address of Mrs. Lynch as follows:

Mr. President, for once I was knocked out, but I have to thank you, and I had better not say much about it. As I told you a day or two ago, this is my last meeting with you as a Master Painter. I have been with you for fifteen years, and I have had many pleasant associations, every one of which I have enjoyed. I have tried to make it pleasant for others. I am leaving my present position with the hope and belief that I am going to do better. I do so much to the regret, I am proud to say, of my people. The people with whom I am associated do not want me to leave, but I felt it was to my interest to do so. I shall meet you every year so long as I live and I hope that our relations, while they may not be so close inside the room, will be just as close as ever outside. I thank you. (Loud applause.)

MR. BUTTS: When Mr. Gohen got up in the convention yesterday and announced that this was going to be his last meeting with us as a Master Painter I assure you that it came to me as a great surprise, and I know I voice the sentiment of every one here when I say I heard it with profound regret. I have always felt so ever since he told me he was going to leave our association, because he has been associated with us so long and has been such a great help to us. He has been one of the workers in our conventions, he has never shirked any responsibility, has been anxious to do anything and everything for our pleasure. We do not expect to lose. We do not believe he is going to desert us and not going to come to our conventions. We need his help in the future, and we are very sorry we are not going to have it in the respect that we have had it in the past. I know I voice the sentiment of every one here when I say we are sorry from the bottom of our hearts that Mr. Gohen is not going to be with us in the same capacity. I certainly wish him well in his new venture. I believe anything he will apply himself to will be well done and successfully done. That has been so in the past, and why should we not expect that he should have success in the future. I believe he will.

MR. GOHEN: I must reply to Mr. Butts. I certainly have had a good time here. I have tried to do my part and I believe I did so. I have no regrets on that score. I am not afraid to say that I believe I have worked as hard as any other man in the Association. I bar none—not even Sam Brown, (Laughter). But there is a time when we do have to part. Some of us met last year, never to meet again. But as long as I live I shall certainly take an interest in the Master Painters' Association.

Mr. Gohen concluded his remarks by pointing out in the convention about half a dozen men who had served with him as apprentices.

MR. PITARD: Ladies and gentlemen, I am particularly interested in this occasion, on which Mr. Gohen signifies his intention of leaving us as an active member of this Association. I might say I am personally interested, because I have been an apprentice of Mr. Gohen, and there is the greatest friendship existing between us. I think you will agree with me that Mr. Gohen has labored earnestly for the upbuilding of this association and I know we shall miss him, and as a fitting tribute of our appreciation of his services along this line, move we tender him a rising vote of thanks of this Association, in which the ladies shall participate.

MR. HUTCHINSON: I take pleasure in seconding that motion.

The motion was carried and the entire assemblage arose.

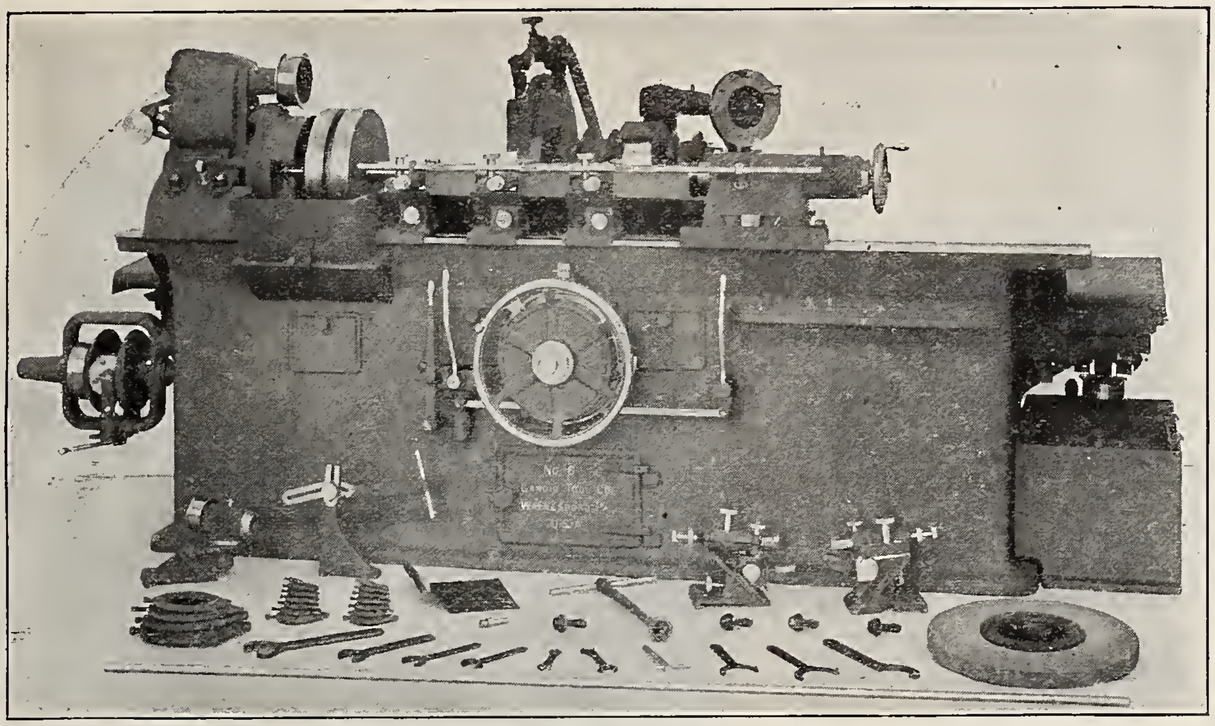
MR. BROWN: If I am present next year at Toronto, which is somewhat doubtful, and that thought being in my mind, I hope someone will propose a little amendment to our bylaws We have seen a little reason for doing it. That is, if any of our members cease to occupy the position of Master Painter they shall always be entitled to the same consideration as an active member, and not be debarred from any of our deliberations. I think we should change that by-law to entitle them to all the rights and privileges, the same as though they were mixing paint and putty, and telling someone else how to do it.

After singing "Blessed Be the Tide That Binds," the convention, at 12:30 p. m., adjourned.

The supply firms in attendance were:

United States Graphite, Co.,	Saginaw, Mich.
Sherwin-Williams Paint Co.,	Cleveland, Ohio.
Aquart Mfg. Co.,	St. Louis, Mo.
The Flood & Conklin Co.,	Newark, N. J.
Charles R. Long, Jr., Co.,	Louisville, Ky.
Murphy Varnish Co.,	Newark, N. J.
Detroit Graphite Mfg. Co.,	Detroit, Mich.
Hilldreth Varnish Co.,	New York, N. Y.
Buffalo Oil, Paint & Var. Co.,	Buffalo, N. Y.
Kay & Ess Co.,	Dayton, Ohio.
Standard Paint Co.,	New York, N. Y.
Valentine & Co.,	New York, N. Y.
Edward Smith & Co.,	New York, N. Y.

PROLONG THE LIFE OF YOUR LOCOMOTIVE PISTON AND VALVE RODS



NO. 16 GAP GRINDING MACHINE.

This can be accomplished by refinishing them when worn by grinding, producing a degree of accuracy impossible to obtain by any other method. The "Landis" No. 16 Gap Grinding Machine is just the one for this purpose, which is also adapted for finishing other parts having projections which require a large swing while part to be finished is relatively small. As shown, gap is placed near end of bed but can be located wherever desired when ordered.

CIRCULARS AND FURTHER INFORMATION FURNISHED UPON REQUEST.

LANDIS TOOL CO., WAYNESBORO, PA. U. S. A.

AGENTS—Walter H. Foster Co., 513 Williamson Building, Cleveland, Ohio. Walter H. Foster Co., 114 Liberty St., New York. C. W. Burton, Griffith & Co., London. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Paris and Bilbao. A. R. Williams Machinery Co., Toronto. Williams & Wilson, Montreal, Canada.

LAKEWOOD

"AMONG THE PINES OF NEW JERSEY"

A Fashionable Fall Resort

90 MINUTES FROM NEW YORK

REACHED BY THE

New Jersey Central

Its palatial hotels are famed for their perfect cuisine and its sports include all popular pastimes.

A Descriptive Book will be sent upon application to C. M. BURT, General Passenger Agent, New York.

THE

H AND M

RAILWAY PAINTS

PRACTICAL

DURABLE

ECONOMICAL

Heath & Milligan Mfg Co

Paint and Color Makers,

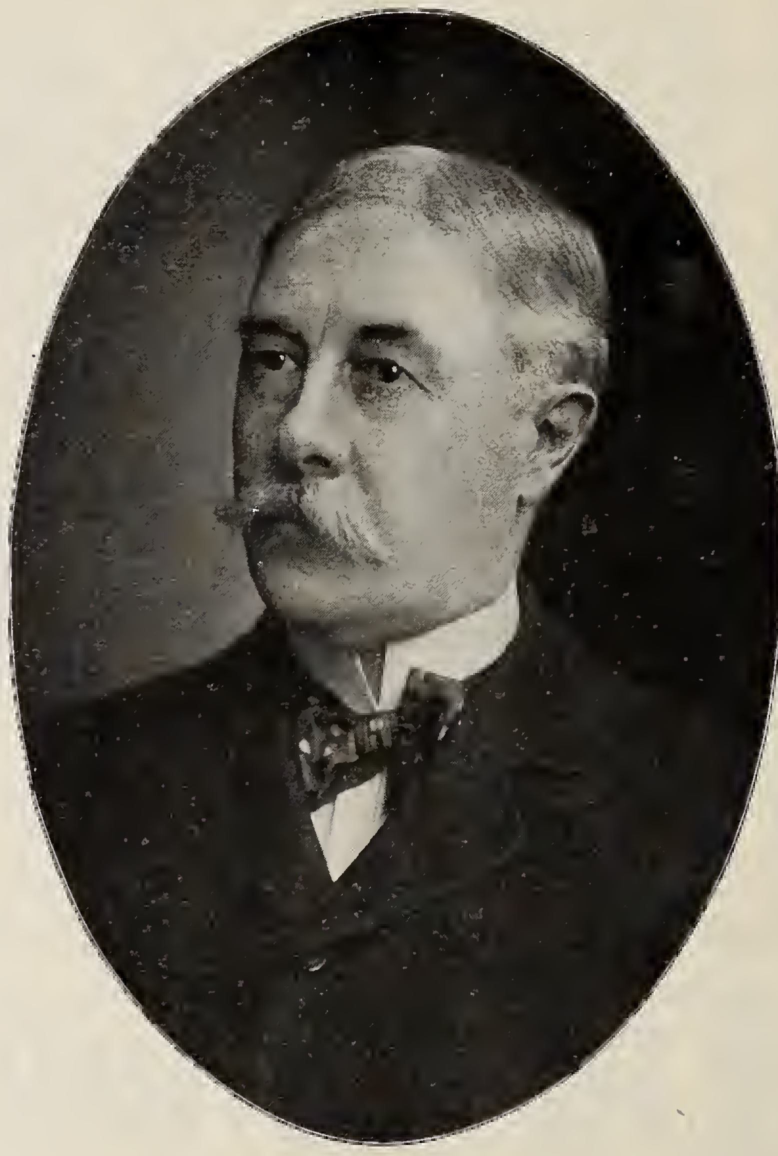
CHICAGO U. S. A.

Joseph Dickson Crucible Co.,	Jersey City, N. J.
Akron Mining, Milling & Mfg. Co.,	Aurora, Ill.
Protectus Co.,	Philadelphia, Pa.
Eureka Solvent Co.,	Chicago, Ill.
Lowe Bros.,	Dayton, Ohio.
National Paint Works,	Williamsport, Pa.
The Rubberset Brush Co.,	Newark, N. J.
Wadsworth Howland Co.,	Chicago, Ill.
Toch Bros.,	New York, N. Y.
Pratt & Lambert,	New York, N. Y. (Buffalo, N. Y.)
Acme White Lead & Color Co.,	Detroit, Mich.
C. A. Willey Co.,	Hunters Point, N. Y.
Heath & Milligan Co.,	Chicago, Ill.
W. H. Coe Mfg. Co.,	Providence, R. I.
Thresher Varnish Co.,	Dayton, Ohio.
The Anglo-American Var. Co.,	Newark, N. J.
Berry Bros.,	Detroit, Mich.
Patterson-Sargeant Co.,	New York, N. Y.
Chicago Varnish Co.,	Chicago, Ill.
Sipe & Co.,	Pittsburg, Pa.
Cleanola Co.,	Allegheny, Pa.
Wolfe Brush Co.,	Pittsburg, Pa.
M. B. Suydam Co.,	Pittsburg, Pa.
Imperial Car Cleaner Co.,	Newark, N. J.
Glidden Varnish Co.,	Cleveland, Ohio.
Detroit White Lead Works,	Detroit, Mich.
F. W. DeVoe & C. T. Raynolds,	New York and Chicago, Ill.
Standard Oil Soap Co.,	New York, N. Y.
St. Louis Surfacer Co.,	St. Louis, Mo.
The Patton Paint Co.,	Milwaukee, Wis.
N. Z. Graves & Co.,	Philadelphia, Pa.
The Mamolith Carbon Paint Co.,	Cincinnati, Ohio.
Beckwith & Chandler Co.,	New York, N. Y.
Columbia Refining Co.,	New York, N. Y.
Paul A. Davis, Jr.,	Philadelphia, Pa.

Among the Supply Men

MR. R. T. BRYDON.

Mr. Brydon began his railroad career on the Central Ohio R. R. From this road he went to the Pan Handle, which he left to become general passenger agent of the Ohio & Mississippi R. R., with headquarters at St. Louis. He then served three years as secretary of the Trunk Line Commission under Albert Fink. From this he was appointed general passenger agent of the Lake Erie & Western R. R., which position he resigned to become vice-president of the Wadsworth-Howland Paint Manufacturers.



MR. R. T. BRYDON.

Established 1878

RAILWAY MASTER MECHANIC

Published by the

BRUCE V. CRANDALL COMPANY, CHICAGO

Office of Publication, Rooms 409 and 410 Security Building, corner Madison Street and Fifth Ave., Chicago

TELEPHONE - - MAIN 3185

Eastern Office: Room 714, 132 Nassau Street, New York City.
Telephone: - - 3524 John

Entered at the Post Office in Chicago as Second-Class Matter

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price $1.00 a year, to foreign countries $1.50, free of postage. Single copies 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the tenth of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent.

Vol. XXIX CHICAGO, NOVEMBER, 1905. No. 11

Contents

THE November meeting of the Association of Transportation and Car Accounting Officers will be held at St. Louis, Mo., on November 21, 1905, with headquarters at the Jefferson Hotel. Reports of the following committees will be presented on that occasion: Executive, On Conducting Transportation, On Car Service, On Office Methods and Accounting, On Per Diem and On Handling Railroad Service Mail. A special announcement to the membership explained that St. Louis was selected for this meeting owing to the yellow fever situation at New Orleans which was the point originally agreed upon.

ONE of the strange things about the tool equipment of the woodworking shop on most railroads is the reason, if any, if there is one, why the belt drive has not long ago been discontinued. Electricity possesses all the necessary factors to make it the ideal drive for woodworking machinery, and is in fact better adapted for that work than for service on iron tools, because of the fact that woodworking tools are of the high speed variety and do not require gearing down largely, yet there are few such tools operated by electricity when compared to the number of machine shops having such drives. In special cases perhaps, like a sill-dresser there may be a direct drive, and always to the advantage of the tool. With the few object lessons of that kind, railroads should not be slow to electrify their woodworking equipment entirely.

The Magnet in Shop Work

THE use of magnets in shop operations has been too recent to predict the possibilities in store for the future. Enough, however, is known about its labor-saving properties to make its position secure as an adjunct that will not readily be dispensed with where once in use. Lifting magnets have been found of immense service in boiler shops for handling plates. They are used for loading and unloading scrap material, and at a lower expense than by any other method. The magnetic chuck for holding small pieces of work on the platen of a planer or grinding machine, is one of the most convenient devices ever gotten up, in fact some thin jobs cannot be properly trued in any other way. For such work, the current from an incandescent light circuit is sufficient to not only hold a job to the platen for grinding, but will also furnish resistance to a fair finishing cut from a tool, and do this without danger of shock to the operator. It therefore furnishes a solution to handling many intricate jobs that require to be true, and at the same time presents an opening to do such work on the ordinary shop tool.

Superheat and Lubrication

THE Delaware, Lackawanna & Western eight-wheel passenger engine No. 955, having the American Locomotive Company's superheater, and which was illustrated in the July issue of the Railway Master Mechanic, has been having a thorough trying out since going into service, and with most satisfactory results, in the way of fuel economy in a district too where the cost of fuel is merely nominal. This engine has piston valves, while a duplicate machine has slide valves, on the latter, however, there has been encountered the troubles heretofore found in lubricating valves operating under superheated steam. The piston valves though, have not given the trouble in this respect that was had with the slide type, however, both used about 30 per cent more oil than was required in engines without superheat. This question of lubrication under high temperature steam has been a live one under saturated conditions, and it has offered some vexatious problems under the new conditions, but is nearing a satisfactory solution with the piston valve, and the Richardson oil pump which places the oil where required, as being steam or air driven, lubrication becomes a positive quantity in so far as getting it to the scene of trouble is concerned, leaving the matter open only with reference to the viscosity required, and experiment now going on is giving some valuable data in this regard.

The Compound Locomotive

IT is a fact of sufficient importance to excite comment, that while compound locomotive sentiment is in a state of passivity with reference to its use in this country, there is a well defined interest in it as a type abroad, in which the four-cylinder machine has the preference over the two-cylinder design for passenger service, though there are three cylinder engines yet being built adapted to various wheel arrangements. This is true of England as well as on the continent, for on the Prussian State Railways and in Bavaria. Austria and Belgium, the four-cylinder engine is being built and experimented with to an extent never before noted in its comparatively brief career, and this fact would give the impression that the American roads may have been somewhat premature in their general abandonment of a type of machine that finds favor abroad, with but few exceptions.

The recent introduction of the de Glehn four-cylinder balanced compound on an English road has resulted in an order for others of the same type; it has not, however, yet developed that the purchase of the de Glehn engine by the Pennsylvania road, seen at the St. Louis exposition, and later in service on that road, has awakened sufficient interest here to displace our own productions. Whether this engine has failed to impress our motive power officers favorably by reason of so-called complications in design, or whether prejudice against the compound principle is responsible for the apathy that exists, is not clear. Both of these grounds of objection do not seem to appal the foreign engineer, as many of their high speed compounds are fitted with the Walschaent valve gear, which has not yet appeared in this country in passenger service.

Improvement of the Locomotive

THE steam locomotive has now reached a stage in design when mere amplification of established details will not serve the purpose so well filled when the machine was less powerful than at this time, as the general trend to increased power has forced a change in type that has given us some strange creations right at home, while the foreign engineers have not been at all dilatory in seeking to cut the Gordian knot that had so long bound the builders to types that had outlived their usefulness for modern railway requirements.

De Glehn blazed the way for an improved locomotive with his four-cylinder balanced compound, in France, producing an engine of less pounds weight per horse power than any other yet built, and introducing some features that will become standard practice in locomotive construction, namely, the system of balancing the reciprocating weights by opposing one set against the other, and also dividing the piston stresses between two axles, by which an entirely new type of locomotive was born, and one that has set the pace for advanced practice in this county.

Henschel & Sons, the German builders, have proceeded on equally original lines, and produced a high-speed compound engine with three cylinders, also having a balancing system peculiarly its own. These engines have nothing in common, yet both are the highest development of passenger locomotives worked out on different lines, and each serves as a reminder that the internal forces of an engine must be reckoned with, and shows how the problem is best solved for their respective conditions.

The most recent, if not the most important, factor in steam economy to engage the attention of the steam engineer is the superheater and its application to the locomotive. One of the best papers ever written on this subject was that by H. H. Vaughan and read by him at the last meeting of the M. M. Association, in which generalities made way for facts deduced from actual service. Germany is entitled to first honors for having perfected the superheater for use in the locomotive, and demonstrating the steam economy possible by its use. Our motive power officers are now convincing their native acumen by employing this device in an improved form, which has recently been put out by the American Locomotive Company, which was quick to see the advantages of superheating and to supply the wherewithal when the time was opportune for its introduction.

One other foreign device that has taken root in this country is the Walschaert valve gear. That it will live down the increasing prejudice existing here against all valve gears differing in the slightest particular from the old link motion time will tell. The Walschaert gear is a popular and efficient one in Belgium, its birthplace, also in Germany and France, and has been found satisfactory in its limited use here. In so far as steam distribution is concerned, this gear is the equal of the link motion (and said by some to be superior to it because of its feature of constant lead), but the reason for its adoption to our engines lies not so much in its correct work in the cylinders as in the fact that it is entirely outside, and therefore easy to inspect and maintain, and for the more convincing reason that the difficulty of applying links to an engine is becoming a serious matter for want of room, and an absolute impossibility on some types of engines. The Walschaert gear is therefore likely to become adopted in our locomotive practice even against lively opposition, since it affords a solution of a problem already present by the crowding out of the details that made the locomotive the efficient machine it is.

The L. & N. Shops at South Louisville

THE Louisville & Nashville Railroad has recently put into operation at South Louisville a very large locomotive and car repair shop, which is located on the main line of the railway just outside the city limits of Louisville. The location was previously a marshy strip of land, and it was necessary to use great care in the foundation of the buildings. From the standpoint of size and completeness of details, it ranks as one of the best in the country. The general location of buildings and the mechanical details were worked out under the direction of Mr. Theo. Curtis, superintendent of machinery. The plans and erection of the buildings were under the direction of Mr. W. H. Courtney, chief engineer.

Referring to the general layout of the buildings and tracks shown herewith, it is seen that the plant occupies an inverted roof-shaped plat of ground with a 75-foot transfer table running 919 feet east and west at the middle. The iron working departments are to the north of this transfer table and the wood working departments south of the transfer table pits. With this layout it is proposed to have the raw material enter at either end and the finished cars or locomotives to emerge on the table ready to be put in service. With this idea in view the iron and brass foundries together with the pattern storage building were placed at the extreme north end. Then follow the wheel and pipe shops for freight car work, in which freight car tracks are also manufactured. These buildings extend north and south and are followed by the blacksmith shop with its long dimensions east and west, which in turn nearly adjoin the large locomotive shop building containing the erecting, machine and boiler shop. This building is parallel to the transfer pit and only 15 feet from it. The buildings mentioned have their east end or side in line and abut the runways of a 10-ton crane of 40-foot span. This crane extends from the side of the transfer table northward, a distance of 1,000 feet, bringing it to a point near the north end of the foundry building. The crane is over the stock yard for raw or semi-finished material, which is to be taken into the shops opposite.

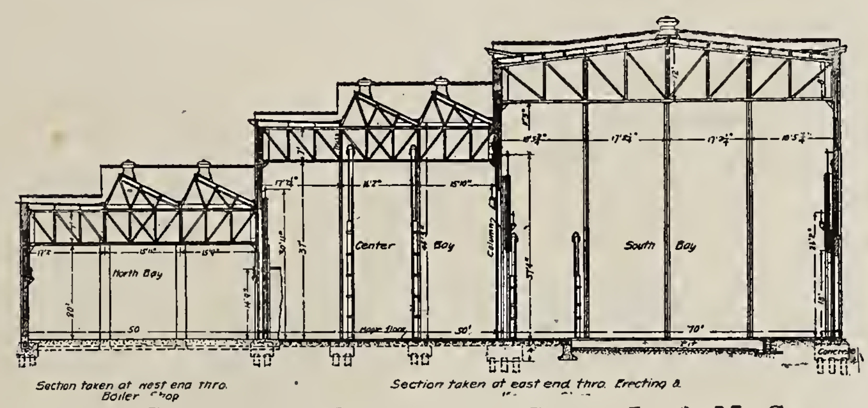


FIG. 1—SECTION OF LOCOMOTIVE SHOP, L. & N. SHOPS AT SOUTH LOUISVILLE.

Similarly to the south the first building is the dry kiln, followed by the lumber-storage building and the planing mill. The north end of the latter adjoins the transfer-table pit. West of the planing mill and paralleling the transfer table is the building containing the coach shop, paint shop and tender shop, together with smaller associated departments. To the east of the planing mill is the shop for constructing new freight cars. The freight-car repair shop, it will be noted, parallels the east side of the stock-yard crane, and is not served by the transfer table. The yard for freight-car repairs is to the north of this shop and that for crippled cars to the south, the tracks from either of these yards extending through the repair shops.

There is a belt line track extending around the outer edge of the whole plant, to which all tracks into the buildings or yards are connected. This arrangement makes the distribution of finished material to or from, or between any shops very convenient. Reference to the general plan will show the track connections, and also the space reserved for a future roundhouse and new boiler shop.

The general storehouse, which will be found just west of the coach shop, is a three-story building, the first and second floors of which are used for general storage purposes, this being the central storehouse for the system. The third floor contains the offices of the superintendent of machinery, master mechanic, mechanical engineer, general storekeeper and the mechanical department drafting room.

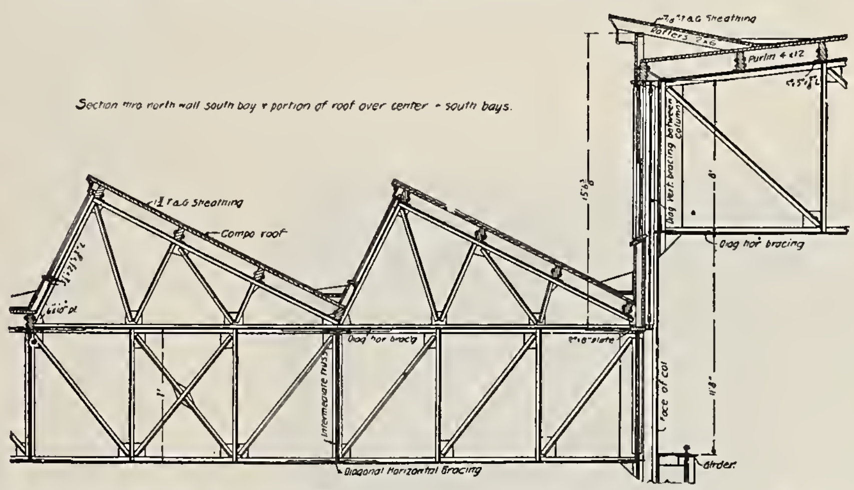


FIG. 2—DETAIL OF LOCOMOTIVE SHOP ROOF, L. & N. SHOPS AT SOUTH LOUISVILLE.

It will also be noted that there are several tracks extending northward out of the boiler shop, on which repairs to steel cars, which is practically boiler work, are to be made.

The power house is located just south of the coach shop in close proximity with the planing mill. This position was chosen for convenience in using shavings from the mill as fuel, and also because a large part of electric power is used in the planing mill.

A close study of this general layout will reveal its excellence both in economy of ground and in convenience of handling material, as well as the provision made in nearly all cases for an extension to the different buildings without changing the general scheme. The transfer table and stock-yard cranes which are of course the key features of the whole plan, are provided with high-speed equipment giving a maximum speed of 1000 ft. per minute in either case. Both of

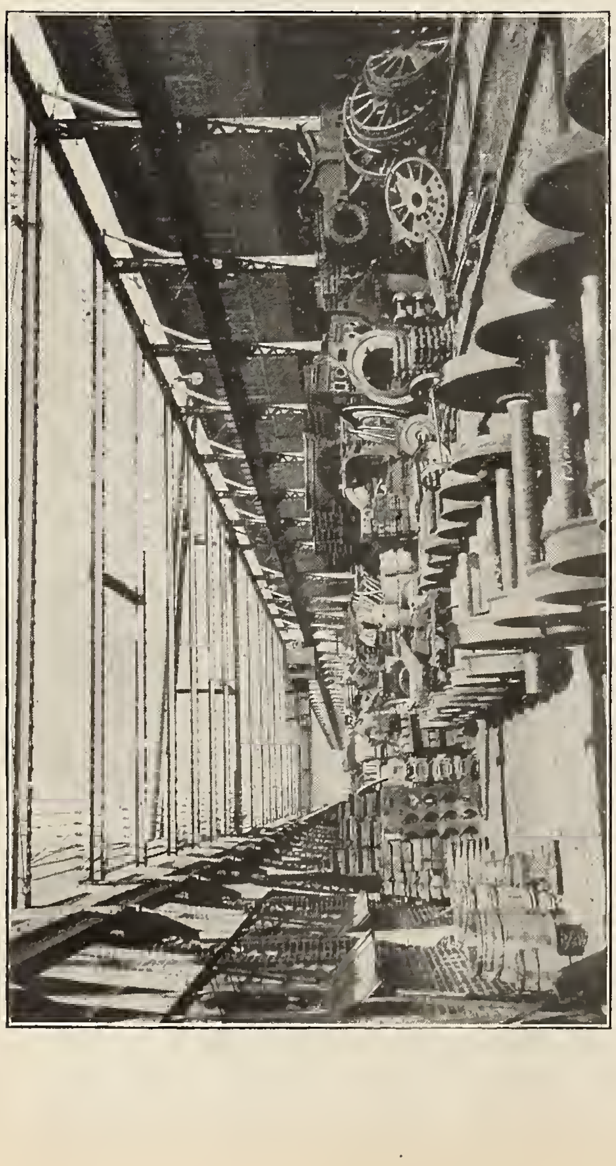


Fig. 3—View of Yard Crane and Structure, L. & N. Shops at South Louisville.

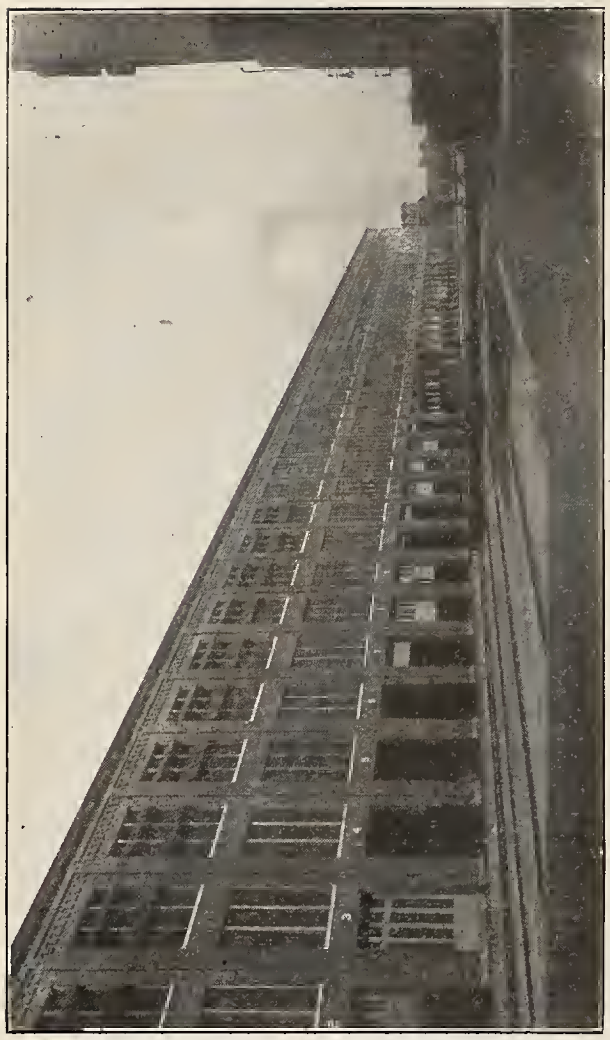


Fig. 4—Transfer Table and Locomotive Shop, L. & N. Shops at South Louisville.

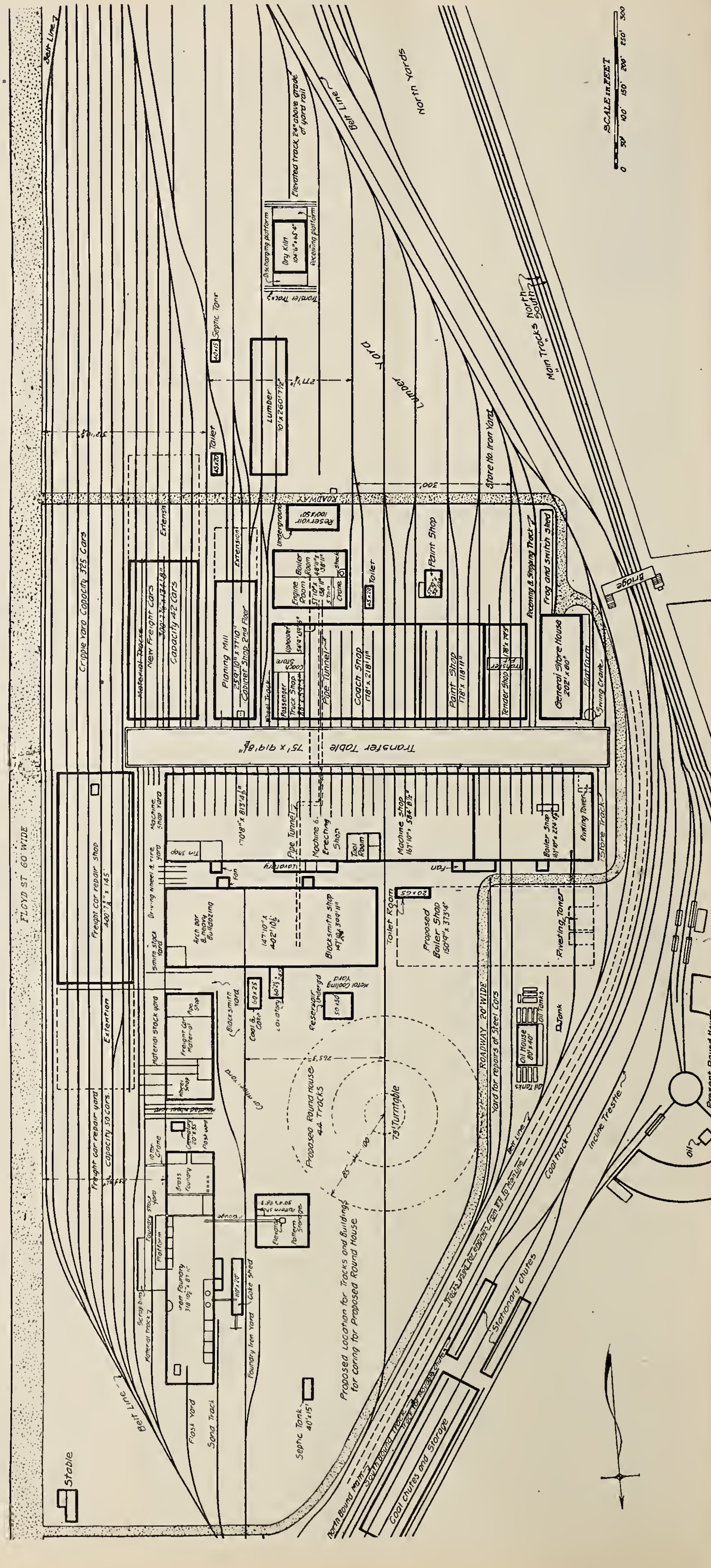


Fig. 5—General Layout, L. & N. Shops at South Louisville.

these conveniences are in practically constant use, and both are able to take care of the work without any serious delays. The table was built by Geo. P. Nichols & Bro. and the crane by Niles-Bement-Pond Co. As an example of the manner in which the details of the plant had been taken care of there is a 20-ft. macadamized roadway forming a circuit in close proximity to all the main buildings which is for the use of a fire department, and is always kept clear of obstruction. The whole plant is fenced in with a high board fence and admission can only be gained after passing a gate keeper.

Machine Shop Building.

The largest building of the group is that containing a locomotive erecting, machine and boiler shops, a plan, elevation, cross section and exterior views of which are shown herewith. This building is 170 ft. 8 ins. x 813 ft. 4 ins. exterior dimensions, and has 39 tracks extending in from the transfer-table pit, of which four pass through and out of the other side of the building. Over 224 ft. on one end of this building is given up to the boiler shop, which contains 10 tracks from the transfer table and is divided from the other shops by a brick wall extending to the crane runways.

This building is divided into three parts longitudinally by the rows of steel columns. The south section which covers the erecting-shop pits, is three stories in height and 70 ft. wide, and is covered by a gable roof supported by a simple design of steel truss. There are three cranes spanning this bay, the runways of which are supported on columns abutting, but separate from the building columns. The upper runways, which are for the 100-ton crane, are 37½ ft. above the floor, and the lower ones, which are for 10-ton cranes, are over 26 ft. from the floor. Both runways are supported on the same columns, the upper ones by girders resting on top of the column, while the girders for the lower cranes rest on brackets. The bottom chord of roof truss is 49 ft. above the floor and the center of the truss is 12 ft. high from top to bottom chord.

The center bay, which is 50 ft. wide, is but two stories in height and is covered by a saw-tooth roof, the supporting truss of which on one end joins the same column as the higher section. The girders supporting the runways for the 20-ton cranes over this bay rest on brackets from the building columns at the south end on a separate column at the north end. A detail showing the construction of this saw-tooth roof is given herewith.

The north bay is but one story in height and has a roof exactly similar to that of the center bay. It is 50 ft. wide and for part of the distance in the boiler shop has a 3-ton crane, the supports for which are attached directly to the building columns.

The foundations under the supporting columns consist of large blocks of concrete formed in place and resting on a support of creosoted piles, the number of which depends on the weight carried by the column. The walls are of brick and broken by numerous large windows, the size and location of which can be seen by reference to the elevation and views of this building. Many of the sashes are arranged to swing, which in connection with the numerous ventilators on the roof provide a good circulation of fresh air. The doors covering the track openings on to the transfer table are arranged to lift up, being counterbalanced and operated by a hand chain through a set of gears. All roof surface is arranged to drain inward and passes down through pipes alongside the building columns, thus preventing all dripping of the eaves. The end walls are carried above the roof line, arranged in a stepped design and capped with terra cotta tiling, giving the building a very good appearance.

In the southwest corner of the boiler shop is located the hydraulic riveter, above which is the tower containing a 20-ton crane. This rises somewhat above the other parts of the building and is constructed independent of the building wall. The rooms for the heating fans, wash rooms, etc., are separate brick structures adjoining the main building on the north, the location of which can be seen by reference to the plan of the building.

The pits, of which there are 29 (the boiler-shop tracks have no pits) are 4 x 4 ft. in size and built of solid concrete sides and bottom. The south end of the pit is 12 ft. from the inner side of the building column, and they are spaced at 20-ft. centers. Along the inner end of all pits is a pipe tunnel of concrete, which has connections into each. This is covered with cast-iron covers between the pits, and is thus easily accessible. The tracks from the pits extend a short distance into the center bay, which permits the crane, serving the machine tools in the center bay, to take material from or deliver it to cars on the pit tracks.

A noticeable feature of this building, as it is of all other buildings in this plant, is the exceptionally good lighting facilities, both natural and artificial. The large glass area allowed by the use of the saw-tooth roof taken in connection with the large window area in the side walls and the solid glass area in the vertical connections between the different roof levels, gives a very strong well-distributed light over the whole floor. At night the shop is illuminated with numerous enclosed arc lights hung below the crane runways on the columns, and by incandescent lights wherever needed.

The heating is by hot air, which is forced through ducts beneath the floor and is carried by galvanized iron pipes running up the side building column, where it escapes on either side at a point about 7 ft. above the floor, the shape of the pipe throwing it downward. The floors throughout the building are of granitoid on a cinder foundation.

Boiler-Shop Equipment.

In the boiler shop will be found a collection of the most modern boiler-making machinery. There is a large hydraulic riveter beneath the tower in the corner of the building, which is served by a 20-ton electric

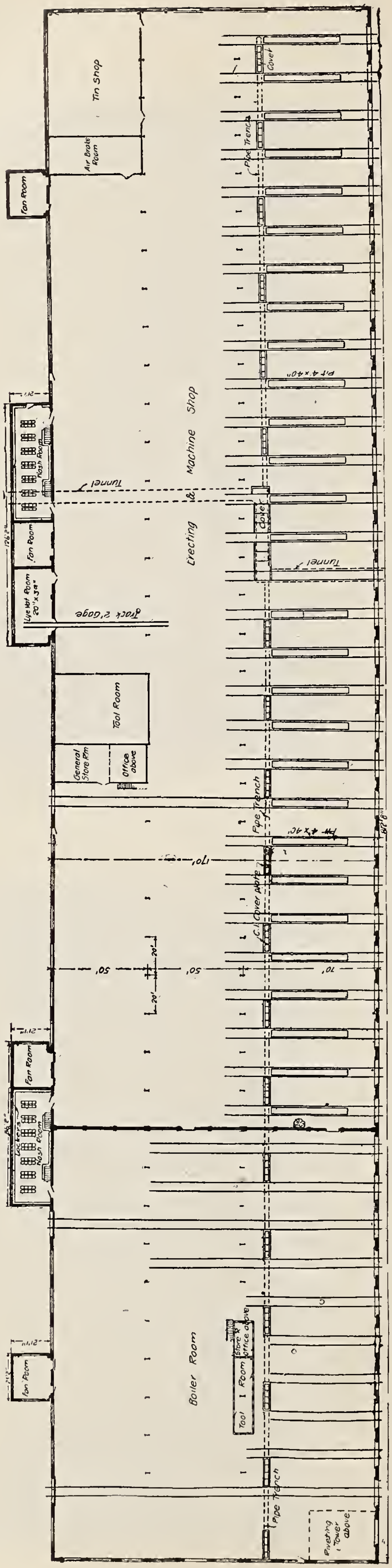
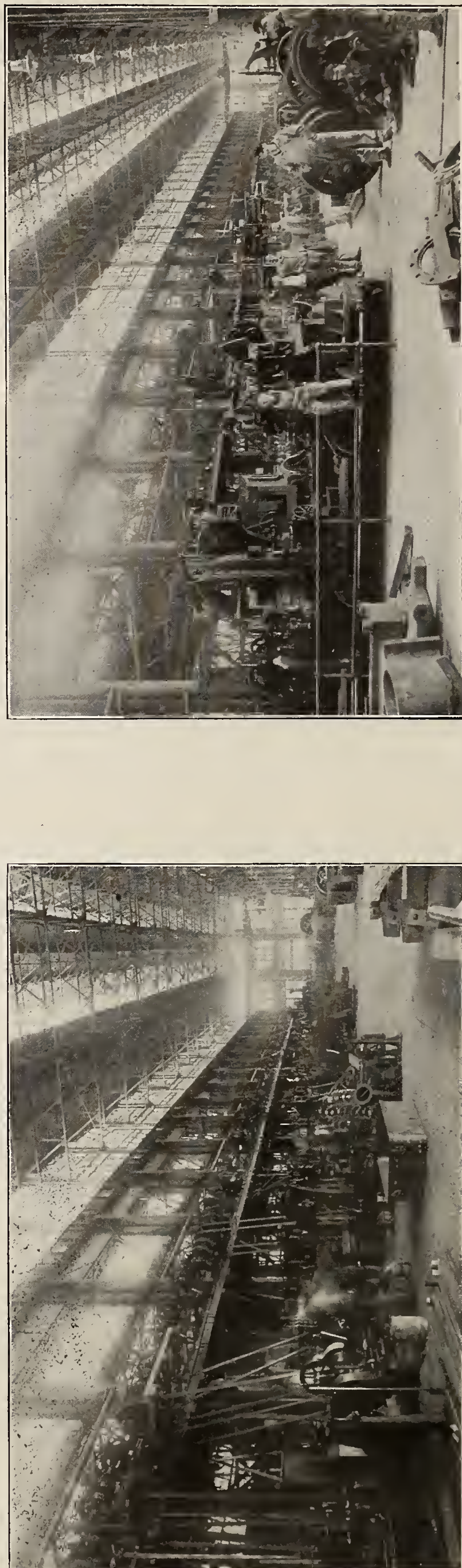


Fig. 6—Plan of Locomotive Shop, L. & N. Shops at South Louisville.



Figs. 7 and 8—Views in Machine Shop, L. & N. Shops at South Louisville.

crane and a large hydraulic flanging press, both of which machines were built by the Chambersburg Engineering Co. The flanger is served by a large oil furnace for heating the plates, so situated that they can be quickly swung from the furnace to the flanger. There is also a large open flanging fire with space for blocks, where large flanging beyond the capacity of the press is performed. A large and small set of bending rolls, heavy capacity punches, both vertical and horizontal, furnished by Hillis & Jones, as well as Lenox bevel shears, a plate planer, a punch with traveling table, from the Cleveland Punch & Shear Works, a multiple spindle plate drill from Manning, Maxwell & Moore, a three-headed bolt cutter, flue working machinery, and a 12-in. lathe, are also included.

The larger of these machines are driven by individual motors, and others are grouped and driven from a shaft. This shaft is supported by a platform resting on brackets on the building colmns, and is below the level of the crane runway.

There are ten tracks entering this shop from the transfer table, three of which pass through and out the other side. The shop has the service of five different cranes, including the one in the riveting tower. Since the brick wall dividing it from the machine shop does not extend above the crane runway the 100-ton and the 10-ton cranes over the erecting pit can continue over the tracks in the boiler shop, and the 20-ton cranes serving the machine tools can also be used in this shop, and in addition to these there is a 3-ton crane serving part of the north bay.

The tool room occupies a central position in the shop, and the office of the foreman is above this, giving a clear view of the whole shop.

Machine-Shop Equipment.

As is the practice of all modern shops, the machine tools are driven either by individual motors or in groups from a countershaft, depending on their size, location and work performed. The interior view of this shop shown herewith gives a good idea of the way the tools are connected and arranged. The larger and heavier tools are located in the center bay, where they can be served by the 20-ton cranes, being placed on either side, as far as possible, leaving a clear passageway in the center. The smaller tools and bench work, together with the tool room, tin and copper shop, substore room, etc., are in the north bay. The same method of supporting the countershaft on a platform from the building column below the crane runway, as was used in the boiler shop, is employed here. The motors, which are principally of Bullock (Allis Chalmers & Co.) make, in some cases are located directly on the platform, while in others, if too large and heavy, they are placed on the floor, or have separate supports from the columns.

The tools are grouped in a manner which allows all of the work on a particular part to be performed in one locality. The work on frames and cylinders is done in the end of the shop towards the boiler shop, and several very large modern machines, consisting of a large Pond cylinder planer, a three-headed frame slotter from Bement-Miles & Co., a large-frame drill, consisting of practically three heavy radial drills on one bed, from the American Tool Works Co., together with cylinder boring machine and frame planers, have been installed at this point in the center bay. Then follow tools for work on eccentrics, cylinder packing, cylinder heads, driving boxes, frame braces, etc., most of which are in the north bay although, the large slotters, some of the boring mills, and a few of the other heavy machines are in the center bay. These machines are largely old tools taken from the former shop, but also include quite a number of modern tools, among which are Niles boring mills, American engine lathes, Bullard turret boring mill, turret lathes from Pratt & Whitney, two-headed shaper from Bement, Miles & Co., and lathes, boring mills, shapers, etc., from other firms.

The extreme east end of the center bay is given over to driving wheel and axle work, and at this point there are several new and interesting machines, notably a large 80-in. Niles wheel lathe, which it is claimed by the management, has a record of turning out returned driving wheels, that has never been equaled. Following down the center bay from this point there are several large direct-driven automatic lathes for piston and piston-rod work, which contain many devices for the most convenient and rapid work. These were furnished by Schumacher & Boye. The remainder of the center bay is largely used for storage of raw and finished parts, there being rows of smaller machines located along the north side, most of which, however, do not require the service of a heavy crane. The space in the north bay along this portion of the shop is occupied by benches and tools for carrying gear, valve, link and rod work. These include a number of very interesting tools, notably some turret boring mills, automatic lathes and planers, too numerous to mention in detail.

The general tool room is in almost exact center of the shop, and back of it is a sub-store house for small material. The foreman's office is located above in the same manner as in the boiler shop.

In a later number, when taking up the subject of power distribution, we will give an illustration showing the location of the tools. At present all tools have not been installed.

In a later number we will take up the remainder of the buildings and equipment, together with the electrical distribution and special features of this plant.

On page 343 of the October issue the line under cut "Mr. Hubbard explains the Valve Gear" should have read "Mr. Hubbell explains the Valve Gear."

Program of Tests with Special Fifty-Car Tran at West Seneca, N. Y.

THE tests recently made under the auspices of the Lake Shore and Michigan Southern Railway at West Seneca, New York, and herein described, have served to demonstrate the net results attained by The Westinghouse Air Brake Company in its effort to provide brakes and draft gear fully adequate for service under modern conditions, and to perfect other new devices no less important from an economical and operating standpoint. During the fifteen years that have elapsed since the quick-action automatic brake came into general use on freight trains, the average weight of locomotives on drivers has increased from 100,000 to 200,000 pounds, and their draw-bar pull from 25,000 to 50,000 pounds. Within the same period the average freight car capacity has increased from 40,000 pounds to 100,000 pounds; and while in 1888 fifty cars in a train was considered a maximum, now eighty is common and one hundred by no means rare. Reference to these familiar figures is scarcely needed to emphasize the statement that brake apparatus which met all requirements fifteen or twenty years ago is now satisfactory only in inverse proportion to the increased demand made upon it. So far as draft gear is concerned the proposition is self-evident.

The equipment consisted of the following:

Cars.—The train used in making test consisted of fifty cars, gondola type, of B. & O. patent, steel underframes, wooden sides, 100,000 pounds capacity, with a light weight of 45,000 pounds, equipped with special Westinghouse appliances as indicated.

Locomotive.—Consolidated type, Pennsylvania class H6a; size of cylinders, 22x28 inches; diameter on drivers (outside), 56 inches; steam pressure, 205 pounds; weight of drivers, 173,000 pounds; tractive force about 40,000 pounds; main-reservoir pressure, 90 pounds; brake-pipe pressure, 70 pounds; main-reservoir capacity, 66,000 cubic inches. Engine equipped with same special appliances as cars, also with Westinghouse latest improved engine equipment, possessing the combined straight-air and automatic, together with the distributing valve, features.

Brake Equipment and Other Special Devices.—Standard 10-inch freight cylinders equipped with standard triple valves (known as H-49); also improved quick-service triple valves (known as H-49-B), arranged with cut-in and cut-out device enabling competitive tests; Westinghouse Friction Draft Gear, Westinghouse Automatic Air Coupler, American Automatic Slack Adjuster, high and low-pressure retaining valve.

The tests demonstrated that the quick-service brake will stop a fifty-car train in 34.6 per cent less distance than the M. C. B standard brake; that the quick-service brake, with a light application, will stop a fifty-car train in about the same distance as the M. C. B. standard when set with full-service application; That the old and new brakes operate in perfect harmony and with increased advantage in proportion to the number of new brakes in the train; That it is possible to release brakes at low speed when train is equipped with improved brakes with greatly reduced draft gear strains; That the automatic air coupler accomplishes a great saving in time with increased efficiency.

TRIPLE VALVE TESTS.

(In all tests the dynamometer car was the twenty-sixth in the train.)

Test No. 1.—Standard (old style) triple valves. Speed, twenty miles per hour. Reduction, twenty pounds.

Brake-pipe reduction, 20 lbs.
Speed, 21½ miles p. h.
Length of stop, 557 ft. 9 in.
Length of stop reduced to 22 m. p. h., 584 ft.
Duration of stop, 25 seconds.

NOTE.—Runs 1 and 2, covering Test 1, were not counted owing to the improper action of the equalizing piston in the brake valve.

Test No. 1-A.—Repeat Test No. 1 with 5-pound reduction.

Brake-pipe reduction, 5 lbs.
Speed, 22¼ m. p. h.
Length of stop, 1312 ft. 10 in. (See note.)
Length of stop reduced to 22 m. p. h., 1283 ft. 6 in.
Duration of stop, 57 seconds.

NOTE.—In announcing the tests at the time they were made, it was announced that this was 1613 ft. 10 in. The record given above is the correct one.

Test No. 2.—Quick-service (improved) triple valve. Speed, twenty miles per hour. (Same as Test No. 1) Reduction, five pounds.

Brake-pipe reduction, 5½ lbs.
Speed, 22¼ m. p. h.
Length of stop, 456 ft. 2 in.
Length of stop reduced to 22 m. p. h., 446 ft.
Duration of stop, 20.2 seconds.

Purpose of Tests Nos. 1 and 2 is to show that practically the same length of stop is obtained with a five-pound reduction with new triple valves as with a twenty-pound reduction with old triples, thereby making it possible to operate positively a train with a much larger number of brakes in operation, when equipped with new valves, than can be done successfully with old-style valves, which fact has been demonstrated with 100-car train test—the brakes working throughout with new style valves.

Test No. 3.—Quick-service (improved) triples. Speed, twenty miles per hour. (Same as Test No. 1). Reduction, seventeen pounds (equalization).

Brake-pipe reduction, 17 lbs.
Speed, 22 m. p. h.
Length of stop, 382 ft.
Length of stop reduced to 22 m. p. h., 382 ft.
Duration of stop, 16.4 seconds.

Please note that equalization with the new triples requires only seventeen pounds reduction, while old triples require twenty. Test No. 3, when compared wtih No. 1, will show lengths of stop obtainable by the two different types of triples when the brake cylinder and auxiliary pressures are equalized.

Test No. 4.—Standard (old style) triples. Speed, twenty miles per hour. Reduction, ten pounds.

Brake-pipe reduction, 10 lbs.

Speed in m. p. h., 22¼.

Length of stop, 774 ft. 6 in.

Duration of stop, 33.6 seconds.

Test No. 5.—Triples arranged, twenty-five standard (old style), twenty-five quick-service (improved), alternating in groups of five. Speed, twenty miles per hour. Reduction, ten pounds.

Brake-pipe reduction, 10 lbs.

Speed in m. p. h., 22¾.

Length of stop, 538 ft.

Length of stop reduced to speed of 22 m. p. h., 503 ft.

Duration of stop, 23.2 seconds.

Tests Nos. 4 and 5 will show, (1) that both triples work in harmony, (2) that shorter stops are obtained practically in proportion to the number of new triple valves introduced.

Test No. 6.—Twenty-five standard (old style) triples ahead, and twenty-five quick service (improved) triples behind. Speed, twenty miles per hour. Reduction, twenty pounds.

Brake-pipe reduction, 20 lbs.

Speed in m. p. h., 21¾.

Length of stop, 469 ft. 5 in.

Length of stop reduced to speed of 22 m. p. h., 491 ft.

Duration of stop, 20 seconds.

The maximum draw-bar tension during this test was 18,000 lbs.

This test probably represents worst possible combination of old and new triples, proving that the jerk due to the latter being in the rear is but slight.

RELEASE TESTS.

Test No. 7.—Standard (old style) triples. Speed, thirty miles per hour. Reduction, twenty pounds. Brakes released at slow speed and full head of steam at once applied to keep train in motion.

Maximum draw-bar pull due to release and use of steam was 169,000 pounds.

This test resulted in breaking the knuckle on the rear of the 19th car.

Brake-pipe reduction, 20 pounds.

Speed in miles per hour, 30.9.

Release made at 12½ miles per hour.

Test No. 8.—Quick-service (improved) triples. Speed, thirty miles per hour. Reduction, five pounds. Brakes released at slow speed, as in Test No. 7.

Maximum draw-bar pull due to release of the brakes and use of steam, 34,000 pounds.

No damage whatever resulted in the train.

Brake-pipe reduction, five pounds.

Speed, 31½ miles per hour.

Release made at 15 miles per hour.

The purpose of Tests Nos. 7 and 8 is to show that the releasing at slow speed, which causes so many break-in-twos with the standard apparatus, is practically rendered harmless with the improved type of triple valve. The retardation of train with a reduction of five pounds is greater than obtained with a twenty-pound reduction using the standard valves. This is shown to be so by the Triple Valve Tests, see results of Tests 1 and 1-A, also by accompanying curve.

With the improved triple valves, the action of valves in retarding the release will stall the train and prevent damage, even when steam is used, if an attempt is made to release when the speed of the train is very low.

TEST NO. 9.

Standard (old style) triples. Speed, thirty miles per hour. Reduction, 10 pounds. Brakes released at slow speed and steam applied to keep train in motion.

Maximum draw-bar pull, due to the release of the brakes and to the use of steam, 42,000 pounds.

Steam used 15 seconds after release.

Speed, 32 miles per hour.

Brake-pipe reduction, 10 pounds.

Train was kept in motion by use of steam.

Brakes released at 15½ m. p. h.

Minimum speed, 6½ m. p. h.

TEST NO. 10.

Test No. 9 was repeated with quick-service (improved) triples.

The maximum draw-bar pull, due to the release of the brakes and to the use of steam, 45,000 pounds.

Steam used 7 seconds after release.

Speed in miles per hour, 33.

Brake-pipe reduction, 10 pounds.

Brakes released at 16.1 m. p. h.

Minimum speed, 4 m. p. h.

Train kept in motion by use of steam.

The twenty-pound reduction with the old and the five-pounds with the new valves was made to see the comparative results that would be obtained with reductions that would give, as nearly as possible, the same comparative stop. The ten-pound reduction shows the greatest reduction that could be made with the new valves, with this train, and at a speed of no faster than 33 miles per hour, followed by a release at a speed as low as 10 m. p. h. With a heavier reduction the train would have been brought to rest before it could have been possible to have accomplished a release.

Purpose of Tests Nos. 9 and 10 same as that of Nos. 7 and 8: To show effect produced by making a release and using steam at slow speed; also to demonstrate, with equal reductions, a much shorter stop than can be made with new valves.

Owing to greater retardation, release with improved valves must be at higher speeds than with old valves to keep train in motion; see Tests 9 and 10.

FRICTION DRAFT GEAR TESTS.

Test No. 11.—Train backing at speed of eight miles per hour, engine reversed and full head of steam applied.

This test was designed to represent usual yard conditions.

Sped, 7½ miles per hour.

Maximum jerk, 95,000 pounds.

No damage resulted.

Test No. 12.—With slack bunched and reverse lever in back position, lever suddenly thrown ahead and full head of steam applied.

Maximum jerk, 98,000 pounds.

No damage resulted.

Test No. 13.—With ten rear brakes fully applied and slack bunched, reverse lever thrown ahead and full throttle used.

This test was intended to demonstrate the ability of the friction draft gear to absorb heavy shocks and strains.

Maximum jerk, 118,000 pounds.

No damage resulted.

Test No. 14.—At speed of fifteen miles per hour, emergency application applied from the rear car, engine working under full head of steam throughout the test.

This test was intended to represent conditions existing when hose bursts on rear of train.

Speed at time of brake application, 23½ miles per hour.

Maximum tension, 87,000 pounds. This came in the shape of a hard steady pull, no jerk.

No damage resulted.

Test No. 15.

Train separated at tenth and fifteenth cars; forward section backed into second, and without stopping, into rear portion at a speed of from four to six miles per hour.

Maximum buff, 0 pounds.

Speed indicated by speed recorder on engine four miles per hour. No speed record on dynamometer car, as it was at rest during this test.

Shock had died out by the time it had reached the dynamometer car, which was the 25th in the train.

No damage resulted.

Test No. 16.

Duplicating Test No. 15 at speed of from six to eight miles per hour.

Maximum buff, 42,000 pounds.

Speed, six miles per hour by indicator on engine. No dynamometer car record, as car was at rest.

No damage resulted.

This test shows the value of the friction draft gear in absorbing shocks; also the absence of recoil.

Test No. 17.

Duplicating Test No. 15 at speed of from eight to ten miles per hour.

Maximum buff, 100,000 pounds.

Speed by recorder on engine, eight miles per hour. No record made of speed on dynamometer car.

No damage resulted.

Another example of the dissipation of energy and absence of recoil in the friction draft gear.

Test No. 18.

With all cars from tenth to twentieth uncoupled test made to determine time necessary to couple up both couplers and hose connections, release brakes and move train. One brakeman employed during this trial

This test intended to illustrate the saving in time obtained by the use of the automatic air hose couplers.

Time necessary in which to cut in the air, after car couplings had made, 42 seconds.

A similar test made with ordinary hose and couplings showed that the corresponding time to couple hose and turn angle cocks was 2 minutes and 2 seconds.

EXTRA TESTS.

Extra No. 1.

Emergency application of the brakes from the engine. 100 per cent of air cars cut in.

Triple valves used, Improved.

Speed, 33¾ miles per hour.

Stop in feet, 506.6.

Duration of stop, 14.8 seconds.

Maximum buff, 41,000 pounds. Maximum tension, 41,000 pounds.

No damage.

Extra No. 2.

Emergency application of the brakes from the engine. 100 per cent of air coupled up.

Triple valves used, Improved.

Speed, 6½ miles per hour.

Stop in feet, 14.3.

Duration of stop, 3.4 seconds.

Maximum buff, 104,000 pounds. Maximum tension, 0 pounds.

No damage.

Extra No. 3.

Emergency application of the brakes from the engine. 50 per cent of the air cars coupled up.

Triple valves used, Improved.

Speed, 10 miles per hour.

Stop in feet, 49.6.

Duration of stop, 6.4 seconds.

Maximum buff, 345,000 pounds. Maximum tension or recoil, 0 pounds.

Extra No. 4.

Buffing and coupling test. Cut made back of the 29th car and front portion backed into rear portion.

Speed, 6 miles per hour.

Maximum buff, 172,000 pounds. Tension or recoil, 0 pounds.

No damage.

Extra No. 5.

Buffing and coupling test. Train cut at the 24th car and front backed into rear portion.

Speed, 8 miles per hour.

Maximum buff, 430,000 pounds. Maximum tension or recoil, 0 pounds.

No damage.

All of these buffing tests showed conclusively the capacity of the friction draft gear to absorb shocks and stand punishment, also that practically all recoil is eliminated.

Union Pacific Motor Car "No. 2"

MOTOR Car "No. 2," the second gasoline motor car built by the Union Pacific Railroad Company at its Omaha shops, is an all-steel car. The new car is a car is a commercial, practical car, finished and complete, for service on branch or inter-urban lines.

It is of the same general design as Motor Car "No.

A Group at the Trial of the Union Pacific Motor Car No. 2—No. 1, W. R. McKeen, Jr., S. M. P.; No. 2, A. L. Mohler, V. P. & G. M.; No. 3, U. S. Senator Millard.

1," described in the August issue of the Railway Master Mechanic, and embraces the same features in regard to ventilation, sanitation, heating, lighting, etc. The inside finish of the car is antique mahogany, the ceiling being cream white, with decorations in gold and sepia. The seats are finished in leather, with a semi-circular tufted seat at the rear. The exterior of the car is finished in maroon and striped in gold, while the trucks are painted olive green.

This car has two four-wheel all-steel trucks; is fifty-five feet long, with seating capacity of fifty-seven. With its steel sills and bracing, the steel carlins and ribs and the angle bracing and outside steel shell, the new car is one of remarkable strength, which is due particularly to its structural design. In spite of its strength the car is of wonderfully light design, the total weight being but 56,000 pounds. The driving wheels are 42 inches in diameter; other wheels 34 inches.

The hot water circulation coils which serve the double purpose of cooling the engine and heating the interior of the car, are located and housed in the pilot.

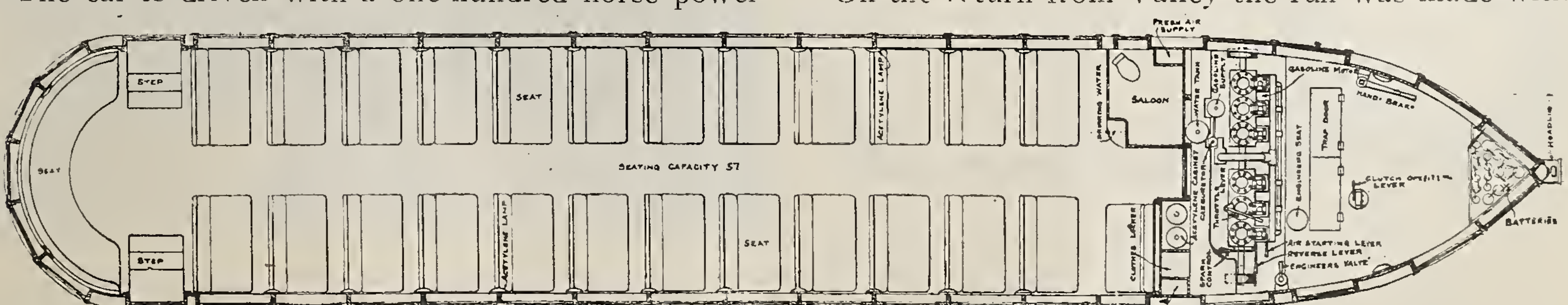
Twenty-five opalescent panel lights, burning acetylene gas, provide a most perfect illumination.

The car is driven with a one-hundred horse power six-cylinder gasoline engine, built after special railroad patterns, designed to meet regular railroad car service requirements; has a "make and break" spark ignition, with a primary battery to start on and a magneto for regular running service.

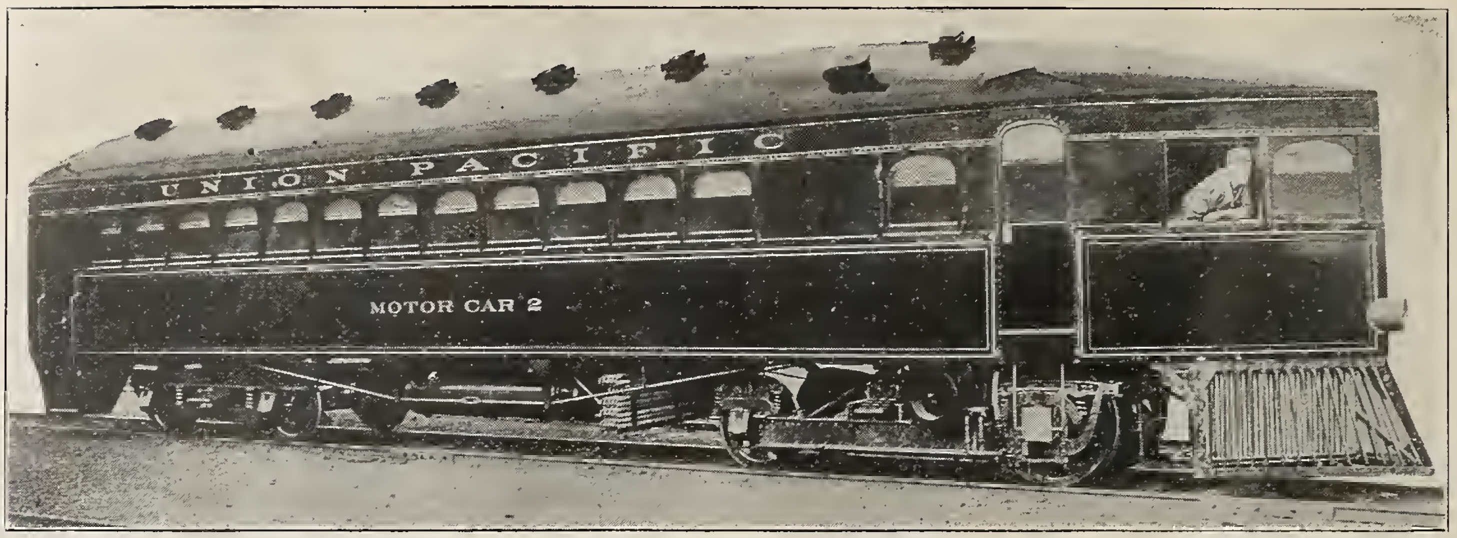
The metal clutch, operated by hand levers, which proved so successful on Motor Car "No. 1," has been applied to Car "No. 2," but is operated by air pressure, controlled by a specially designed operating valve. The car is started at low speed, engine disconnected, or thrown into high speed, at will, simply by means of the operating valve.

Motor Car "No. 2" made its initial trip September 14, 1905, when the car ran from Omaha to Valley, Nebraska, on the main line of the Union Pacific, a distance of 34.8 miles. On the westbound trip no effort was made to make a fast run, the car being put through various evolutions demonstrating its practicability in regular service. However, the distance, deducting stops, was covered in 1 hour and 11 minutes, actual running time. Especially noteworthy was the performance of the car ascending Elkhorn Hill, where the grade is 42 feet per mile. This hill was ascended at the rate of $32\frac{1}{2}$ miles per hour.

On the return from Valley the run was made with-



Floor Plan of Union Pacific Motor Car No. 2.



Union Pacific Motor Car No. 2.

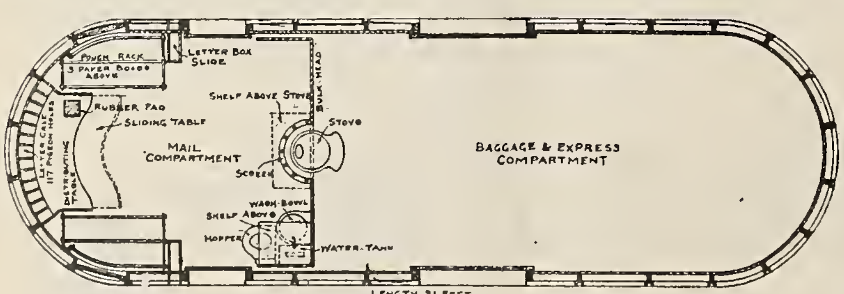
out stop, and deducting 8 minutes for slow-ups the run was made in 57 minutes, or an average of 37 miles per hour. with a maximum speed on the run of 52 miles per hour.

The mechanism of car was in perfect order during the entire trial, not even a hot bearing developing during the run.

September 22nd Motor Car "No. 2" made second trial run to Valley and return. On this occasion an average speed of 39.4 miles per hour was made on the westbound trip. On the eastbound trip the car made the 25 miles from Valley to Gilmore in 30 minutes, or an average speed of 50 miles per hour. Several miles were covered in 57 seconds, or 63.2 miles per hour, and mile after mile was accomplished at better than a mile a minute.

Notes of the Omaha Shops

NOTHING appeals with greater force to the shop visitor who has the instincts of a mechanic, than the special appliances found in a well managed shop. The air brake repair room of the Omaha shops is a case in point, where they have a small home-made lathe that would be readily taken for the product of a regular tool builder. The frame or bed is made of a grate bar about 30 inches in length, planed on top and sides and set on the bench. The head stock is made of spring saddle, the open ends of which are secured to the bed, and the solid sides form a bearing for the cone spindle. The tail stock is also made of a piece of scrap stock, as is the tool carriage, which has a compound rest and is fed in each direction by screw. The spindle is fitted with a small universal hand chuck, and also a face plate, the latter being made of a pump gland. This little machine has about six-inch swing and will take about twenty inches between centers. It is driven by a triple piston air engine, and does all of the valve work and other small work on air pumps. It is a high class tool notwithstanding every detail in it was made from pieces that would have been in the hands of the junk man in any other shop, and it is regarded as one of the most valuable tools in the plant, for the reason that there are no waits for its work.



FLOOR DIAGRAM OF COMBINATION MAIL, BAGGAGE & EXPRESS MOTOR CAR TRAILER

Union Pacific Motor Car Trailer.

Officers of the Chicago Car Foremen's Club

The annual election of officers of the Chicago Car Foremen's Club, October 10th, resulted as follows:

President—I. S. Downing, L. S. & M. S. Ry.

First Vice President—G. M. Bates, C. B. & Q. Ry.

Second Vice President—T. R. Morris, C. M. & St. P. Ry.

Treasurer—W. B. Templeton, Templeton, Kenly & Co.

Secretary—T. H. Eskridge, Armour Car Lines.

Interior View of Union Pacific Motor Car No. 2.

Locomotive Water Space Stays

THE locomotive firebox of today—as it is stayed in the water spaces—differs but slightly from its prototypes of 30 years ago, notwithstanding that the heating surfaces have been greatly extended and furnace areas enlarged to provide adequate heating capacity, in the effort to effect a greater distribution of steam and maintain higher working pressures, so essential to the requirements of modern locomotive practice.

The ordinary water space stay, known as the rigid staybolt, as shown in Fig. 1, connecting the outer and inner sheets of the firebox end of a locomotive boiler, is simply a piece of wrought iron, A, threaded its entire length, screwed through the outer sheet and plate, across the water space and into the inner plate or fire-

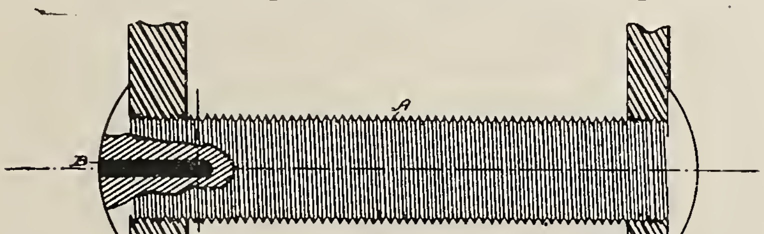
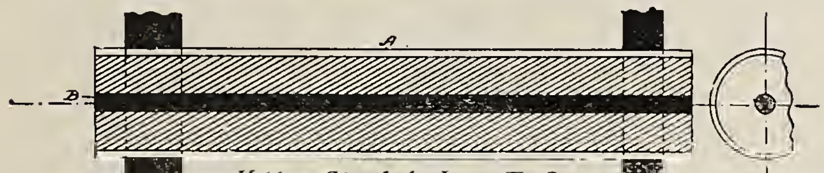
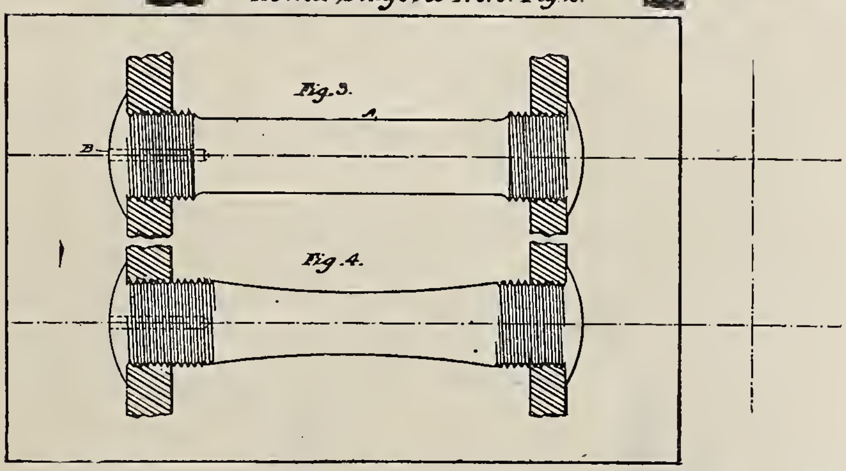


Fig. 1. The Ordinary Stay.



Hollow Staybolt Iron. Fig. 2.



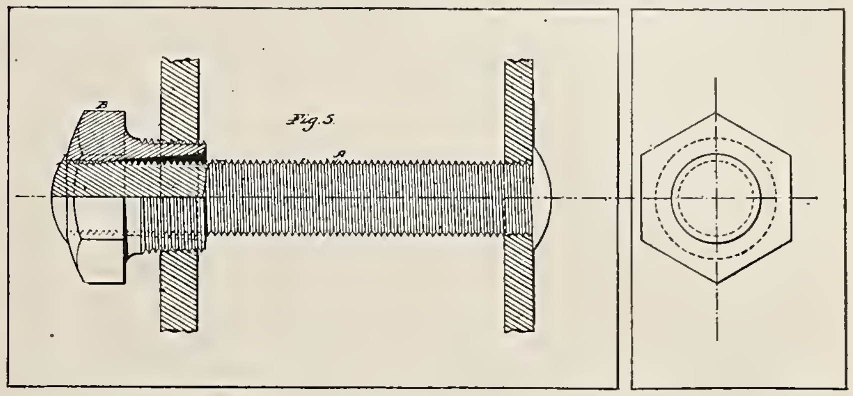
box sheet, and riveted over on both ends, securely holding in a rigid manner, the outer shell to the firebox. In later years the tell-tale hole, B, was thought advisable, and such has been drilled in the outer ends of all staybolts of this type, to a depth of 1¼ inches, with a 3-16 inch drill, passing beyond the thickness of the outer plate, enabling inspectors to detect rupture or breakage by the emission of water or escape of steam through the orifice, where the structure of the iron has become separated and gives way close to the inner surface of the outer sheet. Fig. 2 represents a staybolt similar to Fig. 1, the iron of which has a structure so made as to provide a hole through the entire length of the bar, and known as hollow staybolt iron.

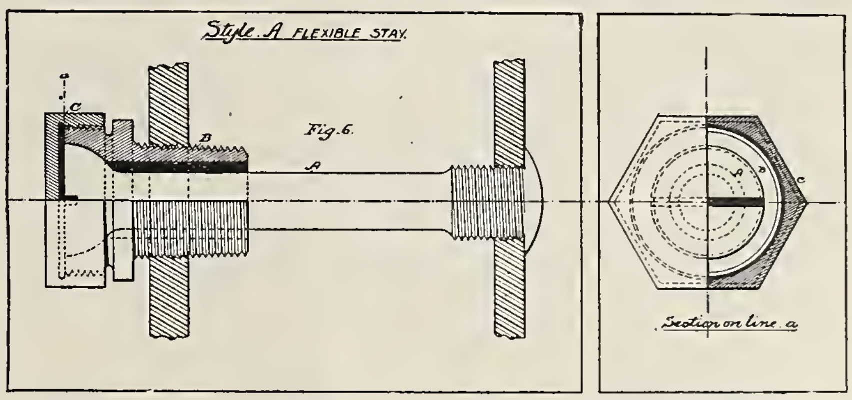
---

*Abstracts from the paper read before the Pittsburg Railway Club, April 28, 1905, by B. E. D. Stafford.

In bad water sections of the country where lime and magnesia are found in solution, incrustation forms on the outer surface of the staybolt and at times covers a fracture, fills the tell-tale hole during the first stage of rupture and prevents the escape of steam or water regardless of breakage. In sections where the water is free from solids, this tell-tale hole is most advantageous as has been recognized by state and government supervisions of inspection as a necessary process to the proper inspection of staybolts, who have authorized its incorporation on grounds of safety.

In arranging the pitch and diameter of the water space stays, the strength of the sheets or plates is not taken into consideration, the common practice being to make the stays strong enough to sustain the total load due to pressure and allow for the required margin of safety. The diameter of stays varies from ⅞ to 1 inch when new, and is pitched equally over the entire surface of the fire sheet, generally from 3¾ to 4 inches from center to center of staybolt, each bolt exposed to





a strain equal to the square of the pitch multiplied by the working pressure in pounds per square inch. The safe stress allowed on the cross section of a water space stay by the United States rule is 6,000 pounds per square inch, irrespective of the difference in stress between short and long stays.

The tensile stress in a water space stay is the load applied due to the working pressure on the surface of the plates, and so far is the only factor taken into consideration in connection with the ordinary or rigid staybolt as shown in Fig. 1, yet in addition to the tensile stress due to the pressure on the plates within the water and steam space, these stays are subjected to strains from the unequal expansion of the outer and inner sheets. To overcome staybolt breakages certain modifications of the original stay have been made, as shown in Figs. 3 and 4, that of simply turning off the threads in the center of the bolt exposed in the water space, followed by a greater reduction of diameter, as shown in Fig. 4, for the purpose of giving flexibility to the bolt to more readily withstand the reversal strain due to expansion.

While it has been found that the reduction of the diameter in the water space has not been of any material benefit to the life of the staybolt, it has the preference over the full threaded bolt to the extent that deposits, carbonates and sulphates of lime and magnesia, which precipitate from the waters used, do not adhere so closely and do not impair the quality and strength of the iron to such a marked extent as when threaded. Corrosion and incrustation in sections of the country where waters are impure not only have a deteriorating effect on the life of the stay, but in greater proportion affects the fire sheets and congests the water spaces.

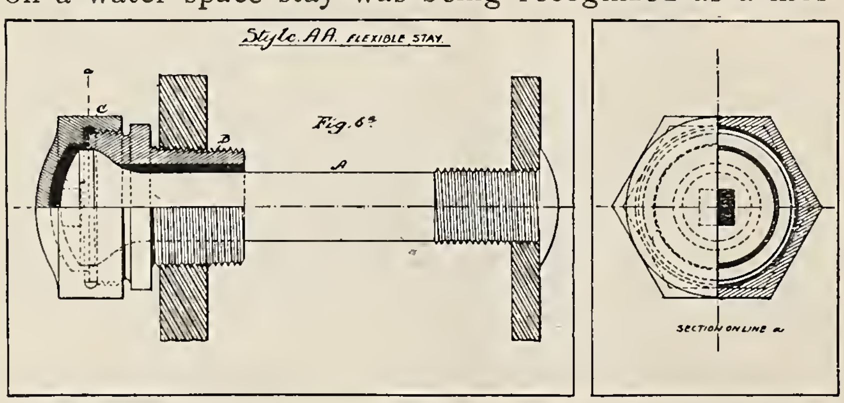
In the use of the rigid water space stay—the ordinary staybolt—quality of material plays a most vital part in the life of the staybolt. In determining the value of an iron for staybolt use in locomotive practice it is most essential that such material should be of that nature to withstand shocks and vibrations, high pressure and side strains, and of a character to maintain its general quality throughout service, to the highest limit of efficiency and safety. The specifications of requirements ordinarily used, and based on the rulings of the testing machine, call for the following claims: A minimum of 48,000 pounds per square inch tensile strength. A minimum of 25 per cent elongation on eight-inch sections. That such shall be a double refined iron free from blisters and seams, rolled true to gauge, and taking a sharp thread. Fractures to be wholly fibrous. Samples to stand bending double cold and hammered down without flaw. Later specifications stipulate that the iron shall meet a given number of vibrations, and so judged by the ratings of the vibratory machine. This was advisable in as much as the reversal strain thrown on a water space stay was being recognized as a most destructive force. It was then decided to stipulate in the body of the specifications, that iron having a tensile strength between 47,000 and 48,000 pounds per square inch must show an elongation of not less than 30 per cent in eight inches; between 48,000 and 49,000 pounds per square inch, 29 per cent; over 49,000 pounds per square inch, 28 per cent; all tests to be pulled at the rate of one-half inch per minute.

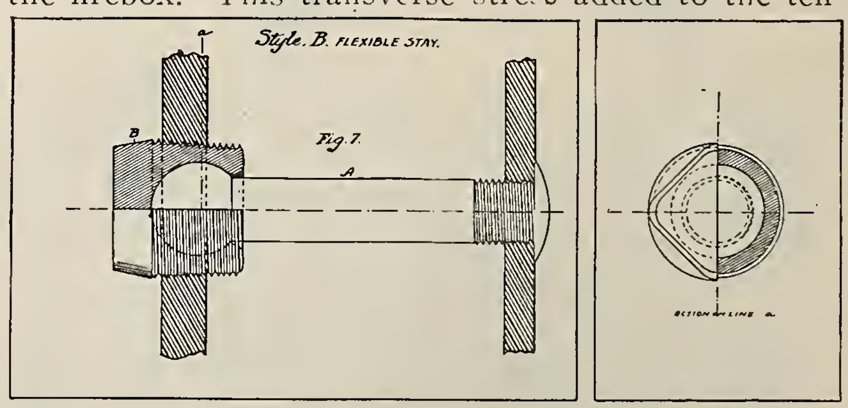
If the tensile stress were the only factor to be considered, we would be assured of a large factor of safety. When firebox sheets are heated to high temperatures the expansion of such is excessive, and when rigidly stayed the transversal stress applied to the rigid stay is enormous in consequence of the expansive force exerted. Sheets buckle and bend in their effort to expand, and rigid stays fail to withstand the strain thrown upon them. This expansive force, known as the transverse stress, has been overlooked in the calculations which were deemed necessary toward arriving at a factor of safety which could be warranted as safe.

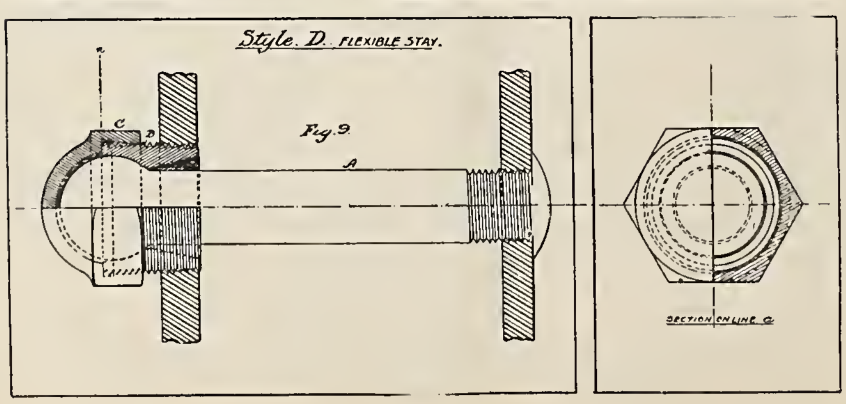
The transverse stress on a one-inch bolt whose diameter at bottom of thread is 0.892 inch, is figured as follows by the principle of bending moments. We will assume the load at the end of the stay is equal to 200 pounds, and the length of the bolt 4 inches. The bending moment M then $= 200 \times 4 = 800$ inch pounds.

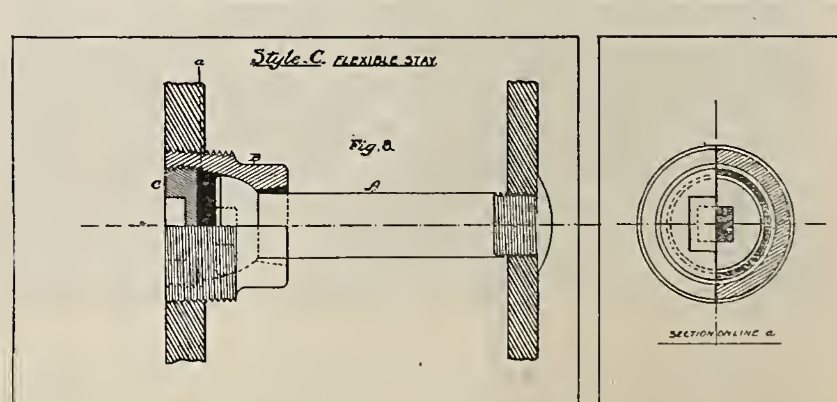
The resisting moment for a solid cylinder is $R = \frac{A\,D}{8}$, in which A = area and D = diameter.

For a one-inch bolt 12 threads, $R = \frac{0.628 \times 0.892}{8} = 0.07$, and by the equation $\frac{M}{R}$ the stress at the outermost fibers of the water space stay is: $S = \frac{M}{R} = \frac{800}{0.07} = 11428$ pounds per square inch, due to the vibratory action of the firebox. This transverse stress added to the ten-









sile stress, as both stresses tend to rupture the bolt, is 5120+11428=16548 pounds per square inch. This total stress is entirely too high when constantly reversed for a rigid stay to withstand.

There is only one unknown quantity in the factors used, namely, the assumed load of 200 pounds acting on the firebox side, due to expansion of the sheets. The theoretical deflection caused by that load

$$=D=\frac{Wl^3}{3EI}=0.0047 \text{ inch.}$$ In which

l^3=length of bolt cubed.
E=coefficient of elasticity.
I=moment of inertia of the section.

The fiber stress S then $=\frac{3\times D\times E\times C}{L^2}=11788$ pounds per square inch. Where

D=deflection.
E=coefficient of elasticity.
C=distance of outermost fibers from neutral axis.
L^2=length of the bolt squared.

The fiber stress of 11788 pounds per square inch as found above closely agrees with the result found by the first method.

In the absence of any data to show what the magnitude of the expansive forces are, which are at work in the firebox, it is necessary to assume either the load or the deflection of the bolt. The deflection for the load of 200 pounds was shown to be 0.0047 inch by calculation. If the actual deflection is known, and this should by all means be found, not by theory, but by actual tests with instruments applied to the firebox sheets, then the fiber stress can be found at once as by the equation above. Rigid water space stays are inadequate to the test. Flexibility must be maintained in a water space stay, and the most practical means for providing such is a flexible staybolt.

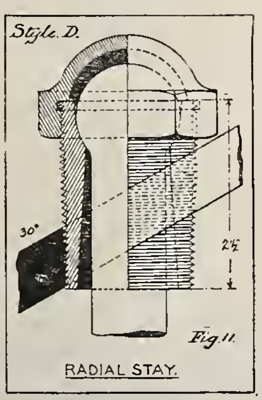
Several types of flexible stays have been tried in railway service, as shown in Figs. 6, 6a, 7, 8, 9 and 14. Several other designs have been invented on the principle of the chain or link, and wire rope, but the styles shown are found in use covering a period of eight years, and the sketches were made by careful measurements and reduced from sample bolts, or bolts found in service, with the exception of Fig. 14, which was taken from an electrotype illustration. Fig. 5 is not a flexible bolt, it is simply a sleeve screwed into the outer sheet of the boiler, allowing extra length for the ordinary stay. The sleeve is of malleable iron.

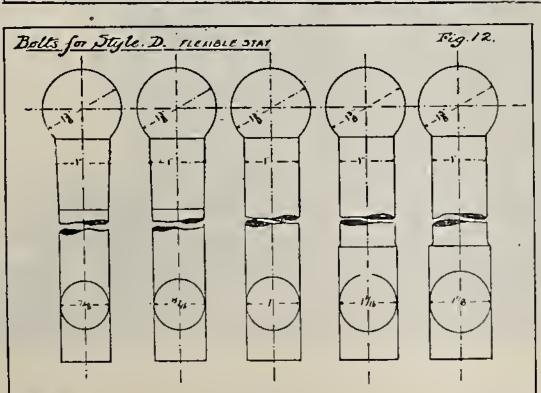
Fig. 6 shows style A, flexible staybolt, the head being quite flat and having little area where such is needed. This bolt has been used by several of the railroads and was one of the early designs to afford flexibility in a water space stay. The black lines surrounding the head and shank of bolt A, showing clearance in cap C, and sleeve B, will give a clear idea as to how incrustation might affect the ease of movement of this bolt. The sleeve and cap are made of brass by some roads and malleable iron by others.

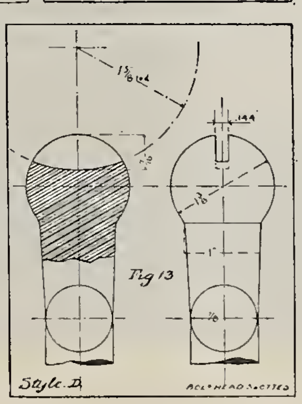
Fig. 6*a* is a modification of Fig. 6, more practical and serviceable in its lines of design to maintain flexibilty. Cap and sleeve are made of steel. Fig. 7 shows a style of flexible stay in which the plug B is of steel drop forged over the head of bolt A, and sleeve and bolt are screwed into the outer and inner sheets simultaneously. Fig. 8 shows a style of flexible stay where the sleeve B is screwed flush with the surface of the outer sheet, the bolt inserted into the inner sheet and plug C screwed into the sleeve B to effect a steam tight joint. Plug and sleeve are made of steel and in some cases of brass.

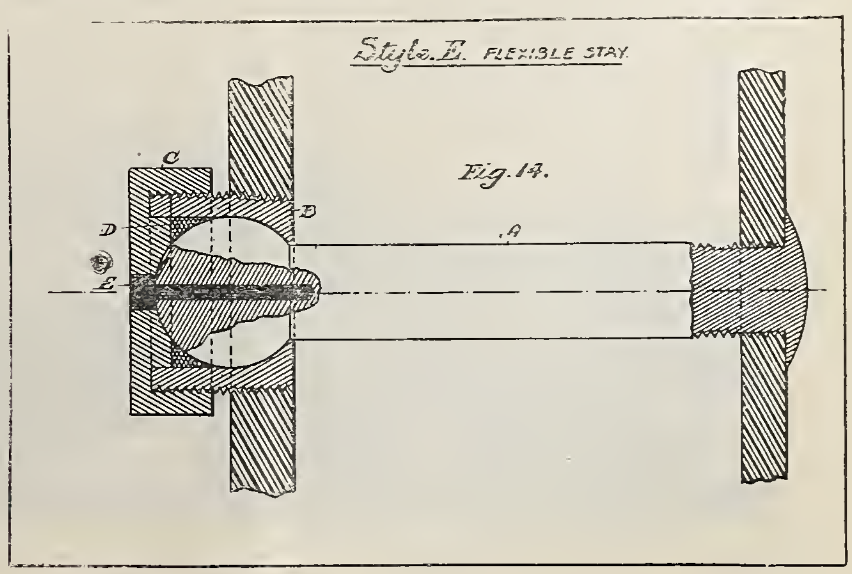
Fig. 9 is a flexible stay of the round head design, taking several sleeves as shown in Fig. 10 for the different thicknesses of plates, and in Fig. 12 is illustrated the assemblage of bolts applying to this flexible stay, to be used in one sleeve. Fig. 11 shows the same flexible stay used as a radial bolt, with long sleeve. The cap is of forged steel and the sleeve of cold rolled steel. Fig. 13 shows the bolt used for this style stay, slotted. Fig. 14 is a flexible stay of the round head type, which has a metallic packing D, closely fitting the head of the bolt, and tell-tale hole E in cap and bolt for detecting breakage.

Flexible stays can only prove their value in service test. The locomotive firebox is no respecter of persons; the design which is perfect to withstand the stresses and disintegrating influence of road service and









maintain flexibility will only be discovered from that standpoint. It is of the most vital importance to the success of the flexible water space stay, that good work be always done in the installation of the complete bolt. There is no excuse for leakage when proper attention is given to methods of installation of a flexible stay, and in tapping the taper holes, which are made in the outer sheet to receive the sleeves, such should be carefully inspected and all plugs and sleeves screwed up to a steam tight fit, and all caps which make their seat on graphite in the threads, for by the unscrewing of the the end of the sleeve should be screwed up tightly, using caps, inspection is allowed to be made when thought advisable.

The fact that staybolt breakages have in no sense diminished, regardless of the quality of iron used, and in many modifications of the forms devised in the rigid stay in the effort to provide flexibility, notwithstanding that water spaces have been widened, leads to the conclusion that the firebox as now constructed is too rigidly stayed to allow of economic and safe working where cost of maintenance of the complete machine is more or less affected in consequence of the expense accruing from the firebox and staybolt charges of repairs incident to the constant disintegration and distraction of the material, the result of shock, strain, vibration, corrosion and heat. The force which works on the fire sheet in course of expansion, due to high temperatures, throws a stress on the outermost fibers of the rigid staybolt far in excess of the tensile stress, and as it is a reversal or vibrating stress, the effect on the structure of the staybolt iron is too severe to warrant safe conclusions as regards maintaining a reasonable factor of rapidity. The transverse stress breaks the rigid staybolt, not the tensile stress, and to enable the expansive forces to take their natural course with least resistance, the flexible staybolt has been designed as a water space stay, as the most perfect means of affording and maintaining flexibility under all conditions of firebox service, adding to the lift of both sheet and staybolt.

Ten-Wheel Passenger Locomotive, Delaware, Lackawanna & Western R. R.

THE American Locomotive Company have built five ten-wheel passenger engines for the D. L. & W. road, which are in the front rank of simple locomotive practice, bristling as they do with the standards worked out to solve the conditions under which they are to operate, also for the further reason that they represent a type of mechine that has earned its right to favorable consideration because of records made in a very exacting service. These engines are the heaviest and most powerful of their type yet built, being some 2000 pounds heavier than like machines built for the Lehigh Valley road, and illustrated in these columns in the October issue. They are also superior in drawbar pull to many of the Pacific type engines which have a much greater total weight .

The maximum tractive force of these engines is 35,000 pounds, which is a high figure when the total weight of 201,000 pounds is considered, giving a pound of drawbar effort per eight pounds of engine. This result is attained by means of elevating the firebox over the 69 inch wheels, as was done in case of the eight-wheel passenger engines of the same road, (illustrated in the July issue of the Railway Master Mechanic) having the same diameter of driving wheels and are also fine anthracite burners as in the case of the engines under discussion.

The tractive force of these engines is 22.7 per cent of the adhesive weight, that is, there are 4.4 pounds of the latter to each pound of drawbar pull. The weight on drivers is 76.6 per cent of the total weight of the engine, which accounts for the high ratio of traction power to the total weight. The service for which these engines are designed is a severe one in hauling the heavy fast trains of the Lackawanna over stiff mountain grades and sharp curves. To reduce the curve resistance to the minimum, the tires on drivers are set in from the usual gage lines so as to give one inch clearance at front flanges, 11-16 inch at the main, and 9-16 inch at the rear, while the driving boxes have ¼ inch lateral motion. The result of giving this amount of initial play is a reduction of wear at flanges, boxes and hubs, and the engines are said to run on curves with almost the same freedom as on tangents. Our half-tone shows a splendid machine, and the appended specifications will assist to an understanding of details not illustrated.

Cylinder, type........................Simple slide valve
Cylinder, diameter........................22½ in.
Cylinder stroke........................26 in.

Delaware, Lackawanna & Western Ten-Wheel Passenger Engine.

Track guage	4 ft. 8½ in.
Track guage, tractive power	35,100 lbs.
Wheel base, driving	14 ft. 4 in.
Wheel base, rigid	14 ft. 4 in.
Wheel base, total	25 ft. 6 in.
Wheel base, total, engine and tender	54 ft. ¼ in.
Weight, in working order	201,000 lbs.
Weight, on drivers	154,000 lbs.
Weight in working order, engine and tender	321,000 lbs.
Heating surface, tubes	3156.3 sq. ft.
Heating surface, firebox	221.7 sq. ft.
Heating surface, total	3378 sq. ft.
Grate area	94.8 sq. ft.
Axles, driving journals, main	10x13 in.
Axles, driving journals, others	9½x13 in.
Axles, engine truck journals, diameter	6½ in.
Axles, engine truck journas, length	12 in.
Axles, tender truck journals, diameter	5 in.
Axles, tender truck journals, length	9 in.
Boiler, type	Straight top
Boiler, type, O. D. first ring	74⅝ in.
Boiler, working pressure	215 lbs.
Boiler, fuel	Fine anthracite
Firebox, type	Wide Wooten
Firebox, length	126 1-3 in.
Firebox, width	108¼ in.
Firebox, thickness of crown	⅜ in.
Firebox, tube	⅝ in.
Firebox, sides	⅜ in.
Firebox, back	⅜ in.
Firebox, water space, front	4 in.
Firebox, water space, sides	4 in.
Firebox, water space, back	4 in.
Crown staying	Radial
Tubes, material	Charcoal iron
Tubes, number	398
Tubes, diameter	2 in.
Tubes, length	15 ft. 3 in.
Tubes, gauge	No. 12 B. W. G.
Boxes, driving, main	C. S.
Boxes, driving, others	C. S.
Brake, driver	Westinghouse American high speed
Brake, truck	Westinghouse American high speed
Brake, tender	Westinghouse high speed
Brake, air signal	Westinghouse J.
Brake, pump	9½-in. R. H.
Brake, reservoirs, 2	16x96 in.
Engine truck	4-wheel pedestal type W. I. frame
Exhaust pipe, double nozzles	3½ in. and 3⅝ in.
Grate, style	Rocking
Piston, rod diameter	4 in.
Piston packing	C. I. snap rings
Smoke stack, diameter	18 in.
Smoke stack, top above rail	15 ft. 9-16 in.
Tender frame	10-in. channels and plates
Tank, style	U. D. L. & W. Standard with hood at front
Tank, capacity	6000 gallons
Tank, capacity, fuel	10 tons
Valves, type	Allen Richardson
Valves, travel	5½ in.
Valves, steam lap	1 in.
Valves, ex. lap	1-16 in. on first four engines
Valves, ex. lap	C. L. 1-32 in. on last engine
Setting, eccentrics to give one-quarter lead at 6-in. cut off forward motion	
Wheels, driving diameter outside tire	69 in.
Wheels, centers diameter	62 in.
Wheels, driving material, main	C. S.
Wheels, driving material, others	C. S.
Wheels, engine truck, diameter	33 in.
Wheels, engine truck, kind	National No. 3 C. I. spoke
Wheels, tender truck, diameter	33 in.
Wheels, tender truck, kind	Boies No. 2 wrought iron disc.

The American Street Railway Association

PHILADELPHIA was the scene of the twenty-fourth annual meeting of the American Street Railway Association, which convened on the 27th of September with more than eight hundred members of the various bodies composing the allied associations, together with nearly two hundred manufacturers of street railway supplies. President Ely's annual address was marked by the close attention given to the many points concerning issues requiring the immediate attention of the association, as having an important bearing on its future, among which were traffic agreements between urban and interurban lines, consolidation of enterprises, work on technical subjects, municipal ownership and other live questions of import. The portion of the president's address referring to the existing status of electric and steam railways called attention to the better feeling prevailing between the two systems, and also presented an ideal arrangement of transportation which would utilize the strong elements of each system, as follows:

"Many of the larger steam railroad systems are changing their policy regarding the construction of electric railways from one of active, and in some cases, bitter opposition, to either passive acquiesence, or quiet assistance. This is an approximation of the conditions that ought to, and some day surely will prevail. The ideal railroad situation, both from the point of view of the companies and the public, would comprise a heavy long-distance railroad doing the freight and through passenger business, aided by a light interurban railway, with frequent stations upon which the suburban and interurban passenger business would be transacted, and in connection with these two factors, the street railways within and adjacent to the intermediate and terminal cities, would perform the functions of ordinary street railways, as well as those of bringing to and taking from the depots of the first mentioned systems, travelers and their baggage.

In this equation we have three facts, each of which supplements the other, and if such a system could be conceived as having been constructed at one and the same time with reference to the relations existing between them, we could there have exhibited the ideal transportation system, calculated to serve the convenience and economy of the railroad companies and the public in the very highest degree. Possibly this ideal system may not be hoped for, but a modification of the attitude which has been heretofore exhibited by the management of nearly all the great steam railroad corporations toward street and interurban railways, may do a great deal to procure for all concerned, the benefits outlined."

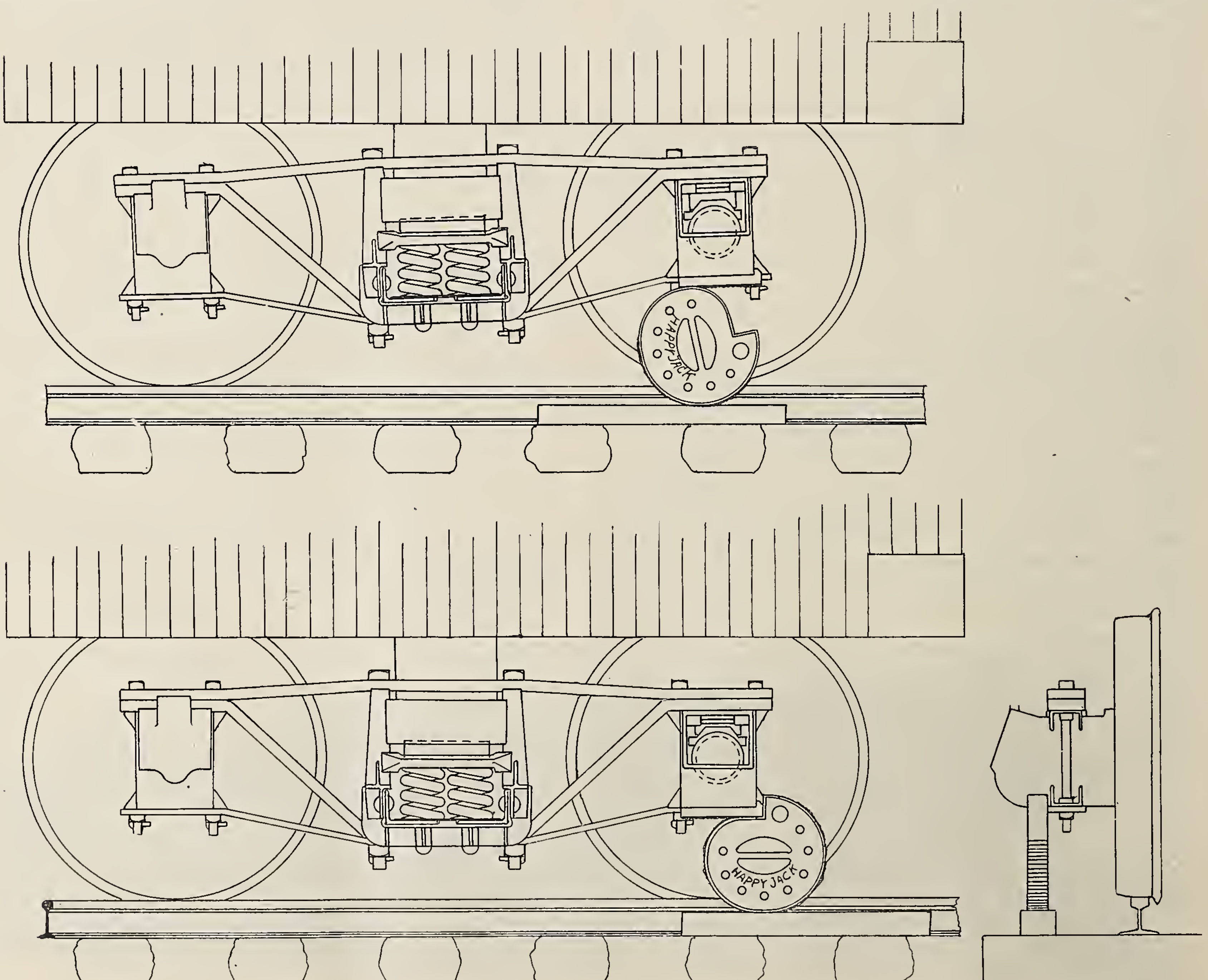
A consolidation of the different associations having connection heretofore with the original organization was effected at this meeting, with the title of American Street and Interurban Railway Association, which is officered as follows: President, W. Caryl Ely, Buffalo, N. Y.; first vice-president, John F. Beggs, Milwaukee, Wis.; second vice-president, Calvin G. Goodrich, Minneapolis, Minn.; third vice-president, James F. Shaw, Boston, Mass. The above officers will, in conjunction with the presidents of individual associations, form the executive committee.

The American Street Railway Manufacturers' Association, numbering 254 manufacturers, elected on this occasion the following executive committee, with E. H. Baker, of the Galena Oil Co., chairman pro tem, and Geo. Keegan, secretary: J. R. Ellicott, Westinghouse Traction Brake Co.; J. A. Brill, J. G. Brill Co.; Chas. Knickerbocker, Griffin Wheel Co.; F. S. Kenfield, Kenfield Pub. Co.; Geo. J. Kobusch, St. Louis Car Co.; Chas. C. Peirce, General Electric Co.; Howard F. Martin, Pennsylvania Steel Co.; Jas. H. McGraw, McGraw Pub. Co.; John W. Nute, St. Louis Car Wheel Co.; Frank C. Randall, Allis-Chalmers Co.; Newcomb Carlton, Westinghouse Electric and Mfg. Co.; Wm. Wharton, Jr., William Wharton, Jr., & Co.; E. M. Williams, Sherwin-Williams Co.

A New Car Jack

A DEVICE for jacking up a car or tender truck box, and one that has the merit of originality in its make-up, is the "Happy Jack" shown in our illustration, which represents the first successful attempt to raise the load from a hot journal by means of the engine coupled to the train. Many schemes in which leverage alone was involved, have been devised to do away with the screw for this purpose and all have failed in test under heavy equipment, but the principle on which this jack is designed (an ellipse) is one that admits of no failure, as no end of tests have demonstrated, since it only needs to be placed in position and the locomotive does the rest.

This jack is a malleable casting, light and easily carried by means of the handle cast in the center of its side, and is strongly ribbed to stand up under 50-ton equipment. Its periphery is elliptic in form, and serrated, having a flat spot three inches long on one side, on which is placed a gib, which bears against the under side of the journal box. The jack rests on a block 2¾ inches thick, which leaves correct space under the box for the jack, as shown in position in the lower part of



A New Car Jack.

the illustration, which represents the jack in position to raise the box and remove the brass.

In operation, the train is cut in two at the car having the hot box and the engine backs the car, which movement rolls the box and jack into the position shown in the upper view, by which the box is raised three inches above its normal position and the journal, which allows the brass to be removed without waste of energy on the part of the train man. Stopping the car in the right position on the jack is accomplished independent of the engineer, by opening the air train pipe cock on the car being jacked up, setting the brake instantly, and with practice, at the exact point required.

There are few train men who have not wrestled with the hot box problem and who are not perfectly familiar with the difficulties attending the removal of a brass from one of the 100,000 pound cars by means of a twelve-inch screw jack, where no amount of leverage is at times capable of raising the load. The new jack is the invention of G. H. Gilman, Supt. of Car Dept., Northern Pacific Ry., St. Paul, whose name is coupled with an emergency knuckle, car doors and many other railway devices, and by whose courtesy we illustrate the jack that jacks.

New Compound Express Locomotive, Great Northern Railway, England

THE accompanying illustration shows the new four cylinder compound express locomotive recently built for the Great Northern Railway Co. by the Vulcan Foundry Co., Ltd., of Newton-le-Willows, Lancashire. The high pressure cylinders are placed outside and have piston valves on top actuated by Walchaert gear. The high and low pressure reversing gears are independent. The coupled axles are placed further apart than in the previous Atlantic engines on the G. N. R., and as a consequence the firebox has not been adopted, but the firebox shell is raised and has also a larger diameter than the boiler barrel. The leading dimensions are: h. p. cylinders, 14 in. by 20 in.; l. p. cylinders, 23 in. by 26 in.; diameter of driving wheels, 6 ft. 8 in., and of bogie and trailing wheels, 3 ft. 2 in.; total wheel base, 28 ft. 3 in.; boiler barrel, 11 ft. 11 in. long by 5 ft. 1⅝ in. diam.; center from rails, 8 ft. 10 in.; heating surface, firebox, 170 sq. ft.; tubes (serve) 2,344 sq. ft.; total, 2,514 sq. ft.; grate area, 31 sq. ft.: working pressure, 200 lbs per sq. in.; weight of engine in working order, 71 tons, distribution as follows: on bogie wheels, 20¼ tons, on each pair of driving wheels, 18½ tons, and on trailing wheels, 13¾ tons. The tender is standard.

Steel Passenger Cars

A STEEL passenger car was recently placed in service on the Great Northern, Piccadilly & Brompton Railway of England, the body of which is entirely of steel, except the flooring. The seating capacity is for fifty-four people. Steel passenger equipment has been in use in this country for some time now, and long enough to demonstrate its superiority over wooden construction. The New York Subway has given a good trying out to such cars, as has also the Illinois Central, while the Erie road had some postal cars in use the past summer which proved highly satisfactory, and the Santa Fe has a simliar equipment, and now the Pennsylvania road has under construction some steel coaches and baggage cars at Altoona. From the interest evinced by railway officials in this type of passenger car a long time will not elapse before they will be standard in the make-up of our through passenger trains.

The Lake Shore Switcher in Service

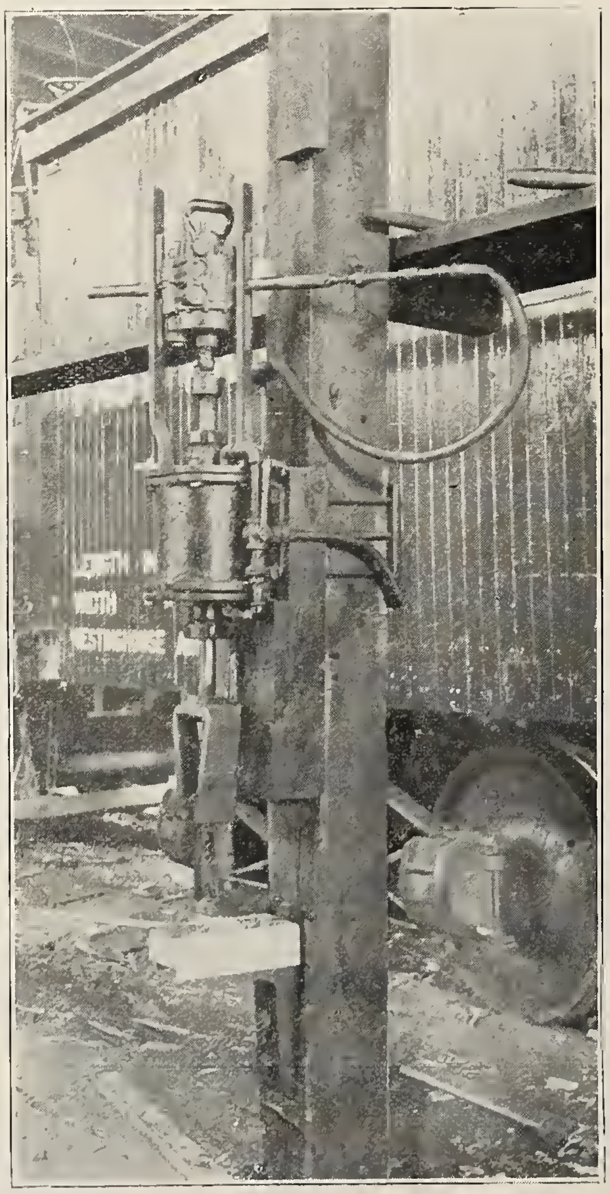
IN our August issue we gave a description and illustration of a ten-wheel switch engine built for the Lake Shore & Michigan Southern Railway Company by the American Locomotive Company. This

New Compound Express Locomotive, Great Northern Ry., England.

Lake Shore Switches in Service.

engine is so large that the clearance did not allow its headlight to be placed in the usual place in front of the stack but had to be placed on brackets where the number plate usually is on the front end. The total weight in working order of the engine is 270,000 pounds.

The accompanying illustration will give an idea of its actual size in comparison to a group of 45 men. The running board is placed higher than the floor of the cab, yet the boiler is so large that the top of it is higher than an average man's shoulder when on the board. The total length of the board is such that 14 men can stand on it with ease.



Hollow Chisel Mortiser.

Hollow Chisel Mortiser

SOMEWHAT unique in construction is the hollow chisel mortiser illustrated herewith. A machine for doing this class of work usually requires a lot of space and power, but this simple device can be bolted against any post or wall where it will do light work with good results.

The machine consists of an ordinary air drill and an old brake cylinder. The cylinder has a piston with a hollow piston rod extending through both heads. The drill has an extension rod passing through the hollow piston rod to the inside of the yoke at the bottom of the rod. The yoke at the bottom of the rod is for fastening the hollow chisel which is forced down into the wood as air is admitted on the upper side of the piston and the drill bores the hole on the inside. The handles of the drill are held in slots to allow the drill to go up and down with the chisel.

This simple device will mortise an inch hole easily and has been found very convenient in localities where compressed air was available, but power not convenient.

We are indebted to Mr. R. S. Miller, G. F. at Stoney Island of the N. Y., C. & St. L. R. R. for the above illustration.

Personals

Mr. E. Lewis has resigned as master car builder of the Southern Indiana, at Bedford, Ind.

Mr. W. G. Rose has been appointed general foreman of the Wabash at St. Louis, Mo., succeeding Mr. H. K. Mudd, resigned.

Mr. A. McCormick has been appointed master mechanic of the Valley and Arkansas division of the Missouri Pacific at Little Rock, Ark.

Mr. C. L. Bundy, general car foreman of the Colorado & Southern, has been appointed general foreman of shops of the Delaware and Lackawanna & Western at Scranton, Pa.

Mr. John Cullinan has been appointed master mechanic of the Central Indiana, with office at Muncie, Ind., succeeding Mr. S. W. Crawford.

Mr. John G. Smith has been appointed master mechanic of the Coahuila & Pacific division of the Mexican Central, with office at Saltillo, Mex.

Mr. John Culliman has been appointed master mechanic of the Central Indiana, with offices at Muncie, Ind., succeeding Mr. S. W. Crawford.

Mr. John G. Smith has been appointed master mechanic of the Coahulla & Pacific division of the Mexican Central, with offices at Saltillo, Mex.

Mr. G. W. Taylor has been appointed master mechanic of the Oklahoma division of the Atchison, Topeka & Santa Fe at Arkansas City, Kan., in place of Mr. A. Dinan.

Mr. H. K. Mudd, formerly general foreman of the Wabash at St. Louis, Mo., has been appointed division master mechanic of the St. Louis, Iron Mountain & Southern at Little Rock, Ark.

Mr. James Ogilvie, formerly superintendent of motive power of the Canada Atlantic, has been appointed master mechanic of the Ottawa division of the Grand Trunk with headquarters at Ottawa, Ont., taking effect Oct. 1.

Mr. G. W. Taylor has been appointed master mechanic of the Oklahoma division of the Atchison, Topeka & Santa Fe at Arkansas City, Kan., in place of Mr. A. Dinan.

Mr. W. G. Edmondson has been appointed engineer of tests of the Philadelphia & Reading, with headquarters at Reading, Pa. Mr. John Roche has been appointed foreman of the blacksmith department at Reading. Mr. Wm. M. Smith has been appointed foreman of roundhouse at Cresona, Pa.

Mr. J. H. Everhart has been appointed road foreman of engines of the Cincinnati & St. Louis, at Cincinnati, O., to succeed Mr. W. H. Holbrook, who has been appointed motive power inspector. Mr. J. F. Daly has been appointed assistant road foreman of engines at Cincinnati, to succeed Mr. Everhart.

Mr. C. Paskeron has been appointed general foreman of the eastern division of the El Paso Southwestern System at Alamogordo, N. M., in place of Mr. T. Fielden, resigned; effective on October 2.

Mr. S. M. Dolan, formerly division master mechanic of the Missouri Pacific, at Baring Cross, Ark., has been transferred to Sedalia, Mo., in a similar capacity, to succeed Mr. A. S. Grant, transferred. Mr. B. Stevens has been appointed division master mechanic to succeed Mr. Dolan at the Baring Cross shops.

Mr. D. J. Timlin has resigned as master mechanic of the Rio Grande, Sierre Madre & Pacific and the office has been abolished. The jurisdiction of Mr. H. M. Levinson, superintendent, with office at El Paso, Tex., has been extended over the mechanical department.

Dissolved Acetylene Gas Under Pressure

THE use of acetylene gas for illuminating purposes in the United States began about 1893, although the gas and its properties were well known to scientists and chemists as early as 1836, when it was discovered by Edmund Davy, of England. The first system to come into general use consisted of a small generator and one or more burners, so connected that the gas passed at once from the generator to the burner or burners. The bicycle lamp is a good illustration of this type. Other plants for house and general lighting followed, most of which consisted of a generator, from which the gas passed to a small holder or reservoir, which received it as fast as generated, and was so arranged as to cut off the water supply when sufficient gas had been generated; its predetermined weight also giving a constant pressure at the burners. This form was known as the water-feed type, and although it had some merit it has been almost entirely superseded by the carbide feed type, in which the carbide in lump form is plunged into the water, the gas being generated near the bottom of the vessel and rising through a large volume of water, cleansing the gas and removing the majority of its impurities. Eminent scientists of the present day pronounce this as the only correct form.

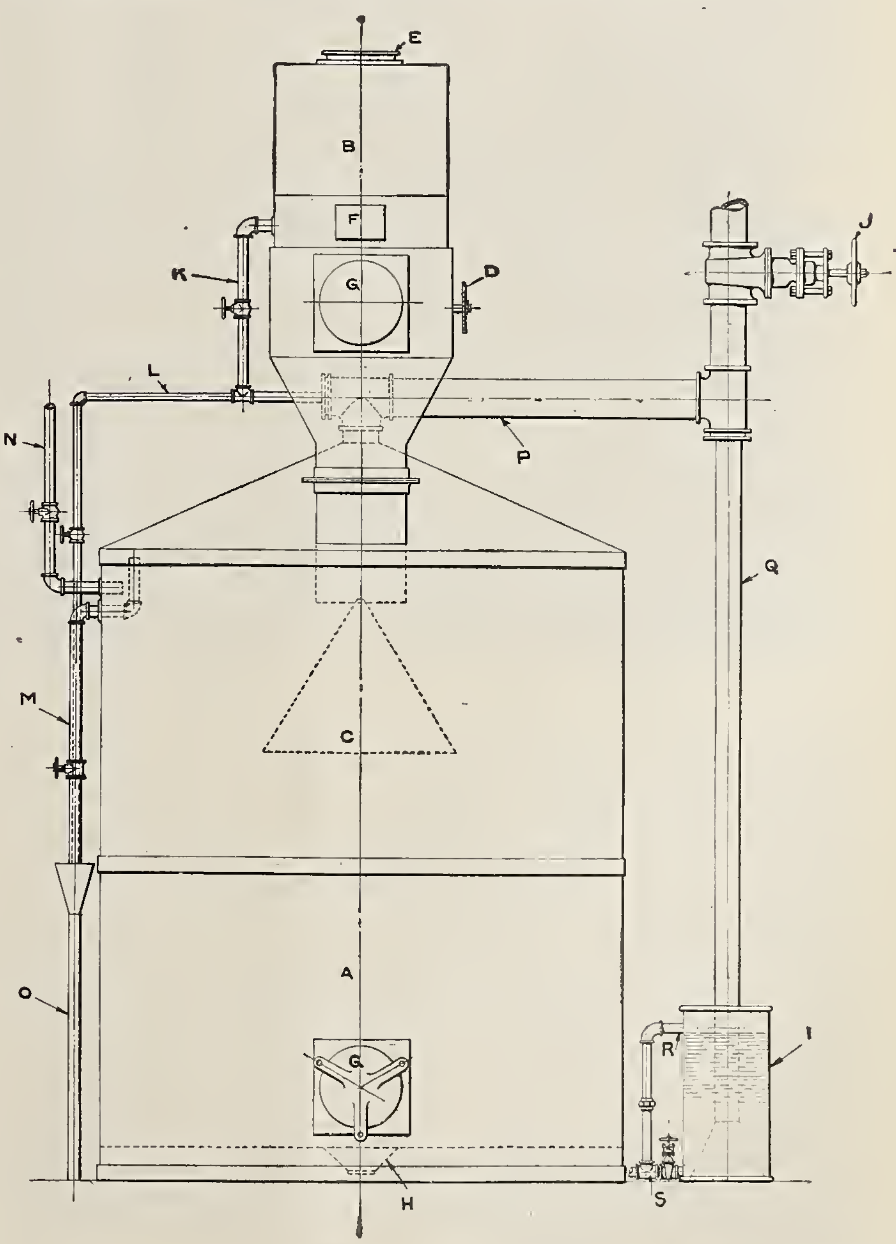


FIG. 1—NON-AUTOMATIC ACETYLENE GENERATOR FOR COMPRESSING PLANT.

In 1899 great things were expected from liquified acetylene. This was obtained by compressing the gas to 900 pounds per square inch at 32 degrees Fahrenheit. In this form a great volume could be compressed into a very small space, but after being exploited in the United States of America, France and Germany, and tested in England for the British Home Office, it was found to be too dangerous to be handled commercially, or even scientifically. Several serious accidents occurred during the brief period of its use, and in 1900 it was prohibited by law in all civilized countries.

Acetylene is still being compressed into hollow receptacles at a pressure of about 160 pounds per square inch (at this pressure it does not liquify) and used for commercial purposes, but all scientists prescribe two atmospheres, or approximately 30 pounds per square inch as the limit to which acetylene can be compressed in hollow receptacles and handled with safety. Recent accidents in connection with the last mentioned system bear out the scientists' statements.

The reader or student must not confuse the system of "Dissolved Acetylene Gas Under Pressure" with the above mentioned forms of compressed acetylene.

Dissolved acetylene gas under pressure is produced and prepared for commercial purposes in the most perfect and scientific form yet devised. The gas is generated in large generators, which insures cool and well-washed gas. It is stored in a large holder over water, which further reduces its temperature; it then passes through driers, and is thus in a fit state for the purifier to act upon it. During the whole of the above operation the gas is only under a pressure of about 2 ounces per square inch. The gas is then passed on to a compressor, which compresses it at the nominal pressure of 150 pounds per square inch into specially prepared receptacles. It is in these specially prepared receptacles that lies the whole value of the system, as they admit of ten times the volume of acetylene being stored in a given sized receptacle (at the same pressure) over any other system known, and at once placing in the hands of the public an unequalled form of illumination, absolutely safe, portable and of convenient sizes for varied and numerous purposes.

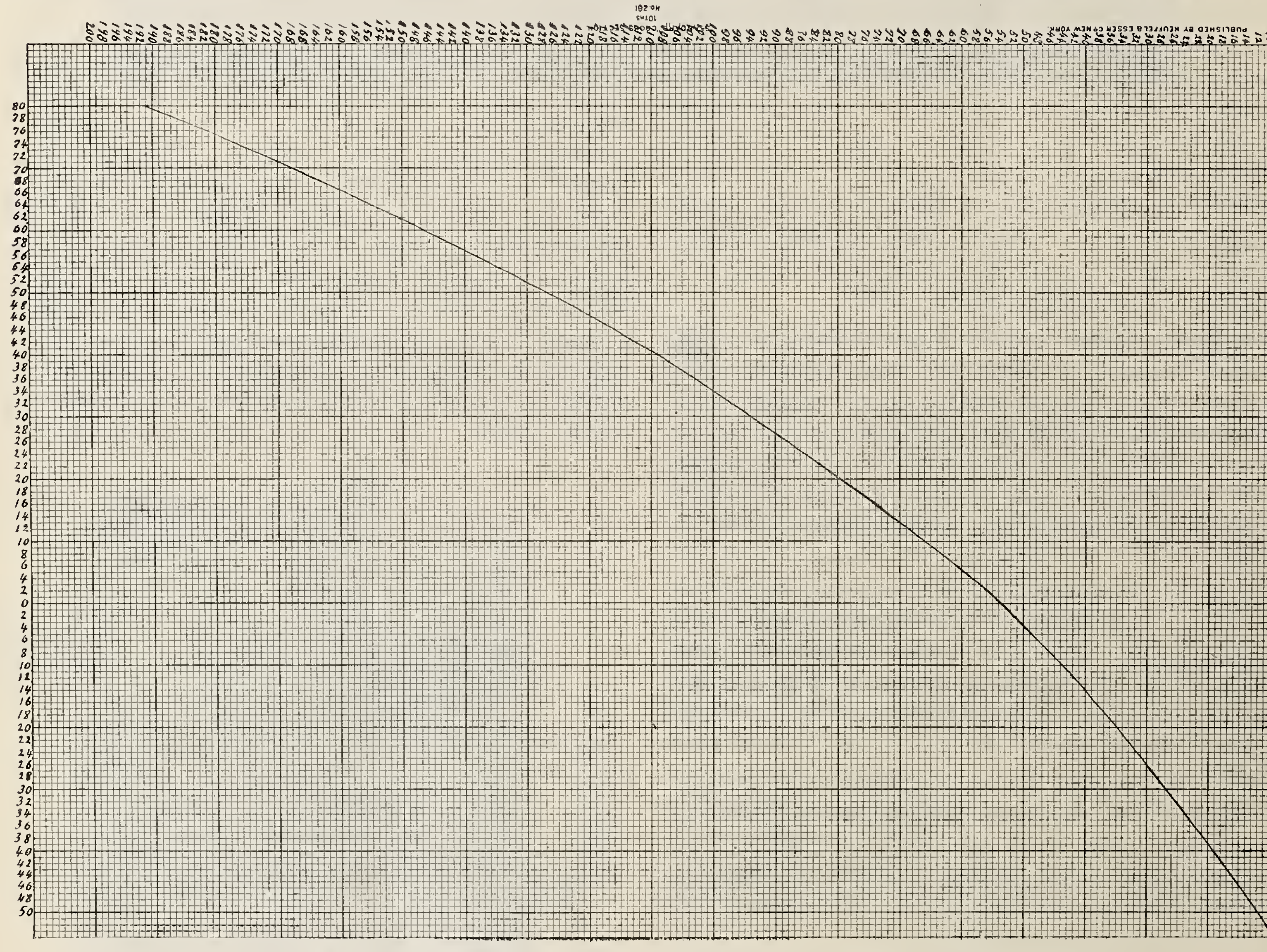


Fig. 2—Chart Showing Variation of Pressure at Different Temperatures.

The preparation of the receptacle will be dealt with fully in its order in this article.

The subject will be treated of under six heads, viz.:

(1) Manufacture of Acetylene.
(2) Preparation of Receptacle.
(3) Compression and Storage.

(4) Its Use in Lighting.
(5) Combustion of Acetylene.
(6) Amount of Available Acetylene at Varying Temperatures and Pressures.

Manufacture of Acetylene.—Acetylene is produced by the decomposition of water and calcium when the two are brought into intimate contact. It is a hydrocarbon whose chemical formula is C_2H_2, or two parts of carbon joined to two parts of hydrogen. It has a pungent odor, similar to that of garlic. It is a fixed gas, and is invisible at ordinary temperatures. It has a greater density than coal gas, and a lesser volume, and will leak or pass through a smaller aperture than in the case of coal gas used for illuminating purposes. No case of asphyxiation from acetylene has yet been reported.

Calcium carbide, from which acetylene is generated, is formed from a mixture of powdered coke and lime, about 40 per cent. of the former and 60 per cent. of the latter. It is subjected to the intense heat of an electric furnace and brought to a liquid state; or, in other words, the carbon of the coke is fused into the lime. It is then allowed to solidify and chill, and is then crushed or broken into commercial sizes suitable for the various generating apparatus of the market. It is transported in iron drums or cans that are practically air and water-tight. It is inexplosive, and can be handled with impunity, provided it is kept from contact with water, but such is its affinity for water that it must be protected even from the moisture in the atmosphere to prevent its decomposition and loss of gas.

Its chemical formula is CaC_2, being one part of calcium joined with two parts of carbon. When water comes in contact with fresh carbide both the carbide and the water are decomposed and two new compounds are formed, one being slacked lime and the other acetylene. An additional amount of water above that required for the evolution of the gas will make a solution of water and lime, similar in appearance and substance to common whitewash, which can be used for the making of mortar, the lime-washing of cellars, basements or sheds, and for all purposes where whitewash would be used. It is an excellent fertilizer and blight destroyer, and when taken from a modern and up-to-date generator does not give off an offensive odor. Considerable heat is produced by the decomposition of water and carbide, so that carbide must be stored where it cannot come in contact with water, or it will heat in its receptacle to a dangerous temperature. This is very important, and the fire insurance regulations concerning the storage of carbide are strict, and should be lived up to.

Generating Apparatus.—The apparatus used by the Commercial Acetylene Company in connection with their Dissolved System of Acetylene, is shown in Fig. 1. It consists of a generator in which the carbide, broken to the proper size, one-half by two inches, is filled into a hopper (the upper portion of the generator) and mechanically dropped at suitable intervals into the water (in the lower portion of the generator). As fast as the gas is generated it rises through the water and flows through a pipe line to a large gasholder (gasometer) located a convenient distance from the generating building. Any number of generators may be used on the multiple unit system. This affords facilities for cleaning whilst some of the genrators are still in use, and thus insuring continuous generation if necessary. From the large gasholder, above mentioned, the gas returns to the generating building, passing through a meter which records the volume, and into a cushionholder. This cushionholder is important, as without it the meter will not record accurately. From the cushionholder the gas passes through a number of small cylinders, filled loosely with coarse pieces of calcium carbide, and known as "the driers," into the purifier. The driers are so constructed as to admit of the quick and easy removal of slack lime, the gas entering at the bottom and leaving at the top of each cylinder. Thus the carbide at the bottom of the cylinder is first attacked by the moisture carried with the gas, and the cleaning out hand-hole is at the bottom of the drier. Any water vapor contained in the gas is usu-

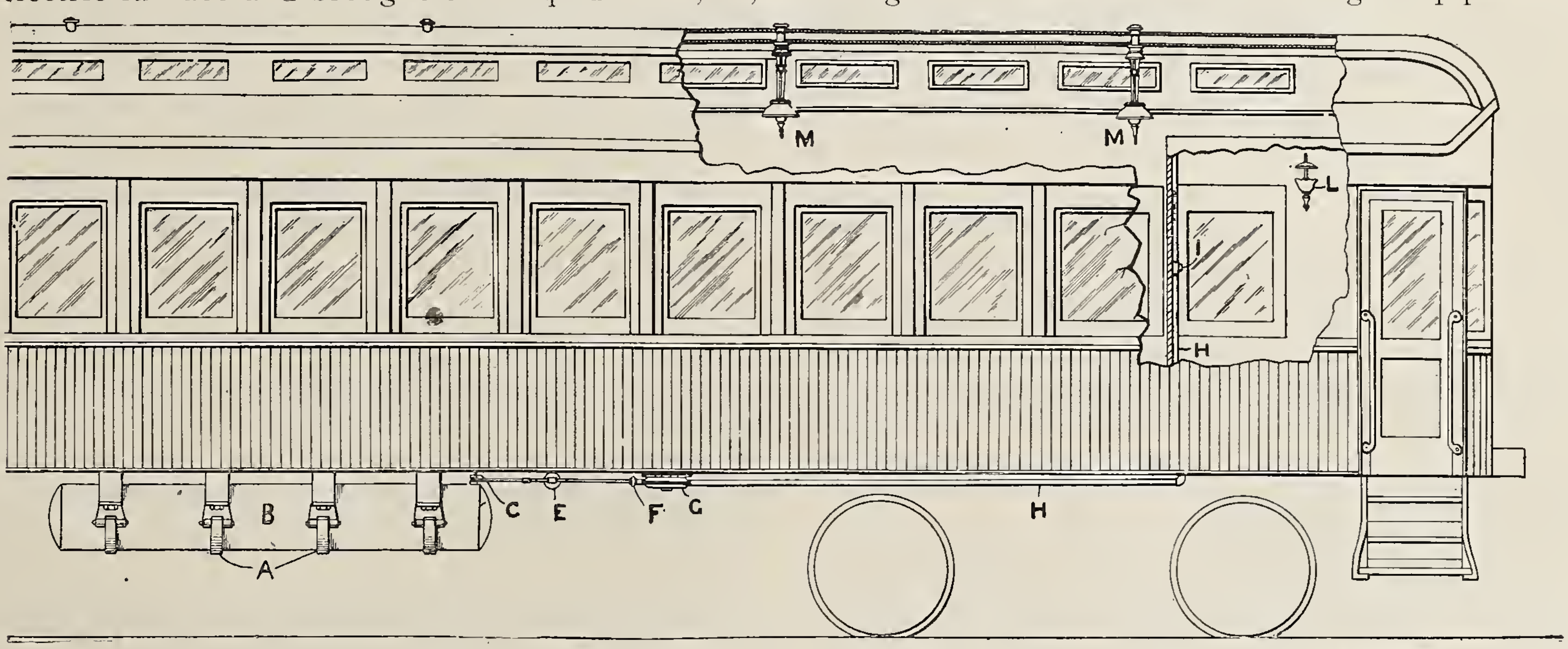


Fig. 3—Railroad Car Showing Method of Installing Cylinder Piping and Fixtures.

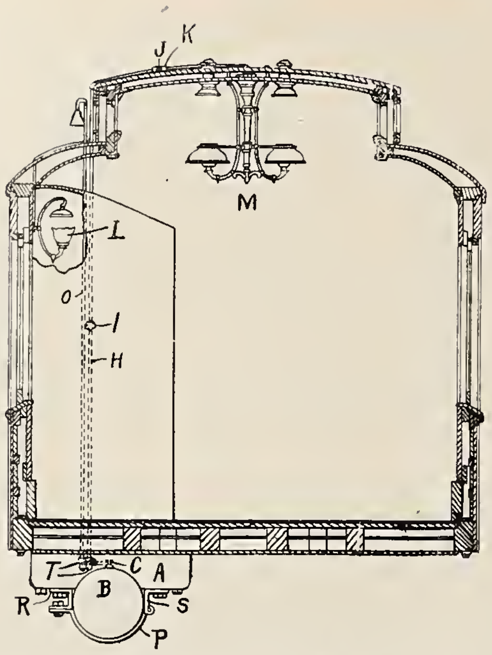


Fig. 4—Cross Section of Car Shown in Fig. 3.

ally disposed of in the first drier, thus leaving the balance practically intact, and seldom requiring attention. The gas so treated reaches the purifier absolutely dry, and in this state all traces of sulphur and phosphorous compounds are easily removed. We now have an absolutely dry and purified gas ready to enter the compressor. Before dealing with the compressing it is necessary to describe the receptacle in which we are about to dissolve the gas under pressure. These are known as the storage reservoir, and are part of the generating plant, and usually consist of five cylinders 20¼ inches by 124 inches, laid horizontally side by side and connected up, practically forming one receptacle. The description of the cylinders in this storage reservoir will suffice for and can be applied to all cylinders used in the system, as the only variation is the question of size.

Preparation of Receptacle (known hereafter as the Cylinder.)—The cylinder is made from the highest quantity of sheet steel, having a tensile strength of 65,000 pounds per square inch. Finished, it is guaranteed to stand a pressure of 1,200 pounds per square inch. Before the head is finally brazed in the cylinder is filled with perfectly fitting discs of asbestos, briquetted or held in shape with silicate of soda (liquid glass). These discs have a 20 per cent solidity, or a porosity of 80 per cent, and are put into the cylinder under slight pressure. The head is then brazed in. We now have a cylinder filled with a practically indestructible mass. Suitable stud valves are then put in, and it is connected to an air pump and a vacuum created. When a vacuum from 20 to 25 inches is reached the stud valves are closed, and the end of a pipe is attached to the stud valve with its other end immersed in a volume of acetone, equal to 43 per cent of the cylinder's volume. The stud valve is then opened and the acetone drawn in by the vacuum previously created. No air is allowed to get into the cylinder during the operation, the stud valve being closed before the last drop of acetone is drawn in. The acetone is absorbed by the asbestos, and is evenly distributed throughout the entire mass. The acetone tends to harden the silicate of soda used in the briquetting of the asbestos, thus assisting in the discs retaining their correct form. Acetone is a liquid which has the property of dissolving many times its own volume of acetylene, and of giving it off when the pressure is released. Acetone is a product of the destructive distillation of wood, and is similar to wood alcohol. It is also made from acetate of lime. The acetone so completely saturates the asbestos that all the interstices or spaces between the fine fibers are filled up, and the acetone is, as it were, expanded, thus offering the greatest surface possible to the gas when it is pumped in. The cylinder is next charged with acetylene to about two atmospheres, or 30 pounds. The stud valve is then closed and the cylinder allowed to stand until the acetone is completely saturated with the gas. When this saturation is complete the stud valve is opened and the gas allowed to blow off, only retaining the amount of acetylene that the acetone will dissolve at atmospheric pressure. The cylinder is now ready to be charged for service, and will be further dealt with under the heading of Compression and Storage.

Compression and Storage.—The compressor can be operated by any power that is available, but where electric power is used the motor should not be placed in the same room as the compressor. A three-stage compressor is found most suitable for the compression of acetylene. The two cylinders that take the gas at the first and second stages are placed side by side, and have their piston rods connected to the same crosshead, and make their stroke at the same time. The first-stage cylinder is double-acting; that is, compresses the gas in both the forward and backward movements. It takes the gas from the gasholder at a pressure of about 2 ounces per square inch, and compresses it to about 35 pounds per square inch, and passing it through the first intercooler, which reduces the temperature of compression by a constant stream of cold water, passes it on to the second-stage cylinder, which is single-acting, compressing the gas only on the forward stroke. This raises the pressure from 35 to 85 pounds. It then passes into the second intercooler, where the temperature is again reduced, and on to the third-stage cylinder, which is attached tandem to the end of the second-stage cylinder. Its piston is operated by an extended piston rod from the piston of the second-stage cylinder. This third-stage cylinder taking the gas at about 85 pounds per square inch raises the pressure up to the maximum prescribed for the high-pressure storage reservoir, which is 150 pounds per square inch. To facilitate rapid charging, the storage reservoir at the compressing plant has two inlets for the gas, one at each end, so that the acetone is dissolving gas from supply points at the same time, and the set of five cylinders forming the reservoir are connected to each other by one main pipe line and a branch pipe line to each end of each cylinder, so that there are ten openings to discharge the gas into the acetone. This also applies to the discharge from the reservoir to the pipe line, where the cylinder or cylinders are to be charged, and insures such a low rate of discharge from each opening that the gas passes away without carrying any appreciable quantity of acetone with it. As the acetone is the dissolvent of the gas, very little will pass away, and in case it does, it is taken up by the asbestos in the cylinder or cylinders being charged, thus keeping the cylinders in service up to the standard, and leaving only the storage reservoir to be replenished. Acetone has a greater capacity for dissolving acetylene at a low temperature (see chart Fig. 3). For that reason, acetone which is charged at a pressure of 150 pounds at a low temperature will give off gas when the temperature rises, and the pressure in the cylinder will increase. Conversely, when the temperature falls the pressure will also fall, as the acetone will re-dissolve the acetylene. Acetylene thus stored in a porous substance, like asbestos, and held in solution by acetone, cannot explode whilst in the cylinder. One of its properties is that of forming carbon or lampblack when subjected to great heat, with no supply of air to support combustion; and tests have shown where a cylinder was heated to a dull red on the outside its contents carbonized but did not explode.

Experiments made with an electric arc formed inside a cylinder filled with asbestos and acetone, and charged at 240 pounds pressure with acetylene, showed that the interstices of the asbestos immediately surrounding the intensely hot arc were solid with carbon, and the rest of the cylinder had its charge of acetone and acetylene intact.

Its Use in Lighting—Installation on Railroad Cars. Cars using dissolved acetylene gas are piped much the same as in any other form of gaslight, great care being taken to use the best of material and the best workmanship. Figs. 3, 4 and 5 show a cylinder attached to the under frame of a car in a convenient position, and so as not to interfere with the air brake or steam-heat piping. Attached by special steel pipe and fittings to the stud valve in the top and at the end of the cylinder is a pressure gauge, a charging valve, and a reducing valve or regulator. The pressure gauge at all times indicates the amount of gas in the cylinder. The charging valve is for the convenience of recharging the cylinder without removing it from the car. The regulator controls and maintains an even pressure at the burners, no matter what the pressure is in the cylinder. Between 150 pounds and zero in the cylinder it will only show a variation of three-tenths of an inch water column. It is also provided with a safety relief device, so that in the very remote event of anything going wrong it will relieve itself when a pressure of 5 pounds per square inch on the low pressure is reached. From the regulator is the service pipe, leading to and rising through the toilet, where the main cock to shut off the gas inside the car is located. From the main cock the pipe leads to the burners, preferably along the roof of the car. Parallel with the service pipe is the relief pipe of the valve, terminating with a return bend outside the roof over the toilet. When the piping is completed and tested, and the lamps are hung and tested, it is only necessary to open the stud valve on the cylinder and open the main cock in the toilet and the burner cocks in the lamps and light the gas. There is no occasion to regulate the flame by the burner cock; the aforementioned regulator takes care of that. When ready to extinguish the lights, turn off the gas at each separate lamp or burner. Do not close the main cock until all the burners are closed, as this would surely lead to a waste of gas. A car thus equipped, and in suburban service, will last on an average three months without recharging. The above is a brief description of its installation and use on a railroad car, but this by no means exhausts its means of usefulness. For all places and purposes where a brilliant, steady light of long duration and portability is required, it is the ideal illuminant. It is now being extensively used on the U. S. Government vessels, also for buoy, post and stake lighting by the U. S. Lighthouse Department. Hundreds of yachts and automobiles are already equipped, and every day opens up fresh fields for its usefulness.

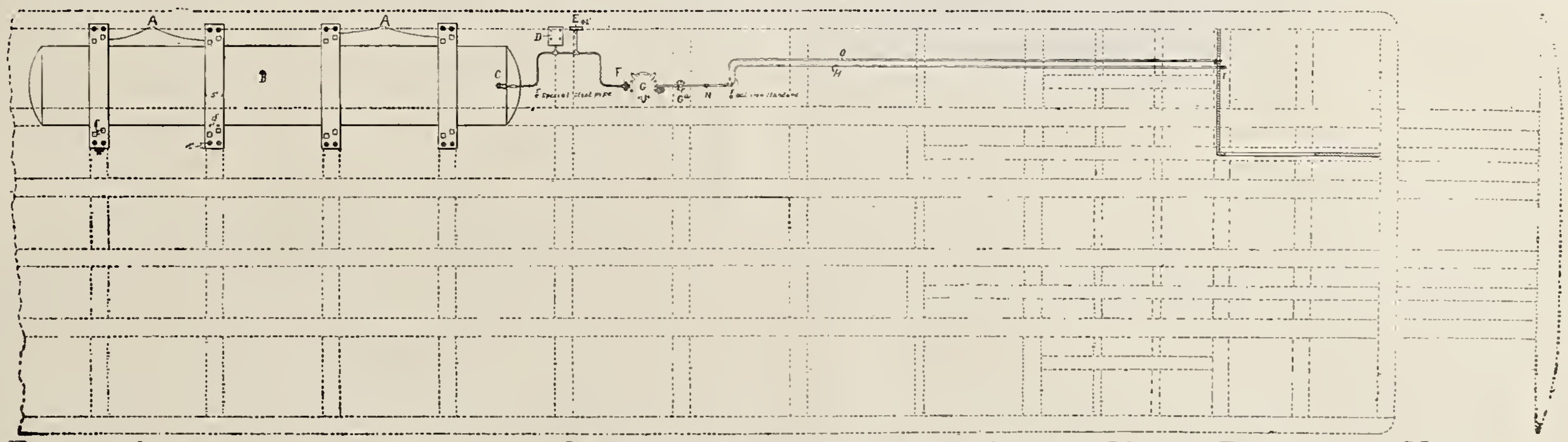


Fig. 5—Showing Installation of Cylinder, Pressure Gauge Filling Valve, Regulating Valve and Piping Under Car.

The Combustion of Acetylene.—Acetylene requires two and a half volumes of oxygen to consume it completely without any loss in efficiency or the production of carbon. Therefore, the burners are so constructed that a large amount of air will flow in with a stream of gas. The gas opening of a half-foot burner is only .0016 inch in diameter, so a small particle of foreign matter coming to the burner with the gas is likely to stop the opening; but this can readily be removed with a burner cleaner, which is a fine, steel needle held in a suitable handle. When the piping of car is completed, it should be thoroughly blown out to remove any particle of foreign substances, which would create the trouble above referred to. This particularly applies to cases where piping has been previously used for other gases. The burner tips are made of steatite, a porous material which, while it gives better service as a burner than metal, is very brittle, and should be handled with care.

As before mentioned in this article, acetylene has a very pungent odor. A very minute quantity can be detected when escaping, not being consumed, and in this way a leak can be approximately located. Then by applying a little soapsuds to the suspected joints and fittings the formation of bubbles will determine the exact position of the leak. Most important, do not look for a leak with a lighted match, taper or flame of any kind.

Amount of Available Acetylene at Varying Temperatures and Pressures.—Attention is called to the following table regarding the pressure and temperature applied to acetylene gas stored in a porous substance, and said porous substance saturated with acetone to the proportion of 43 per cent of the cubic capacity of the cylinder containing these ingredients.

In regard to the column headed "available gas for each pound pressure," these quantities apply to railroad cylinders only (of the size of 20¼ x 124 inches, outside measurement).

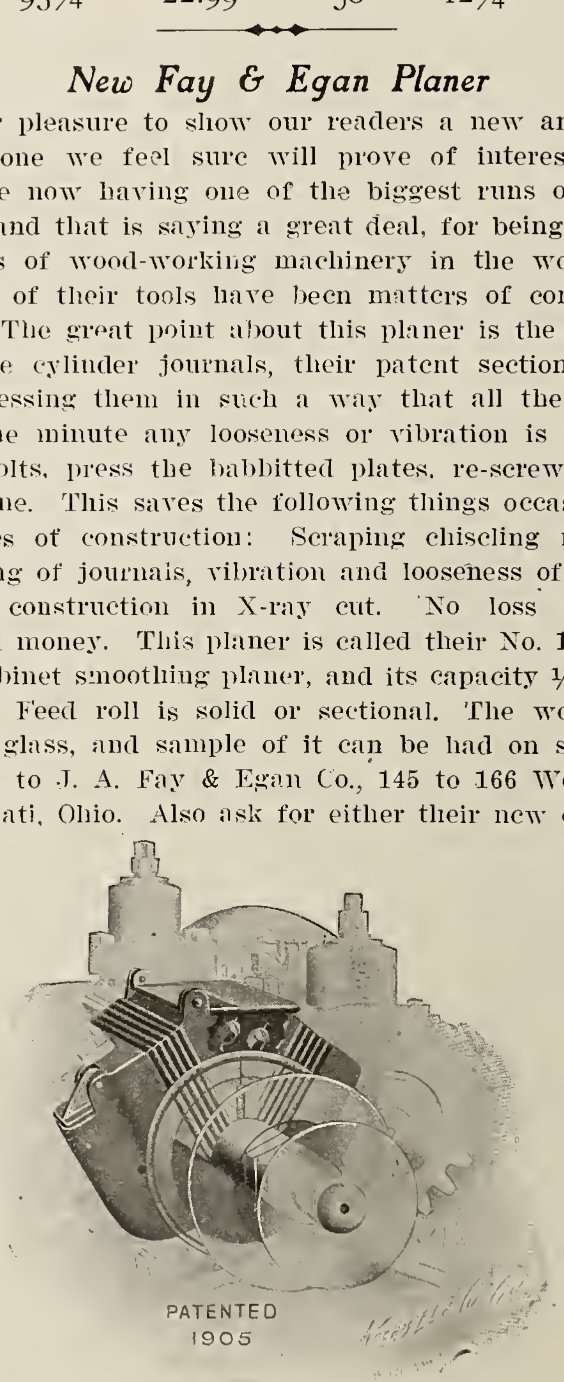
The first column, headed "temperature in degrees Fahrenheit," designates the temperature of the atmosphere. The second column, headed "pressure in pounds," designates the maximum pressure at which a cylinder should be charged at a given temperature; and, at any event, if the temperature rises above 84 degrees Fahrenheit, the cylinder should never be charged over 200 pounds settled pressure. On the other hand, if the temperature falls below 26 degrees below zero, the cylinder can always be charged at a settled pressure up to 30 pounds. The third column, headed "available gas for each pound pressure" (which applies to railroad cylinders only of size given above), gives the number of cubic feet of gas stored in the cylinder per pound pressure at the given temperature, and enables one to determine the quantity of gas stored in a cylinder at any time by multiplying the number of cubic feet of available gas per pound at the given temperature by the number of pounds pressure indicated by the pressure gauge. As for illustration: At 62 degrees Fahrenheit and 150 pounds pressure the gas available per pound is 15.15 cubic feet, or equals 15.15 cubic feet multiplied by 150, which equals 2272.50 cubic feet of gas available at the temperature of 62 degrees; but at the same temperature, if the pressure gauge registers only 50 pounds pressure, the gas available in the cylinder would be 15.15 cubic feet multiplied by 50, which equals 757.50 cubic feet of available gas at the pressure of 50 pounds and 62 degrees Fahrenheit, etc.

While the quantity of gas stored in a cylinder at 80 degrees Fahrenheit and 191 pounds pressure is exactly the same quantity as stored in a cylinder at 62 degrees Fahrenheit and 150 pounds pressure, or a cylinder at 50 degrees Fahrenheit below zero showing 12¼ pounds pressure, a great deal more gas will be gotten out of a cylinder at 80 degrees Fahrenheit than will be gotten out of one at 50 degrees below zero, because the acetone holds a much larger quantity of acetylene at 50 degrees below zero than it does at 80 degrees above zero; but gradually as the temperature rises the gas which was held by the acetone at 50 degrees below zero will be released and become available gas, according to the figures as shown in the table below:

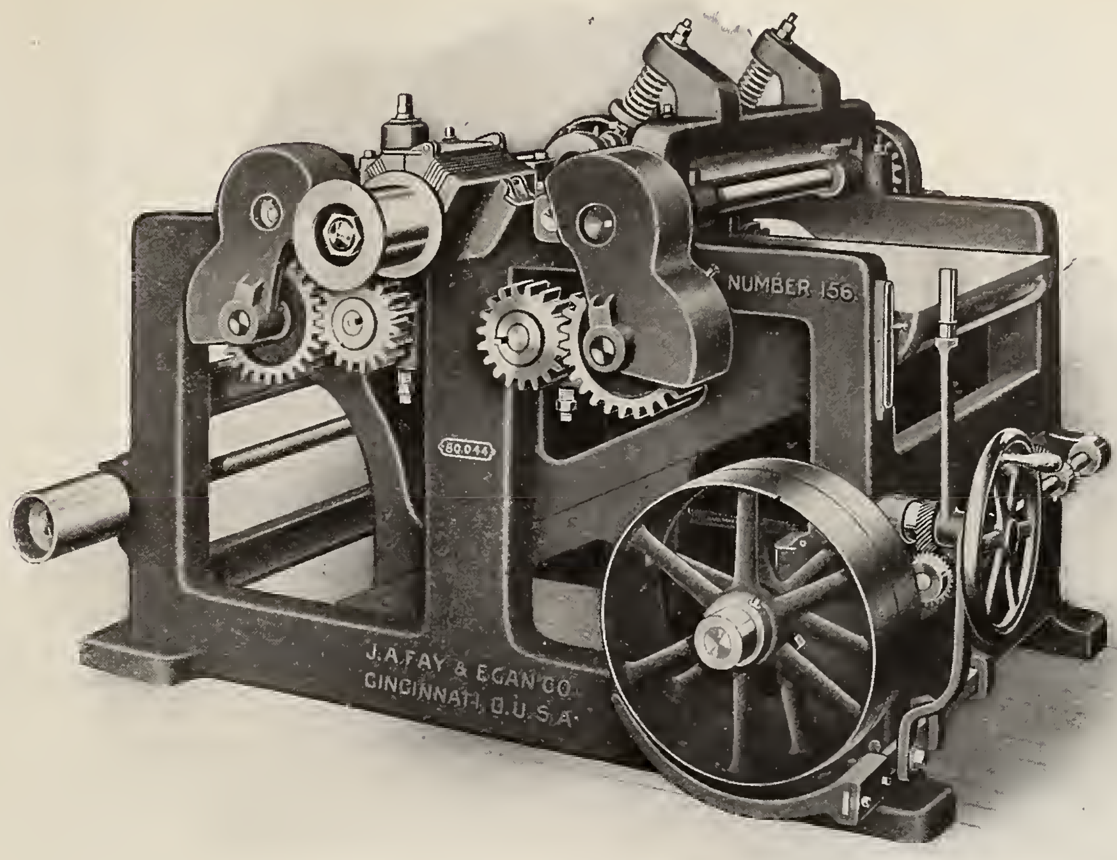
Temperature in degrees Fahr.	Pressure in pounds.	Available gas for each pound pressure.	Temperature in degrees Fahr.	Pressure in pounds.	Available gas for each pound pressure.
90	216	10.82	20	78¾	26.67
80	191	12.13	10	65½	31.05
70	168	13.66	0	53	36.76
62	150	15.15	10	42¾	43.29
60	146	15.53	20	34¾	50.25
50	126¼	17.70	30	27¼	59.17
40	108¾	20.20	40	19¾	71.91
30	93¾	22.99	50	12¼	91.74

New Fay & Egan Planer

It is our pleasure to show our readers a new and unique tool, and one we feel sure will prove of interest, as the makers are now having one of the biggest runs on it they ever had, and that is saying a great deal, for being the largest makers of wood-working machinery in the world, runs on certain of their tools have been matters of common occurrence. The great point about this planer is the construction of the cylinder journals, their patent sectional clamp bearing pressing them in such a way that all the operator need do the minute any looseness or vibration is felt is to unscrew bolts, press the babbitted plates, re-screw and the work is done. This saves the following things occasioned by other styles of construction: Scraping chiseling re-babbitting, heating of journals, vibration and looseness of cylinder. Notice its construction in X-ray cut. No loss of time, temper and money. This planer is called their No. 156 single cylinder cabinet smoothing planer, and its capacity ⅛ to 7 by 42 inches. Feed roll is solid or sectional. The work looks smooth as glass, and sample of it can be had on sending a postal card to J. A. Fay & Egan Co., 145 to 166 West Front St., Cincinnati, Ohio. Also ask for either their new catalogue



Patent Sectional Clamp Babbitted Bearing.



No. 156—Single Cylinder Smoother.

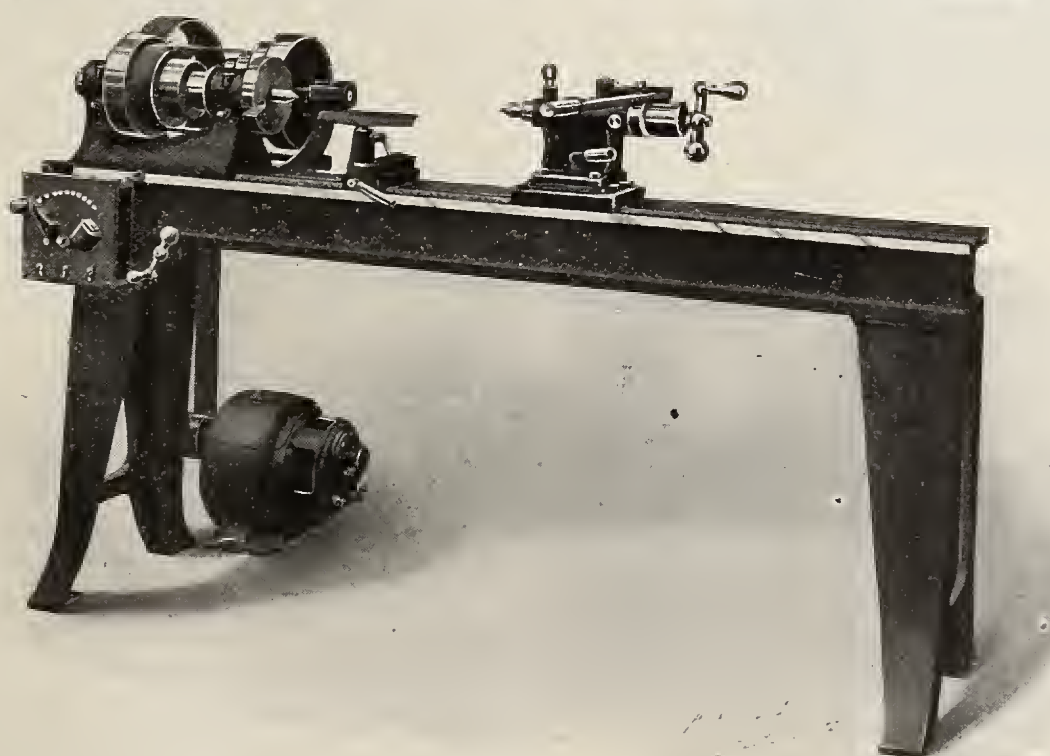
of wood-working machinery, or books on band saws, sanders, or universal wood workers. Notice their ad on another page of this paper; they are with us every month—full page at that, too.

A Motor Driven Speed Lathe

In harmony with the general trend toward the electric drive for machine tools, the J. G. Blount Co., Everett, Mass., have brought out a new motor driven speed lathe, which has a direct drive in the sense that the motor does not drive an overhead countershaft. The motor is of the constant speed type, and as shown in the half tone, is set on the floor, or if desired, on a suitable bracket, and belts to a pulley, which drives a countershaft at the rear of the lathe head. This countershaft runs in self-oiling bearings, and is mounted upon a swinging frame which is hinged to the back of the lathe, and is provided with a screw operated by a ball handle at the front, to tighten or loosen the belt which runs from the cone pulley on the countershaft to the cone pulley on the head spindle, as desired. The head of this lathe has self-oiling bronze bearings, and may be placed on the bed as shown, or reversed as is usual for speed lathes. The tail-stock is arranged with screw and lever feed. The speed variations are the same as when the lathe is driven from an overhead countershaft. As a self-contained shop unit the arrangement of the drive on this tool is one that has lots of merit.

Notes of the Month

Owing to the death of one of their principal designers, the J. A. Fay & Egan Co., of Cincinnati, desire to secure the services of a good man for designing wood working machinery.



Motor Driven High Speed Lathe.

The American Water Softener Co., of Philadelphia, report that orders for water softening and purifying plants from the Florida East Coast railway, and the Detroit, Toledo & Ironton railway, are included among the very recent list of orders.

B. Burgess of Danville, Ill., manufacturer of the Burgess rail anchor, reports that business for the past month has been a record breaker with him. An order from the Paris, Lyon & Mediterranean railway is the first consignment to Europe and the orders from railroads in this country have been unusually large.

The Sherwin-Williams Co., paint and varnish makers, Cleveland, Ohio, sent out a neat announcement titled, "Get Ready for More Business." This was to announce the opening of their new offices and warehouse at 416-422 Pioneer street, Cincinnati. The folder gives a history of the company together with views of their principal plants.

We have been advised that the Burgess rail anchor, manufactured by B. Burgess, Danville, Ill., was awarded a gold medal at the Lewis and Clark Exposition. The popularity of this anchor is shown by the numerous orders received by the manufacturers. Among the recent buyers are the Southern Pacific and Missouri Pacific railroads, as well as some foreign ones.

The Falls Hollow Staybolt Co., Cuyahoga Falls, O., have secured the services of Mr. F. C. Lippert, St. Louis, Mo., as their traveling representative for western territory. Mr. Lippert is a graduate of Cornell university and a mechanical engineer of high standing. He has made the subject of staybolt iron a careful study, and has gone into the subject extensively, therefore he is fully equipped to explicate the advantages in staying modern high pressure locomotives the proper iron.

Mr. William F. Wagner, general manager of Wm. Jessop & Sons, Limited, in the United States together with Mr. Edward L. Hand who represents them in Philadelphia; Mr.. E. W. Salisbury of Warren Salisbury and Nightingale, their agents in together with Mr. F. W. Babcock of the Standard Oil Co., Providence; Mr. E. B. Ridgley, their representative in Detroit, Caronia, Oct. 3rd, to attend the 282nd annual gathering of the Cutlers Co., at their banquet in Sheffield, on Oct. 12. On this resident of Providence, sailed on the Cunard steamer occasion Mr. Sydney Jessop Robinson, managing director of Wm. Jessop & Sons, Limited, will be installed as Master Cutler—a position of great honor and of social and commercial influence.

It is announced that the Pratt & Whitney company, New York, have purchased a plant in Dundas, Ontario, for the manufacture of their full line of small tools—taps, reamers, milling cutters, punches, dies, etc. The building is a modern structure, and the power plant is already in place. The machinery equipment is being gotten ready at Hartford and will be sent there and operations begun immediately. The plant, we are informed, will also include a department for manufacturing a full line of twist drills, an elaborate equipment of special machinery having been gotten ready for the purpose. The location of the factory is near that of the John Bertram & Sons Company, which, as has been announced, was recently purchased by the Niles-Bement-Pond Company.

The experimental locomotive of Purdue University, Schenectady No. 2, which has recently served in an important study designed to determine the value of very high steam pressures, is to be sent to the Schenectady works of the American Locomotive company early in November for the purpose of being fitted with a Cole superheater. It is expected that the engine will be returned with its new equipment early in January.

During the absence of Schenectady No. 2 from the testing plant, a New York Central Atlantic type engine is to be installed upon the plant for use under the direction of the Master Mechanics' committee on front-ends. It is the purpose of this committee to repeat upon an engine of large size the experiments made under the patronage of the American Engineer upon Schenectady No. 2, for the purpose of determining the constants in such equations as may be necessary to the logical design of all portions of the front-end mechanism. The Master Mechanics' committee having the matter in charge consists of Mr. H. H. Vaughan, superintendent of motive power, Canadian Pacific railway, chairman; Mr. F. H. Clark, general superintendent motive power and machinery, C. B. & Q. railway; Mr. A. W. Gibbs, general superintendent motive power, Pennsylvania railroad; Mr. W. F. M. Goss, Purdue university; Mr. G. M. Basford, American Locomotive company.

In its issue of October 13 The Railway Age recorded orders for 460 passenger cars, 30,620 freight cars and 333 locomotives, and inquiries for additional equipment amounting to 83 passenger cars, 17,060 freight cars and 35 locomotives. The contracts reported this week are even more surprising in many ways, and when taken in connection with the large orders expected from the New York Central, Northern Pacific and other roads show that the high records of 1901 and 1902 for freight equipment and locomotives will easily be surpassed before the close of 1905, although the volume of orders in those years was exceptional, and notwithstanding the present high prices and the difficulty in securing prompt deliveries.

The orders placed by the Pennsylvania this week for 21,500 cars, in addition to the 16,160 ordered in August, made a new record in contracts placed by a single company, and practically preempts all steel car building facilities during the entire year of 1906. It is stated that all car manufactures are crowded with orders and that the American Car & Foundry company alone have unfilled contracts aggregating over 60,000 cars, while no company can promise delivery before the middle of next year unless the order is for a few wooden cars. The greater number of the cars ordered during the current year are yet to be built and will keep the car manufacturers busy until well into the second half of next year.

From the detailed records kept by The Railway Age since 1901 of orders placed for new equipment the following totals are taken, the figures for 1905 covering the 41 weeks up to the present:

	1901.	1902.	1903.	1904.	41 Weeks 1905.
Freight cars	193,439	195,248	108,936	136,561	196,672
Passenger cars	2,879	3,459	2,310	2,213	2,297
Locomotives	4,340	4,665	3,283	2,538	4,131

It will be noted from the above table that orders for freight cars for the first 41 weeks of the current year are in excess of any previous year, while the contracts for passenger cars and locomotives, if continued at their present rate, will also exceed any previous record.

Mr. W. Woods, formerly in the shops of the Canadian Pacific at Outermont, Que., has been appointed foreman of the locomotive department at Megantic, Que., vice Mr. P. Ronaldson, transferred to the Atlantic division at Brownsville, Me.

Railroad Paint Shop

Edited by
J. H. PITARD
M. C. Painter, M. & O. R. R.

Devoted to the Interests of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

With this issue of the Railway Master Mechanic Mr. J. H. Pitard, master car painter of the Mobile and Ohio Ry., assumes the editorial responsibilities of the Railroad Paint Shop. We canot too strongly emphasize Mr. Pitard's remarks in his introductory in reference to the use of the official organ as a clearing house for the exchange of ideas between the members of the association. Our new editor is too well known to his co-workers to need any introduction and any references to his ability as a painter and a writer would be superfluous, but we would bespeak for him the active and hearty support of all his fellow members. If, during the coming year, each individual member will kindly remove the large sized "bushel" with which their "light" has been carefully covered heretofore, and let their rays of experience shine forth through the columns of the "Railroad Paint Shop," the official organ will then become of unquestioned value to every member of the association. Bruce V. Crandall.

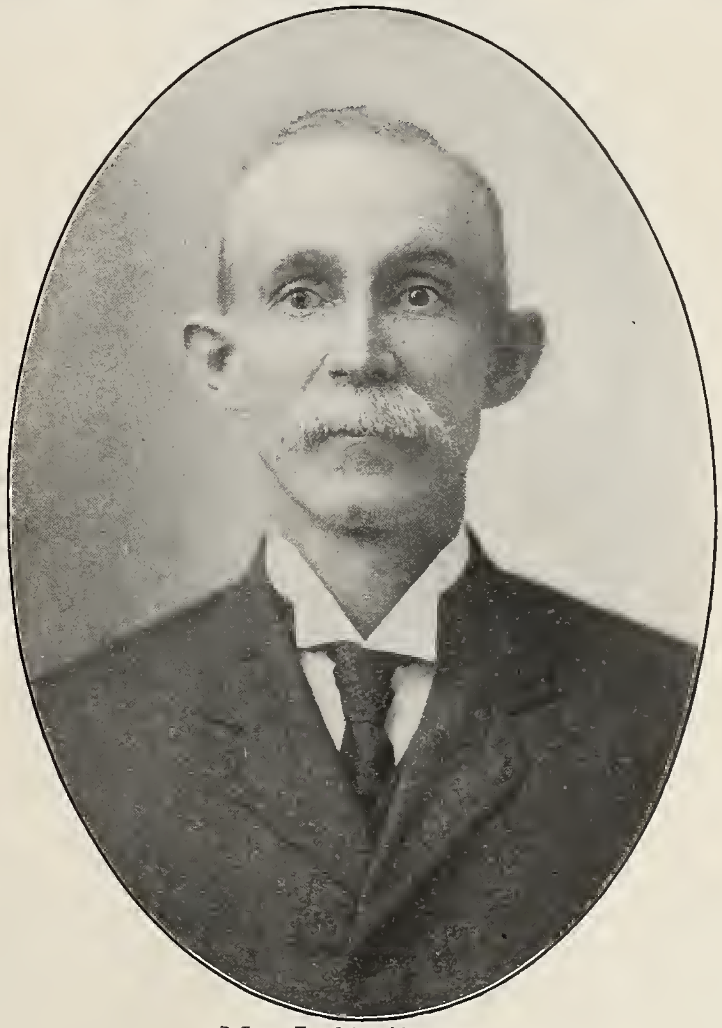
Introductory

With this issue of the Master Mechanic I make my bow as the successor of that able and fluent writer, Mr. C. E. Copp, as editor of the Railroad Paint Shop. It is not without some misgivings that I assume the responsibility of this work. It is my desire to subserve the best interests of the Master Car and Locomotive Painters' Association, to endeavor in every way possible to assist it in maintaining its present high standing. To accomplish this, its official organ should be as a magnet toward which all members should direct their efforts in its behalf. They should not neglect to use it as a medium through which to talk to each other, and through it keep up an exchange of views and experiences throughout the entire year.

There are many things of interest to the craft that does not admit of discussion at the brief sessions of our conventions, that might be discussed through the columns of the official organ. Someone has said that it "requires everybody to know everything," therefore send in your mite and thus contribute to the success of your official organ. Keep the editor informed of all changes that take place. If you have made any new discovery that you do not intend turning to your personal profit, give it to the craft before some one else discovers it, and in that way steals your thunder. It is not to be expected that every one will agree with all the views expressed by the editor, if this should prove to be the case with you, do not hesitate to reduce your views to writing and forward them to the editor. Do not spare him when your views run counter to his; remember that editors are made of a peculiar kind of clay, the more you hammer them the better they like you, the more you rub them the brighter they shine. If they never said anything to provoke controversy, their writing would be tame indeed. There is much hidden gold, so to speak, in the minds and experiences of our members, the personnel of our membership ranks very high intellectually, as proven by the fact that we include among our members some who are aldermen, mayors or ex-mayors, state senators and various other officials of trust and responsibility. I ask, has the editor not a right to expect that some of this intellectual force be given to the upbuilding of the official organ of the association? We should have at least one article (it matters not how short) each month from every member of the association. Let us pull together and make this the banner year for the official organ.

Autobiography of J. H. Pitard

I am a native of Mississippi, in which state I was born in the year 1857, and am therefore 47 years of age. On account of the death of my parents, I was forced to quit school at an early age and seek employment, but I continued my studies at odd times. My first work was in a printing office, and next in a tin shop, but as neither of these occupations were congenial, I turned my attention to painting, which business I began about the year 1874 at McComb City, Miss., the latter years of which apprenticeship was served under our associate member, Mr. Jas. A. Gohen. After quitting the McComb shop and working in various other shops, I accepted a position as foreman painter of the Selma, Rome & Dalton shop at Selma,



MR. J. H. PITARD.

Ala. From there I went to Pensacola, Fla., and engaged in general contract work, but on account of an epidemic of mosquito fever the following summer, I sought refuge in Mobile, Ala., my present home, and where I was married. Here I engaged in general contract work until offered my present position as master car painter for the Mobile & Ohio, which position I have filled continuously for the past fifteen years. I joined the Master Car Painters' Association at Milwaukee, Wis., and with few exceptions have since attended all of their conventions. I was for a short period, editor of the Car and Locomotive Painting department of the Painters Magazine of New York city.

A Visit to the Collinwood Shop L. S. & M. S. Ry.

At the close of the Cleveland convention the writer visited the Collinwood shop and there spent a most pleasant and profitable day. The genial foreman of the coach painting department, Mr. Bob Shore was absent, having gone with other members of the association to Niagara Falls on the free excursion so generously tendered the convention by the Lake Shore officials, but his able and courteous assistants, Messrs. Kiel and Dunbar, gave the writer a most cordial reception, and explained fully the workings of this up-to-date shop, a brief description of which will possibly prove interesting to the craft.

The first point of interest was the paint shop stock room which was was very ably presided over by Mr. Chas. Osborne. The arrangement of this room is such as to furnish the greatest possible convenience for dispensing paint stock and accounting for same. The stock room proper has a partition which separates the mixing room from the dispensing room. In the center of the dispensing room is a large oblong table covered with a solid piece of slate an inch thick, and smoothly surfaced, which is kept constantly oiled in order to facilitate cleaning when it becomes smeared with paint. Possibly the most novel feature of this room is the peculiar construction of the storage tanks in which is contained the oil, varnishes etc. At a casual glance these cans or tanks appear to be the ordinary flat bottom cans, but on the contrary the bottoms are funnel shaped, and to the lowest point of which is attached the faucet, this arrangement admits of the drainage of every particle of liquid from the cans, and greatly facilitates the operation of an occasional washing out of the cans with turps or benzine without either tilting or removing them from the stands. An occasional cleaning out of varnish cans is of the utmost necessity, as many of the so-called deviltries of varnish could possibly be traced to the sediment that settles in the bottom of the cans.

The check board used here for checking out tools and material is very simple, but effective. It consists of a board about three by four feet finished in its natural state and lined off perpendicularly and horizontally. At the top of the board between the lines is painted the names of the various tools and paint and varnish kits used by the workmen, and on the right and left sides of the board are painted numbers, beginning at the top of the board at No. 1 and continuing consecutively to the bottom. Between the lines running horizontally are bored small holes, one hole between each two perpendicular lines, a flat headed peg is made to fit into these holes, so that for instance when workman No. 1 draws a varnish kit, a peg is placed in the hole under the heading of that particular name in the line running parallel with his name, and when the kit is returned the peg is removed and returned to a receptacle for them at the bottom of the board. The board is in full view of the workmen in order that they may see what tools are checked against them. When a workman is sent to varish a car, a varnish kit and a can containing about two gallons of varnish is furnished him, the can is carefully weighed, and is reweighed when returned, and the amount used is charged out in pounds against the car. By this means it can readily be ascertained if the workman has "skinned" the job in order to make headway, as this shop is conducted on the piece work system, which fact renders certain regulations necessary that would not be adaptable to the day work system.

All paints, oils, etc., contained in barrels are kept in the basement of the stock room, and are lifted to the floor above by means of an elevator, and emptied into the cans by means of compressed air. Their system of accounting, although somewhat elaborate, is very comprehensive. All things considered the stock room, which I might term the right arm of a paint shop, is well equipped to meet any demands that may be made upon it.

The paint shop is constructed of brick, with steel framing for the roof, which is almost a solid sheet of glass in the shape of sky lights. In the roof are fixed ventilators which are operated by a lever near the floor. The building is heated by hot air, (but not of the human variety) which is driven in by immense fans, and is drawn back again through underground passages to the heater room and reheated. By this means a constant circulation of air is kept up. The shop will accommodate thirty-six cars. The cars are placed in thorough repair in the carpenter shop before entering the paint shop, and no trucking or other carpenter work is allowed in the paint shop. This statement will doubtless create a feeling of envy on the part of the master painter whose fate is cast in the shop, where, on account of bad management or lack of facilities, or both, the painter, carpenter, tinner, truckmen and upholsterer are all mixed up on the same job in a kind of a wrestling match of the catch as catch can fashion, in each others way and spoiling each others work, while the superior officers look on and wonder why there is not being more work turned out. No carpenter work is permitted in this shop, except that of replacing the detached parts, such as sash, curtains, etc. Possibly the greatest convenience in this shop is the scaffolding, and should Brother Sam Brown come up against it with his patent scaffold, we should prefer to leave the verdict to the craft. A description of this scaffold, unaccompanied by the blue prints, would hardly do it justice. The main supports or uprights are made of channel iron set in concrete, and extending to the height of the letter board of the cars. In the extreme top of the post is placed a grooved wheel over which passes a small cable, one end of which is fixed to the bracket which supports the scaffold planks, to the other is fixed a grooved weight of equal weight of the scaffold board. this weight travels up and down the post on the side opposite from the car, and is intended to counterbalance the weight of the scaffold. The scaffold consists of three trussed plank about twenty-five feet long, each end of which is fixed to a grooved bracket that also slides up and down the posts, this bracket has a convenient set screw with a spring attachment for stopping and securing it at any desired height. The scaffold is so evenly balanced and so nicely adjusted that one man can either raise or lower it with ease. The floor of this shop is concrete, with water drains immediately beneath the bottom edge of the car, these drains are covered with iron gratings, by this arrangement the waste water is carried off, while the floor remains level; this seems to be preferable to those floors which slope toward the center of the space between the cars for the purpose of forming a drain for the water.

The floor is swept with a long brush instead of a broom, to prevent the raising of dust, this is advisable from a sanitary point of view also, as it does not fill the air with disease germs to be absorbed by the shop inmates.

The sash room is under the same roof and is separated from the main shop by a brick partition, this is a very spacious room and easily accommodates all the car and office furniture that is brought into it. In this room is also located the brass burnishing machinery, the stencil, mirror plating and glass etching departments, also the scrubbing vats and toilet room, the glass etching, mirror, stencil room and office are on an elevated platform, the space beneath being not enclosed is utilized for various purposes, the brass room and toilet rooms are enclosed by suitable partitions. The brass burnishing room is most complete in all its appointments; there are six or eight burnishing wheels, and to each one is attached a suction pipe operated by a rotary fan for carrying off the lint and dust created by the wheels. Here are also acid and lye vats, a large lacquaring vat for dipping the brass after it has been burnished, there is no lacquaring done with the brush, it is all dipped and suspended above the lacquor vat until it has done dripping, and is then transferred to the baking room; this room is fitted with suitable racks on which is laid the brass, and then heated to the desired temperature with live steam. Some of the brass in its finished state was shown the writer, and it equaled in appearance the finest factory brass, notwithstanding, the same process is repeated as often as the cars are reshopped.

(To be Continued.)

Personal

We take pleasure in presenting in this issue, the photo and a brief sketch of Mr. F. P. Cheesman, a member of the firm of the National Paint Works, of Williamsport, Pa., who manufacture a special line of paints for metal surfaces. We had the pleasure of making Mr. Cheesman's acquaintance at the Cleveland convention, and found him to be a most excellent gentleman.

This business was founded in 1874 by William G. Elliot. In 1882 he took in as partner William H. Loomis, who had been with him since 1878 as a salesman, and this partnership continued until 1903, when Frank P. Cheesman, who had been identified with two leading houses in the paint trade for over twenty years, bought out the interest of Mr. Loomis, Norman Elliot, son of W. G. Elliot, still continuing in charge of the manufacturing department, which position he has filled for a number of years; and since the change in May, 1903, the capacity of the plant has been enlarged over 50 per cent, many improvements and new connections having been made, and a purchasing and sales offices opened in New York, as well as a sales office in Chicago.

Mr. F. P. Cheesman.

A New Color

Doubtless our friends will be pleased to learn of the advent of all new colors. Here is one:

A flashily dressed young negro woman called at a Westport home last week to inquire about a vacant position as servant there, says the Kansas City Times. When the woman of the house appeared at the door the negress said:

"Is this the place whah a kitchen lady attendant am desihed?"

"I want to hire a servant," replied the woman.

"Well," came from the negress, "I ain't wishin' it fo' mase'f. I'se inquihin' fo' ma sistah. She's complished enough to fill the place. Ill send huh 'round this afternoon. You'll know huh at onct, madam, fo' she's a stylish lady of a beeswax shade."

Among the Supply Men

Mr. J. A. Gohen.

Mr. Gohen was foreman painter of the Chicago, St. Louis & New Orleans, now part of the Illinois Central at McComb City, Miss., January 1, 1877, to March 20, 1880. He was foreman painter of the Kentucky Central at Covington, Ky., from March 20, 1882, to December 31, 1885. He was then transferred to Huntington, W. Va., on account of the C. & O. absorbing the line. On December 15, 1893, he went to the Big Four as master painter which he resigned September 30, 1905, to accept a position with the Cleanola Co., of Allegheny, Pa. Mr. Goshen joined the Master Car and Locomotive Painters' Association in Boston in 1890 and was elected president at Washington in 1891.

A rather pathetic incident of the Cleveland convention was the leave-taking of Mr. Jas. A. Gohen as an active member of the association. It was due in a very large measure to Mr. Gohen's personal efforts that the M. C. P. association has grown to its present magnitude. He has resigned his position as general foreman painter of the Big Four to become a knight of the grip, and under the rules of the association, active membership must cease when a member changes his occupation, hence his resignation. The lady visitors to the convention presented Mr. Gohen with a handsome clock in token of their gratitude for the kindly consideration that they always received at his hands when visiting the conventions. The clock is of the kind that requires only an annual winding, in this particular there is a striking dissimilarity between it and Mr. Gohen, as the latter never needs winding up, for the reason that he never runs down. Mr. Gohen is a most excellent gentleman and is worthy of the success which we bespeak for him in his new field of labor.

Mr. J. A. Gohen.

Effects of Alcohol

There has been considerable printed of late in the trade press, and occasionally in the daily papers, about the poisonous effects of wood alcohol, as though that were the only kind that contained any poison at all. We believe that they are more scared than hurt with regard to refined wood alcohol when used only for mechanical purposes in the ordinary ways that grain alcohol has been used. It is not to be taken internally, of course, nor applied externally as a liniment, though in the latter case we are told that it is harmless where the skin of the patient is unbroken. If the warning is aimed at its introduction into medicines, etc., no doubt, it is well directed; but if all who are unnecessarily frightened at the use of wood alcohol for mechanical purposes will open their eyes to the evil effects that all drinks that contain any kind of alcohol have upon their health we think their zeal would be better directed. Painters are, however, as a rule, an unreasoning lot in this direction. We quote the following from the Army and Navy Journal of Aug. 5, 1905:

"Sir Frederick Treves, the distinguished English physician and surgeon, in the course of a recent address on the physical effects of the use of alcohol, delivered at a public meeting in London, declared that alcohol was distinctly a poison which, like other poisons, has its uses, but the limitations on its use should be as strict as those of arsenic, opium or strychnine. It has a certain position as medicine, but in the last twenty-five years its use by the medical profession has steadily and emphatically diminished. As for its 'aiding digestion,' it hindered digestion, even when taken in small amounts, as could be easily demonstrated. Then there was the idea that alcohol was strengthening. As a fact, to reach the acme of physical condition was impossible if any alcohol was used. Its stimulating effect was only momentary, and after that had passed off the capacity for work fell enormously.

"It dissipated rather than conserved bodily energy. As a work producer it was exceedingly extravagant, and might lead to a physical bankruptcy; and he was not speaking, he would remind them, of excessive drinking. It was a curious fact that troops could not march on alcohol. In the Ladysmith relief column, which he accompanied, the first men to drop out were simply the men who drank. The fact was as clear as if they had all borne labels on their backs."

Car Building at Laconia, N. H.

In connection with a trip Aug. 22 to the Laconia Car Company's plant at Laconia, N. H., to look after the painting of some B. & M. freight and milk cars being built there, the editor of these columns was shown the frame and plans for what will probably be the finest car ever put upon an electric road. It is being built for the Western Massachusetts line. The Laconia company is building three open and this one closed car for this road, and the Mason Manufacturing Company, Springfield, Mass., has an order that reads just the reverse of this.

This elegant closed car in question is twenty-eight feet long and will be painted royal blue and decorated in gold. The interior is to be finished in African mahogany and elaborately decorated with inlaid marquetry and will be finished in the best style of the painter's art. The upholstery will be royal blue plush; the roof of the full Imperial type will have a ceiling in old gold with relief decoration of papier mache touched off in gold. The deck glass is of the cathedral order and the body glass of bevel plate with windows, five on each side, four feet eight inches wide. There will be a lock tile floor of hard rubber in colors worked into a design. In fact, in all other points this will be a palatial street car.

The Laconia company is also building 25 steel cars for the Brooklyn Rapid Transit Company. They are painted in Indian red and lettered and striped in gold. Interiors are finished in solid cherry, with white ceilings striped in gold. The window sash is a combination of sash and steel panel at the bottom, which forms a part of the body of the car, all of which are taken out in summer and screens put in their places, which throw them into a most comfortable open car.

Various orders for other cars are on hand, or being considered, so that the Laconia Car Company is very busy.

Advertise in the Railway Master Mechanic

The Master Car Painters' Association has done much to discourage the manufacture of dishonest paint material. Such goods soon receive their condemnation, thus leaving a clear field to the honest producer. In this particular the association has been a benefit to the paint manufacturer of honest railroad specialties. Did you ever look at it that way? Then why not patronize the association's friend, the Railway Master Mechanic, and thus possibly indirectly assist the association. There were about forty firms represented at the Cleveland convention; all of these should carry an advertisement in the Railway Master Mechanic.

The Sand Blast

There has been much said about the sand blast for cleaning rusty iron surfaces preparatory to repainting, but there seems to be a diversity of opinion concerning it. We would like to have an expression of opinion from those members of the association who are either now using or have used them, describing their merits or defects. This will probably have the effect of provoking discussion that will probably result in solving the difficulties if any, that attends their use. A free expression from the members on this subject, in time for the December issue, will be appreciated.

A Query Department

At the suggestion of one of our members, I have decided to establish a query department in the Railroad Paint Shop, where all who desire may ask questions upon any subject of interest to the craft. The questioner's name will not be printed unless he so desires. It is desired to have all such questions answered by other members of the craft; the editor will not undertake to answer all questions, but will expect the members to answer them over their signatures or not as they may desire. This method will probably create more interest among the members. It is desired that the members of the association will freely avail themselves of this department, and endeavor to make it a special feature of the official organ.

Quality of Colors

Red is a warm color, it is exciting, it remains stationary as to distance.

Yellow is the color most allied to light, it has the appearance of advancing toward the spectator.

Blue is a cold color and appears to recede from the eye.

Blue, at twilight, appears much lighter than it is, red much darker and yellow slightly lighter. By artificial light a pure yellow appears lighter than white itself, when viewed in contrast with other colors.

Black, white and gold are neutral colors. When a color is placed on a gold ground, it should be outlined with a darker shade of its own color. When a gold ornament falls on a colored ground, it should be outlined with black.

When an ornament falls on a ground which is in direct harmony with it, it must be outlined with a lighter tint of its own color; thus, when a red ornament falls on a green ground, the ornament must be outlined with light red. When the ornament and ground are in two tints of the same color, if the ornament is darker than the ground, it will require outlining with a still darker tint of the same color; but if lighter than the ground, no outline will be required.

SELECTED.

Established 1878

RAILWAY MASTER MECHANIC

Published by the
BRUCE V. CRANDALL COMPANY, CHICAGO

BRUCE V. CRANDALL, President, CHARLES S. MYERS, Vice-President
O. W. BODLER, Secretary
O. H. REYNOLDS, Editor WARREN EDWARDS. Manager

Office of Publication, Rooms 409-410 Security Building, Corner Madison Street and Fifth Ave., Chicago
Telephone - - Main 3185.

Eastern Office: Room 714, 132 Nassau Street, New York City
Telephone - - 3524 John.

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

Subscription price, $1.00 a year; to foreign countries, $1.50, free of postage. Single copies, 10 cents. Advertising rates given on application to the office, by mail or in person.

In remitting make all checks payable to the Bruce V. Crandall Company.

Papers should reach subscribers by the first of the month at the latest. Kindly notify us at once of any delay or failure to receive any issue and another copy will be very gladly sent.

Entered at the Post Office in Chicago as Second-Class Matter.

Vol. XXIX CHICAGO, DECEMBER, 1905. No. 12

Contents

The Walschaert Valve Gear.

ONE of the most prominent sidelights in the makeup of the average mechanical expert is the disposition in regard with small estimation, the results of the inventive faculties of his confrere in a similar line of thought. Observation has shown this to prevail in practically all cases of the launching of a new idea in mechanism, and anything having for its object an improvement over old existing devices either in power transmission, or methods governing steam distribution, in which questions of economy or efficiency were involved, has found it necessary to be well fortified by ability to sustain its claims, in the face of remorseless opposition from those who had fathered other devices for reaching the same end.

This iconoclastic attitude has perhaps been seen at its best in the history of years for governing steam distribution, and dating from the birth of the shifting link. Every student of American locomotive development is conversant with the efforts of inventors to devise a means to accomplish the same results as were givn by the eccentrics and links, notably those of Stevens or Wilson, who made a life work of researches in this direction, producing valve motions wonderful in their complexities, but never able to give a superior performance to the link motion so long the standard practice in this country.

At this time there is a prospective invasion of the link preserves by the Walschaert valve gear, which though not new by any means, has been a stranger to us until very recently; it has however, had an extensive vogue in Europe. Like the Joy gear, this has the distinctive feature of a constant lead, and right here, will be found the ground for the loudest protest of the champions of the old link motion, for its adherents regard, next to its simplicity, the fact that it has a variable lead is the strongest argument in its favor. Without entering into detail from a theoretical standpoint, the effect on steam distribution of either system, it is certain the Walschaert gear has many features that well adapt it to the American locomotive, among these it may be mentioned that there are no serious complications in its design, and being on the outside of the wheels there are no dimension restrictions for the heaviest power. In deciding the question of its efficiency as a steam distributor, the indicator will unerringly point out the shortcomings of constant lead if any exist, and judgment of that valve gear, or any other should be based on actual performance rather than on theory.

In answer to our inquiry of the chief engineer of a prominent foreign road on which the Walschaert gear had been standard for several years, that official who is well known in this country by his writings, as an eminent authority on locomotive design, replied as follows:

"You ask my opinion of the Walschaert gear for locomotives as compared with the Stephenson or other links. I consider it as a good gear giving an equal distribution on both sides of the piston, but really if you consider only the distribution of steam, take whatever gear you like, and, if properly designed, you will get the same diagrams. The question is only a practical one; which gear is more conveniently fitted on a given locomotive, with as few working parts as possible, and with a straightforward motion, avoiding flexion and tension of the rods. That depends on the general plan of the engine. For instance, on the old English locomotive with inside cyclinders and valves between the cylinders, I believe they are more easily worked with a Stephenson link.

On the contrary, with valves on flat tables above the cyclinders as on our compounds, the Walschaert system is quite simple, and well in view for oiling and repairs. In that respect I would prefer it to the usual American plan, with a rocking shaft, as this part can be dispensed with. In my idea, as you see, it is only a question of mechanical construction, but I have no preference based on theoretical ideas about the influence of constant or variable lead."

The opinion so frankly expressed in the above, coincides very closely with that expressed by some of the best authorities in this country, and there is no doubt that the Walschaert gear, while receiving more or less opposition from some quarters, will be given a thorough trying out here to demonstrate its fitness for locomotives in general, and more especially those which have outgrown the link.

The Locomotive Fire Box.

NOTWITHSTANDING the lapse of three-quarters of a century since the locomotive entered upon its mission of turning over all precedents in transportation, there are factors in its maintenance that have ever defied the skill of the designer, and these are the forces at work to destroy the firebox. There is no other problem connected with the locomotive that has offered a like stubborn resistance to a solution as that of firebox failure, and this fact so far obtains, despite the best efforts of the theorist and practical man to controvert it.

This condition will no doubt remain until the action of water in the process of changing into a gas at all pressures in a boiler is understood, which it is not, even after the most careful experiments to determine the laws of circulation, which in general is understood to mean the displacement of the heated water by the incoming colder supply. This question of displacement seems to be governed by the rate of combustion and the effect on firebox sheets, while too well known, lends no tangible clue to the action going on in different sections of the boiler; therefore while the results are seen in the leaking tubes and firebox sheets, the means to prevent such destruction have not presented themselves.

The deadly film of steam next to a firebox sheet, accompanied by the equally fatal incrustation, forms a combination that works most disastrously to the sheets, but while the latter condition may be ameliorated and often eliminated by proper solvents, the former is one that wide water spaces alone have only partially relieved. Present practice in this respect is no doubt in the direction of improvement, but the move for a lesser number of flues and therefore on increased water space between flues has been of such a beneficial character that there is good reason for the belief that circulation has been impeded more from too many flues than from any other cause, since the fee water entering from the front cannot reach the firebox without running the gauntlet of steam between flues, which is a condition very similar to that referred to as existing at the side sheets. The remedy for this is plainly fewer flues and a wider center spacing.

It is believed by many who have given this question some earnest attention, that positive knowledge is needed in this matter of circulation, for the reason that economy in fuel consumption is an element to be considered as well as that of the life of the boiler under the present force pressures and high rates of combustion. There is no question that it is most alluring to the purchasers of power to note the liberal heating surface on paper, but there is a question as to whether a high price is not paid for it when firebox maintenance is put in the balance.

One other prolific cause of firebox trouble is broken staybolts, the result of expansive action of the inside sheets; a trouble which is intensified by the high temperature of the modern firebox. Unequal expansion of the inner and outer sheets is also one of the causes of sheet rupture, the remedy for which is so closely allied to the staybolt problem as to be practically identical with it. Rigidity of the staybolt, that is, the resistance of the bolt to motion, is the element that tends to prevent expansion of the sheets, and since the expansive forces are absorbed by the sheet as well as the bolt, it follows that the rupture of either or both will ensue if proper provision is not made to prevent it.

The failure of staybolts has long been one of the most expensive items of firebox maintenance, and will remain so until flexibility in staying is made a standard practice in locomotive construction. The present need of correct information on the forces at work to rupture staybolts, is reflected in the action of the Master Mechanics' Association, which has a committee on flexible staybolts now engaged in investigating all the phases of the subject that are supposed to throw light on the amount of expansion in fireboxes. Accurate measurement, by this committee, of the movement of sheets and therefore the bolts in various forms of fireboxes will furnish reliable data from actual conditions, and it is hoped will make an end of theorizing on a subject that should have been cleared up long ago.

Balanced Compound—Pennsylvania Road

THE Pennsylvania road has placed in commission a four cylinder balanced compound engine built by the American Locomotive Company, and of the Cole design adapted to the Atlanta type. This engine has 117,200 pounds on drivers, being in this respect somewhat heavier than the simple Atlantic type engines built for the Pennsylvania road by the same builders in 1903, and 18,500 pounds heavier in total weight, while of practically the same starting capacity. The Cole compound is now in the way of receiving a thorough trying out, it being on the New York Central, the Erie and the Pennsylvania. In entering service of the latter road, it will be in competition with other Atlantic type of machines, among which are the De Glehn and the Baldwin, besides the simple engines of 1903 mentioned above.

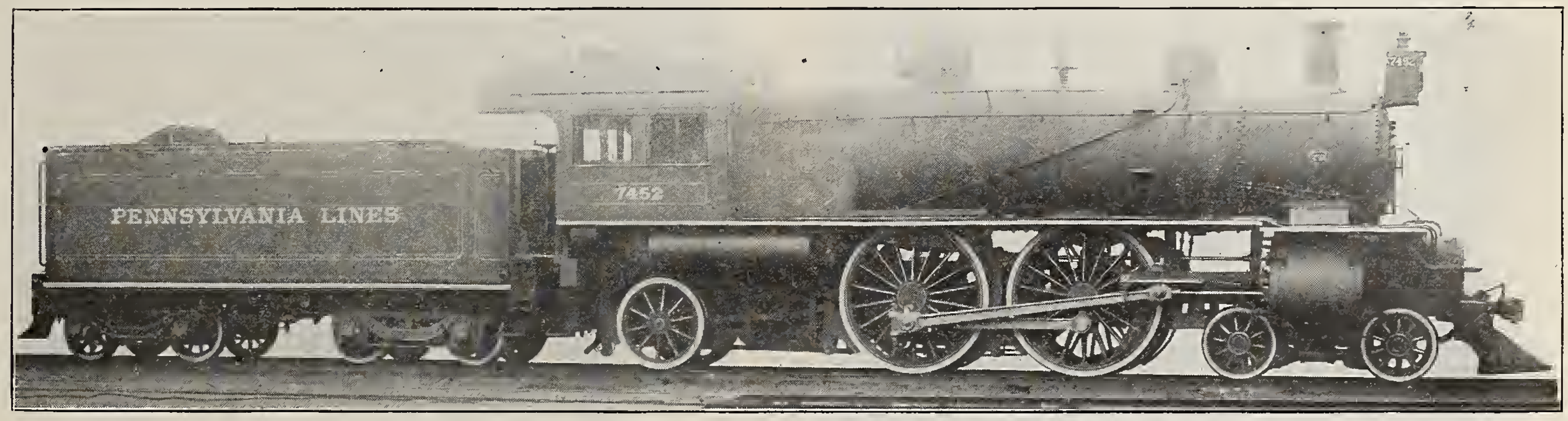
These compounds with the exception of the De Glehn, are comparable with the simple emgines named above since they have the same wheel diameter, grate area, boiler pressure and traction force. The appended table shows the relative proportions of the engines named above, and will be of interest in a general way.

Comparison of Atlantic Type Engines—Pennsylvania Road.

Build.	Date.	Type.	Cyl.	Drivers.	Int. Drivers.	Int. Total.	H. Surface Total.	Tractive Power.	Adhesion Factor.
Am. Lo-co. Co..	1903	Simple	20½x26	80	115500	182000	2640	23800	4.85
De Glehn	1904	4-cyl. Bal. Com.	14 3-16 & 23⅝ 25 3-16	80 5-16	84800	162000	2577	19500	4.33
Am. Lo-co. Co..	1905	4-cyl. Bal. Com.	16 & 27 26	80	117200	200500	2862	23300	5.03
Baldwin.	1905	4-cyl. Bal. Com.	16 & 27 26	80	120000	202000	2864	23500	5.53

The following specification of general dimensions and particulars of construction of the Cole engine illustrated, will give a clear understanding of the proportions and design of the machine.

Cylinder, type ....Com. Piston Valve
Cylinder ....diam. 16 and 27 ins.; stroke 26 ins.
Track gauge ....4 ft. 9 ins.
Tractive power ....23,300 lbs.
Wheel base, driving ....7 ft. 5 ins.
Wheel base, rigid ....7 ft. 5 ins.
Wheel base, total ....31 ft. 11 ins.
Wheel base, total, engine and tender............61 ft. 4 ins.
Tubes ....number, 315; diam. 2 ins.
Tubes ....length, 16 ft. 4 ins.; gauge No. 11 B. W. G.
Weight, in working order ....200,500 lbs.
Weight on drivers ....117,200 lbs.
Weight, in working order, engine and tender.....340,200 lbs.
Heating surface, tubes ....2680.17 sq. ft.
Heating surface, firebox ....181.4 sq. ft.
Heating surface, total ....2861.57 sq. ft.
Grate area ....55 sq. ft.
Axles, driving journals, main.10½x12 ins.; others, 10½x12 ins.
Axles, engine truck journals.....diam. 6½ ins.; length 12 ins.
Axles, trailing turck journals ....diam. 7 ins.; length 11¾ ins.
Axles, tender truck journals ....diam. 5½ ins.; length 10 ins.
Boiler, type ....Ex. Wagon Top
Boiler, O. D. first ring ....67 ins.
Boiler, working pressure ......205 lbs.; fuel Bituminous coal
Firebox, type ....Belpaire wide box
Firebox ....length 111 ins.; width 72 ins.
Firebox, thickness of crown ⅜ in., tube ½ in., sides 5-16
Firebox ....thickness of crown ⅜ in.
.... tube ½ in., sides 5-16 in., back 5-16 in.
Firebox ....water space, front 4 ins. sides 4 ins., back 3½ ins.
Crown staying .... Radial
Tubes, material ....Charcoal iron



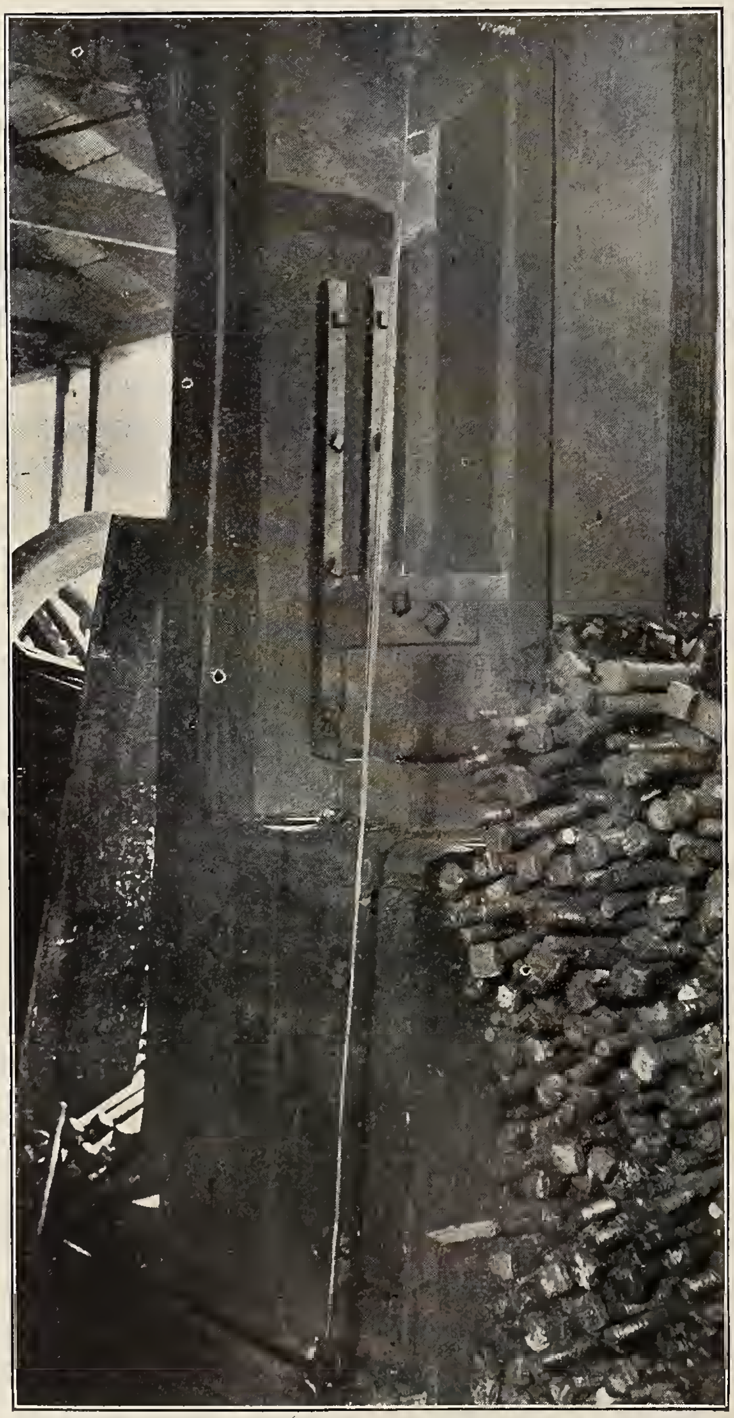
BALANCED COMPOUND, P. R. R.

Boxes, driving, main ....Cast steel; others Cast steel
Brake, driver ....West. American H. S. reduc. valve
Brake truck ....West. Amer.
Brake, trails ....West. American H. S. reduc. valve
Brake, tender ....West. Amer. H. S. reduc. valve
Brake, air signal ....West. J.
Brake pump ....9½ in. L. H.; 2 reservoir 15x88 ins.
Engine truck .....4-wheel W. I. frame, swing center bearing
Trailing truck ....Radial with inside journal
Exhaust pipe ....Single nozzles 5¾, 5⅝ and 5⅞ ins.
Grate, style .... Rocking
Piston rod ....diam. 3 ins.; piston packing, C. I. rings
Smoke stack .... diam. 16 and 18¾ ins.
Smokestack, top above rail ....14 ft. 11½ ins.
Tender frame ....8 and 10 in. steel channel and plates
Tank, style .... Water bottom
Tank, ... capacity 7000 gals.; fuel 10 tons
Valves ....type Piston; travel 6 ins.; steam lap 1 in.
Valves ....ex. C. L. H. P. 5-16 in.; L. P. ⅜ in.
Setting ¼ in. lead forward motion when cutting off at 11 in. of strike, R. H. crank pin at lead.
Wheels, driv. ..diam. outside tire 80 ins.; centers diam. 72 ins.
Wheels, driv., material, ...main, Cast steel; others, Cast steel
Wheels, engine truck, diam. ....36 ins.
Wheels, kind ....Std. Steel Works cast iron spoke
Wheels, trailing truck, diam...........................50 ins.
Wheels, trailing truck, kind ....Spoke center
Wheels, tender truck, diam. ....36 ins.
Wheels, tender truck, kind...Std. Steel Works cast iron spoke

Bolt Straightening Machine.

THE accompanying cut shows a bolt straightening machine as used at the Englewood shops of the Lake Shore & Michigan Southern Railway. The machine consists of two vertical channels bolted at the bottom to the anvil. On the inside of the channels are guides for the hammer to move in. At the top there is a countershaft hung eccentrically. This allows the driving belt to run loose when not in operation and also presses the pulley against the hammer for raising.

The hammer is a heavy weight with a wide vertical bar to which is attached a piece of belting. When the operator wishes to raise the hammer he presses his foot on the step at the bottom which presses the pulley against the vertical portion of the hammer and tightens the driving belt at the same time. When it has attained the proper height he releases his foot whichs drops the hammer. By means of this crude construction many bolts can be straightened and returned to stock which would otherwise be scrapped or straightened by hand.



BOLT STRAIGHTENING MACHINE

We are indebted to Mr. L. G. Parish, assistant superintendent of motive power of the L. S. & M. S. Ry., for the above information.

Ash Pan Openings.

THE accompanying illustration shows the openings in the side of the ash pans as used on the Lehigh Valley railroad. There are three perforated hinged openings on each side of the locomotive, which are kept closed by means of eye bolts and pins. On wide fireboxes, burning anthracite coal, there is always a collection of ashes on the side which burn out the grates. For this reason these openings are provided to clean out the ashes.

We are indebted to Mr. Willard Kells, master mechanic of the Lehigh Valley at Sayre for the above information.

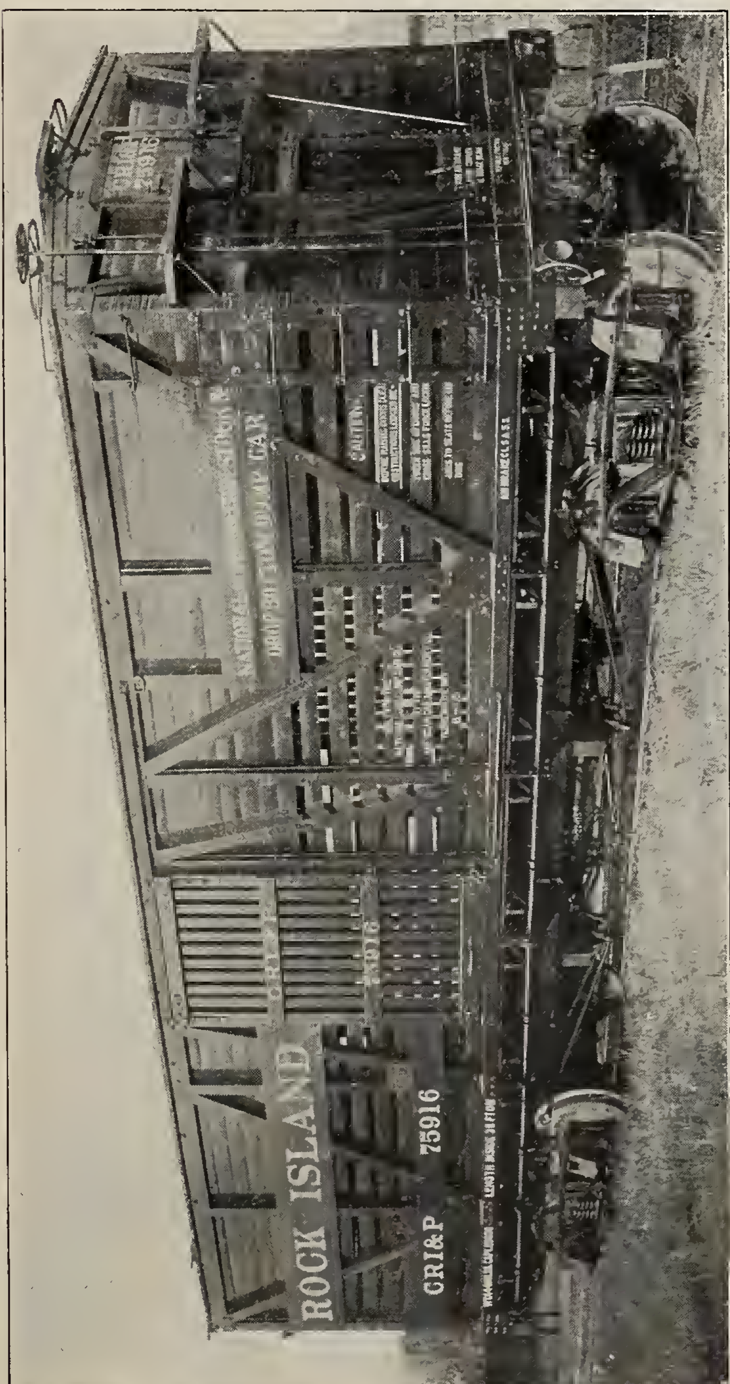
ASH PAN OPENINGS

A Combination Stock and Drop-Bottom Dump Car.

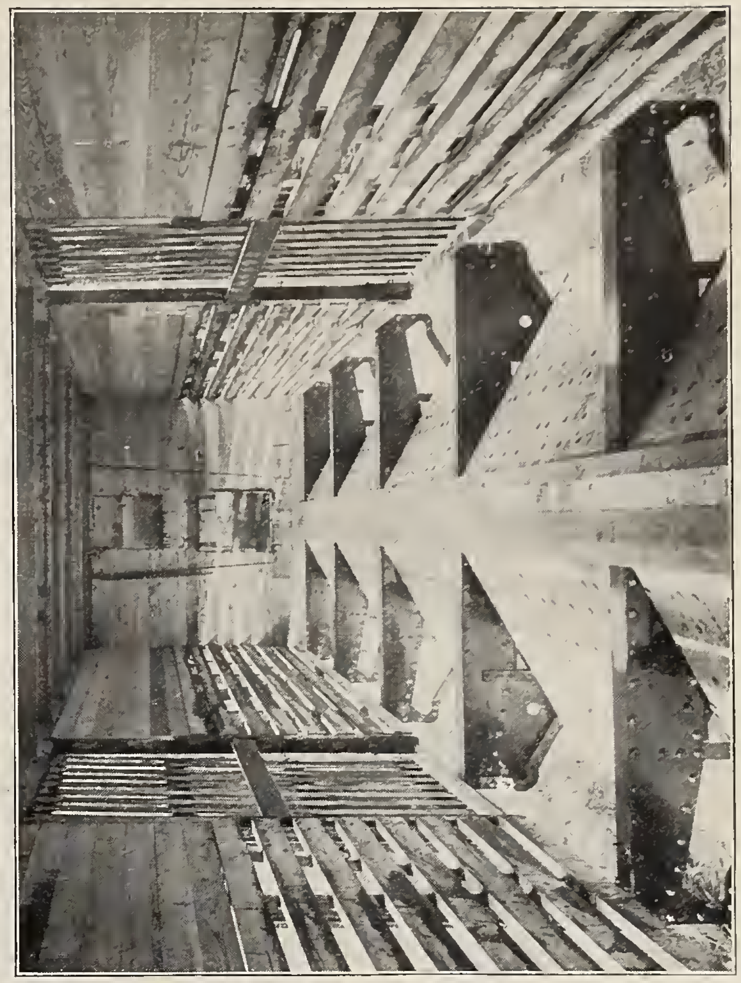
THE accompanying illustration and description is of a combination stock and drop-bottom dump car. The object of the design was to produce a car that could be used for other service besides carrying stock, thus enabling it to be used at all seasons and doing away with hauling so many empty stock cars west. With the present stock car, cattle, etc., are brought east but the construction of the car is such that they can be used for very little otherwise making it necessary to haul so many empties in a westerly direction.

This car is of 80,000 lbs. capacity and was recently placed in service on the Chicago, Rock Island & Pacific Ry. It is intended primarily for hauling coal and coke when it is not loaded with stock. The design and method of operation are quite clearly shown in the illustrations. The bottom is formed by twelve doors, six on each side, which are operated in sets of three by hand wheels on top of the car at each end. By simultaneous movement of the hand wheels, two or more sets can be operated at the same time, dumping all of the load at one time if desired. The car is self-cleaning, no dumpable material remaining after all of the doors have been lowered.

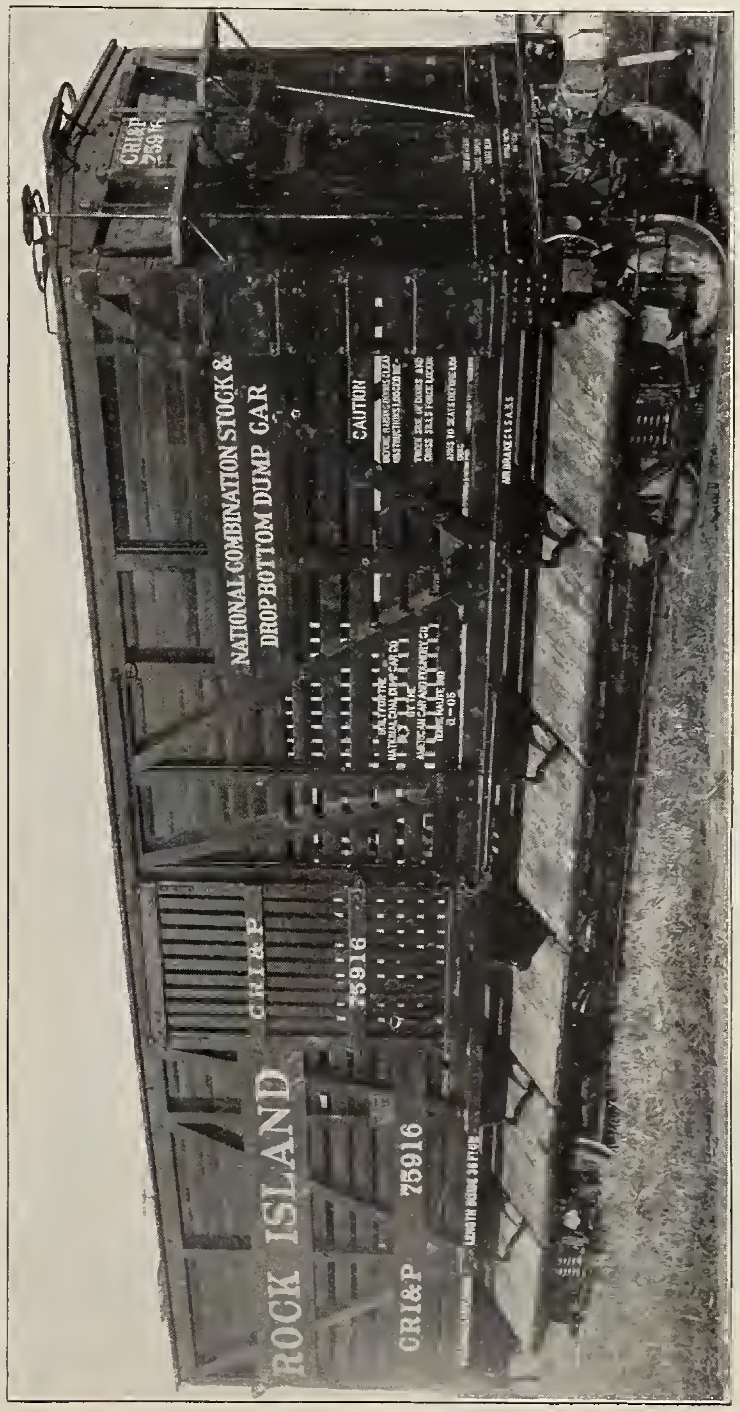
INTERIOR VIEW WITH DOORS UP READY FOR CARRYING STOCK



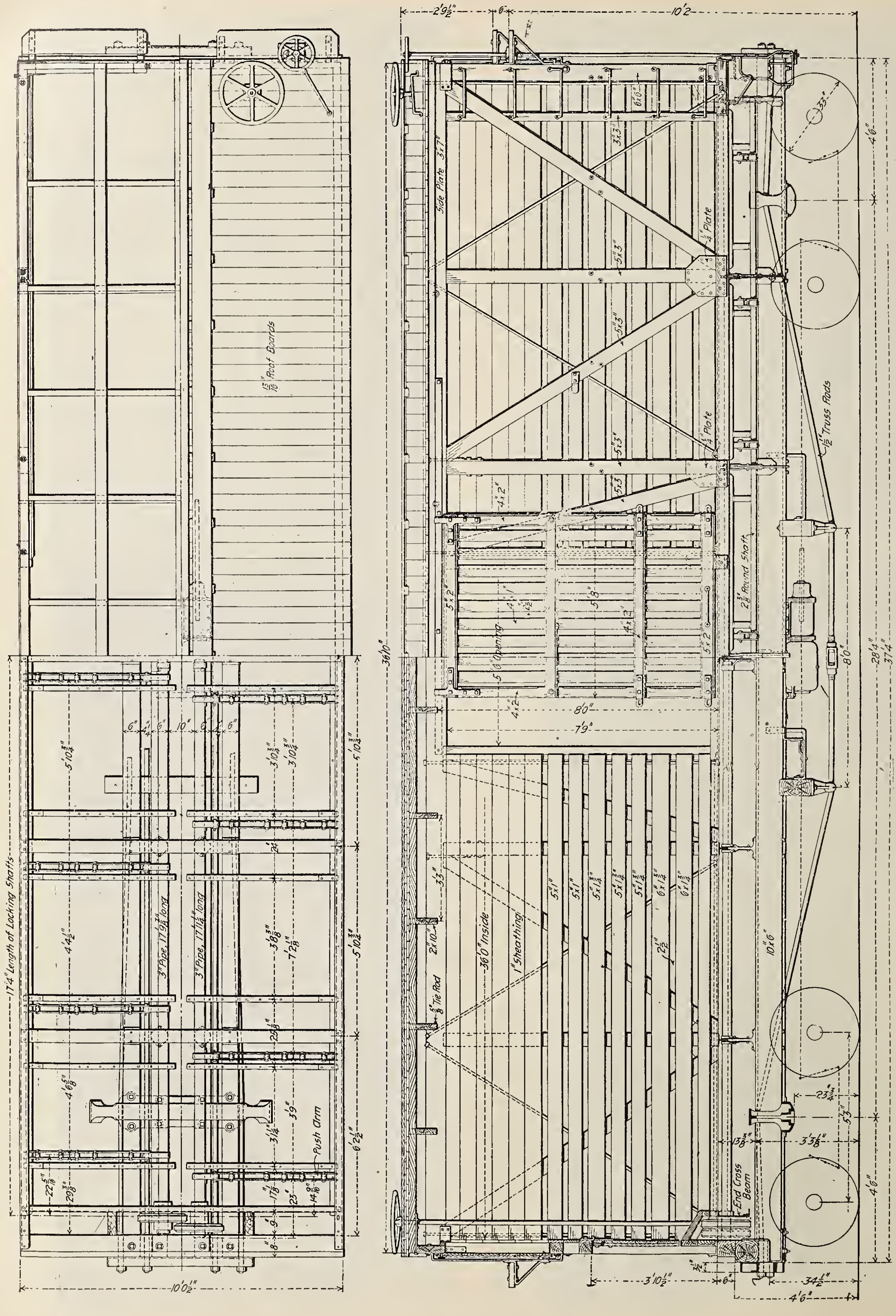
COMBINATION STOCK AND DROP-BOTTOM CAR WITH DOORS UP



INTERIOR VIEW WITH DOORS DROPPED FOR DUMPING

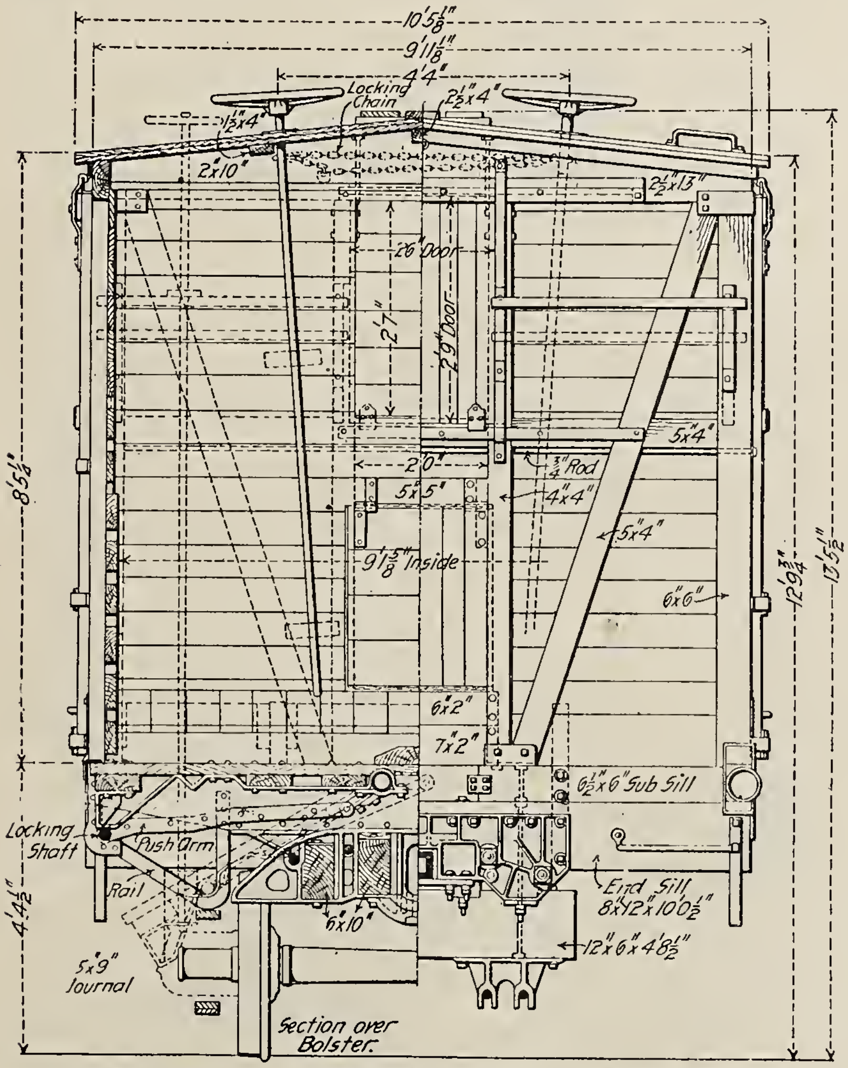


COMBINATION STOCK AND DROP-BOTTOM CAR WITH DOORS DROPPED



PLAN AND SIDE ELEVATION OF COMBINED STOCK AND DROP-BOTTOM CAR, C. R. I. & P. RY

The design of superstructure differs somewhat from the standard construction of the Rock Island. The side sills are 4 in.x3 in.x3-8 in. angles, the posts being bolted to plates which are riveted to the angles. The posts next to the door posts are I, beams, and metal carlins are used to tie the car across the top. The superstructure rests on a series of steel cross beams which are fish-belly girders. These cross beams rest on four 6 in.x10 in. longitudinal timber sills spaced as shown in the illustrations. The beams are riveted to a special form of malleable iron support bolted to the sills. A special form of cast steel body bolster is required. This is shortened to provide for the lowered position of the doors and designed to embrace the four longitudinal sills.



PART ELEVATION AND CROSS SECTION OF COMBINED STOCK AND DROP BOTTOM CAR

Each set of doors is hinged to a longitudinal 3 inch pipe shaft above the sills. The hinges, which are 5-8x2 in. iron, extend along its bottom to the outward end of the door. The doors are supported at their outer ends on a 2 3-8 inch longitudianl shaft carried on brackets supported on the cross beams. Riveted to the bottom of the brackets and also to the cross beams are inclined rails, down which the shaft slides as the doors are opened. The shaft is removed by two push arms under each door which are attached to short crank arms secured to the pipe shaft. The latter is moved from the hand wheel by means of a worm and gear wheel. The lowered position is shown by dotted lines in the section of car.

One of the special advantages claimed for the design is the ease of cleaning when in stock service. This can be done in less than half the time usually required. The drop doors can be locked and sealed in their closed position to insure safety. Trap doors can be placed in the roof if desired for loading coal and coke. The cost of unloading coal or coke averages only half a cent per ton. The design was worked out by Mr. Spencer Otis, President of the National Coal Dump Car Co., Chicago, and built by the company of which he is president.

Hospitals on Wheels.

THE hospital organizations on railways have never been in such an efficient state as right now. From the small growth of a corps of resident physicians and surgeons in the pay of railways, to the thoroughly equipped hospital car and trained nurses is a long stride, and the result of many years hammering and long study to bring it to its present efficient status. The Long Island road has for several years had a car in service which possessed all of the requirements for quick and final aid to the injured, and this road being a comparatively short one, the car can be placed at the scene of an accident practically as soon as an ambulance. No time is lost waiting for the "doctor" as one is always on the car.

The Erie road has long had a remarkably complete service of this kind, comprising not one, but several cars fully equipped with every acessory found in the best hospitals. The Southern Pacific is the latest to enter this humane field, having just placed in service what is no doubt one of the most complete and modern vehicles ever constructed for hospital purposes. This car was designed for the dual duty of taking care of the injured, and also fitted up with the view of use for a private car when necessary to press it into that service. There is nothing wanting in this car to make it the best for either service. The place of repose for the wounded is not a cot or improvised bed, but berths on springs, designed to raise and lower beneath the floor, their space being occupied when not used as beds, by comfortable chairs. The car may be justly called the most luxurious ever made for hospital purposes.

The interest shown in this phase of railway operation is spreading, and as an evidence of it, the paper read before the New York Railroad Club Nov. 17 is ample proof, when the Club rooms were crowded with an attendance which attested the desire of the members to know more of a subject which has been covered with too much mystery. In the demonstrations of first aid to the injured, the subject was handled exactly as in case of an accident, and the information conveyed was therefore of the greatest value.

Errata.

We regret that some typographical errors crept in the article on Locomotive Water Space Stays which appeared in our November issue. On page 410 the twelfth line should be read before the eleventh line; in the twenty-fifth line, the word "destruction" should be read for "distraction," and in the thirty-fourth line, the word "rapidity" should read "safety."

Some Money Saving Schemes. Minneapolis & St. Louis R. R.

THE measure of shop economy in shop operation that is possible to be effected by a close attention to the methods employed, otherwise, the little labor savers known as "kinks," is too well understood to be enlarged upon, but it is a fact that while some shops are noted for a healthy encouragement of the inventive faculty among its men, there are others, that are practically dead to the benefits accruing to a cultivation of ways and means to produce correct results at the least cost. A broad gaged management is alive to this fact, and it is to such that we are indebted for improved devices that cut the expense of shop production.

Among the roads entitled to a place in the front rank for original ideas, well worked out, is the Minneapolis & St. Louis, under the initiative of the veteran superintendent of motive power, John Tonge, by whose courtesy a few good things are mentioned. A wrist pin which is cast solid with a crosshead has always been a vexatious and expensive job to do, when handled on lathe centers by man power, applied through a lever in the piston rod bit. At best, the pin could only be finished by not less than two shifts, that is, by turning one-half, and then shifting the job in the centers in order to present the unfinished surface to the bent tool. The tool devised for this purpose is used in the miller, and trues the rough pin in continuous cuts, from rough to finish in thirty minutes from the time of starting the first cut. The tool discribed without an illustration, which is unavailable, consists briefly of a steel plate about three-quarters of an inch thick, having two holes which receive two gears. The plate is split through the centers of these gear bearings to allow of their introduction into the plate, the upper end of which is hinged, while the lower end is locked by a bolt when the gears are in place. The upper gear, or properly the pinion, since it is the smaller of the two, meshes into the lower gear which carries the cutting tool, the latter being coincident with the face of the hole which encircles the pin.

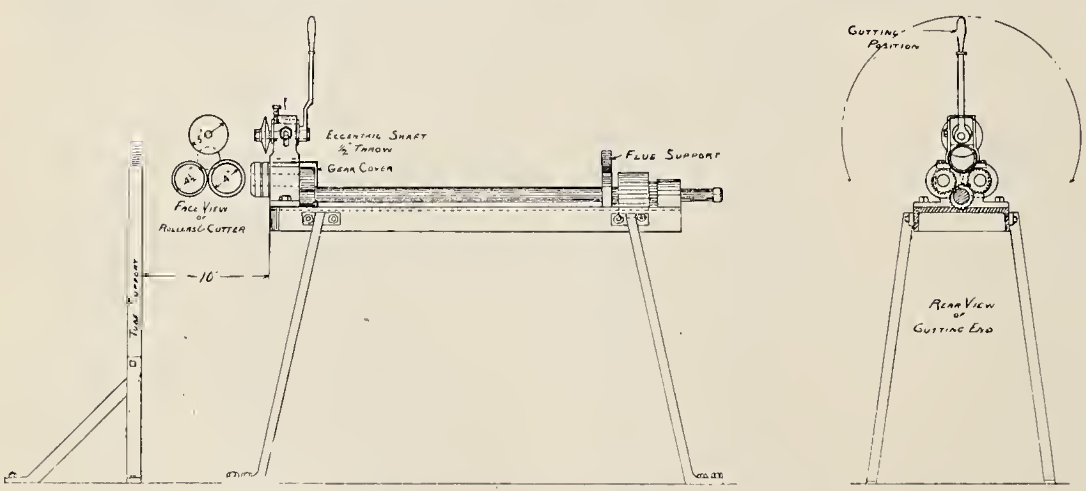


FIG. I—FLUE CUTTING MACHINE, M. & ST. L. R. R.

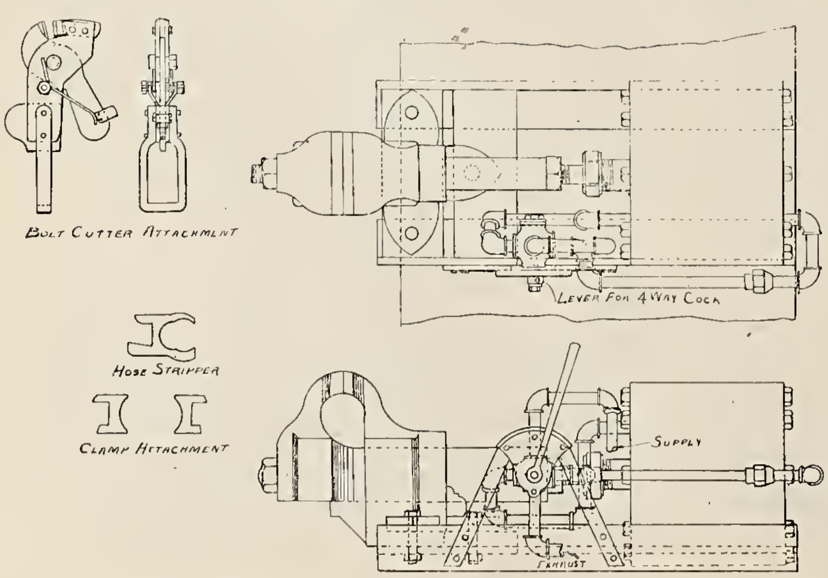


FIG. 2—PNEUMATIC BENCH VISE, M. & ST. L. R. R.

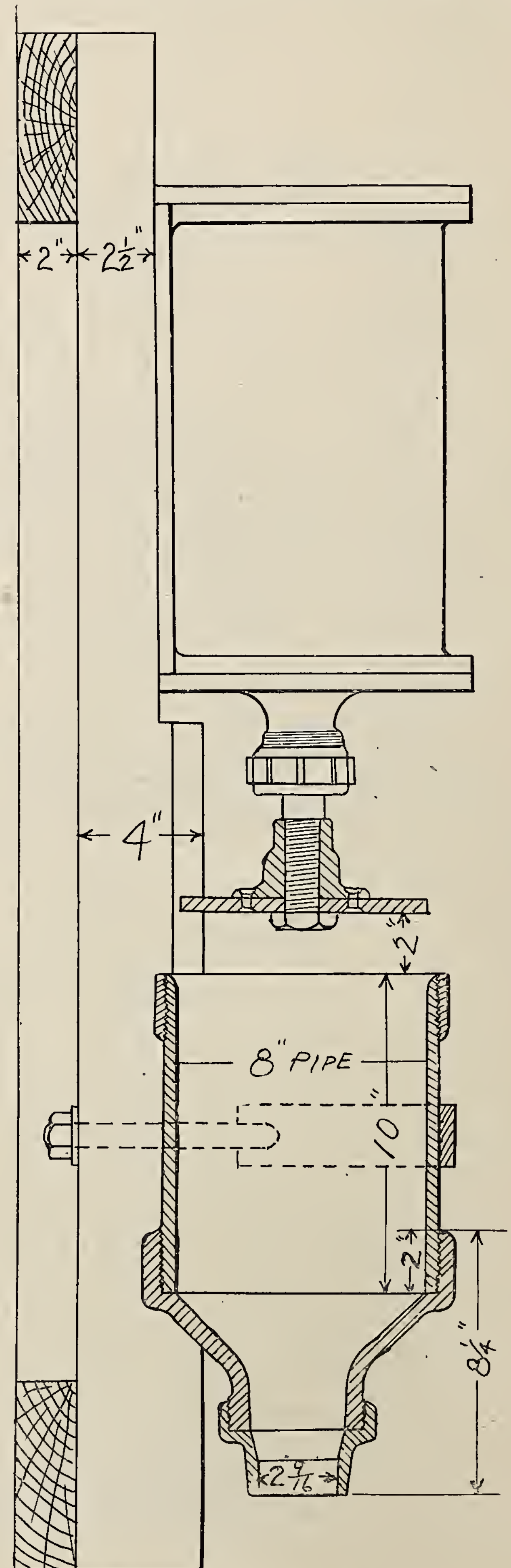


FIG. 3—GREASE PRESS, M. & ST. L. R. R.

When the turning device is in position, the upper gear is keyed to the arbor of the miller, while the lower gear is around the wrist pin to be operated on. This rig is one of the simplest possible, only two gears and a plate. It may be arranged for any cylindrical job difficult to swing in a lathe, and in fact is so used on reverse shaft bearings when the reverse arm has much offset, or considerable length.

The expense involved in threading radical stays, having button heads, is a live proposition when the threading is done in a lathe, as it is in many shops. They are cut here in an Acme bolt cutter at the rate of about fifty per hour. No trouble is experienced in cutting the thread close under the head by the dies, neither is there any trouble due to cutting the ends separately, since a gage is used that results in a continuous thread pitch, such as would have been the case had the bolt been cut its full length at one operation. The gage used is set to the tap with which the holes were tapped, and thus provides for any distortion in pitch which may be existent in the tap, due to hardening. Another little tool that wields a large influence on the tightness of front ends, has been made for facing off the joints on cinder hoppers while they are in place. This device is a simplified arrangement based on the idea used in the rotary valve face planer, in that the tool is made to revolve by means of a small portable air engine, such as is found in almost every shop today where compressed air is one of the aids to economy. The job is done much better and quicker than would be the case if it were taken from the engine.

One of these little rotary air machines is also made to do work on key-seating for eccentrics, in conjunction with a tool that consists of a dove-tailed tool slide which is made to traverse its frame by a screw, all on the same lines as a lathe tool carriage, but reduced to the parts named. The tool spindle has a tapered shank fitting into the socket of air spindle, and the tool is fed along, over and into the cut in the key-way by hand. The frame is secured to the axle by a chain clamp, and the whole thing is operated when the wheels are under the engine, to lines designating the proper angular advance for that particular engine. It is obvious that for new work this device is a quick acting one.

A machine for cutting off flues with neatness and rapidity is shown in Fig. 1. It is a machine that is put together at small cost and is one of the most efficient tools of its kind. A short section of channel iron is used for a base, supported on four legs. The cutter disk is carried on an eccentric shaft by which the cutter is made to engage or leave the cut instantly, and is a marked improvement in this type of machine. Flues are cut off by this tool as fast as they can be handled.

The bench vise shown in Fig. 2 was devised primarily for air-brake and hose work, but it is found a valuable auxiliary for other special jobs requiring a sure hold. The moveable jaw on the vise is secured to the piston rod of the cylinder and is operated by means of the four-way cock which admits and exhausts the compressed air which gives the power. The several attachments required for cutting off bolts, stripping hose and applying clamps, as used in the vise, are shown in detail. A vise of this kind would be a good investment in a shop for any special work aside from the purposes is was designed for in this case.

Grease is now the approved form of lubricant for rods on many roads, and when it was adopted on the M. & St. L., the logical thing to do was to provide some means to save time and material in making the grease ready for the cup. This was accomplished by taking a section of eight-inch wrought iron pipe and placing a funnel-shaped casting having a nozzle at its lower end with an aperture determining the diameter of the stick of grease required, and mounting the whole on a wooden frame. Above this was secured an old air cylinder having its center line coincident with the grease receptacle, and on the piston of which was secured a flange a little smaller in diameter than the bore of the pipe, forming a plunger that when actuated by compressed air forced the grease through the nozzle of the cup's diameter, to be laid away and cut to lengths as needed to fill the cups. The grease press has been a paying investment from the day of its installation. It is shown in Fig. 3.

A most interesting bit of engineering is to be seen at the M. & St. L. round house, Minneapolis, which is a point which sees minus zero temperature sometimes, as well as a visitation of the beautiful snow, occasionally. It is plain that under the conditions named it is not a pleasant procedure to blow down a boiler full of steam at 200 lbs. per. The arrangement was devised by Mr. Tonge, which would keep the surroundings free of steam. It was this: A steam pipe eight inches in diameter was laid around the inner diameter of the round house just outside of the doors, and low enough to be out of the way. From this pipe a four inch pipe extended to each pit, which have suitable provision made to connect with the blow-off cock of the engines. The blowing-off of an engine is then done quietly and without inconvenience, and in addition to this, there is sufficient heat radiated from the eight-inch main to melt all snow and ice between the round house doors and the turntable pit. Not one cent has been expended for cleaning snow since this scheme was worked out in the "circle," neither has the turntable pit seen a shovel in that time, for the reason that the drainage pipe from the table also receives the discharge of the pipe receiving the blow-off from the engines in the round house, and sufficient heat backs up from the sewer connection to keep the pit clean of snow. This would appear to be an investment that gives results rather in excess of those anticipated.

Sand Houses and Appliances IV.

THE sanding apparatus of the Chicago Burlington and Quincy lines west is illustrated in Figures 1, 2, 3, and 4. Fig. 1 shows the general arrangement of the stoves. The wet sand is shoveled in a hopper at the top of the stove which is let into an opening in the floor of the wet sand bin. As it dries, it trickles down and out through several small openings in the lower part of the drying stove on to the slides and screens as shown. These in turn deliver the screened sand to the reservoir in the basement and the refuse in another vessel in the same room. The details of the reservoir are shown in Fig. 2. The sand is delivered from this reservoir to the sand tower by means of compressed air. The general outline of the plant is shown in Fig. 3, where the cars are placed on the trestle, after which they are unloaded by hand into the wet storage bin, following the course as described above. A detail of the delivery spout valve is shown in Fig. 4, which is self-explanatory.

We are indebted to Mr. R. D. Smith, S. M. P., for the above illustrations and description.

The plan and elevation of the Central Railroad of New Jersey sand house is shown in Fig. 5. In this the wet sand is stored at one side of the drying room with the stoves in a pit of such depth as to bring the top level with the floor of the storage bin. This allows easy means of transferring the wet material into the drier. The smoke and waste gases of the stoves are led through eight inch wrought iron pipes along the floor of the wet

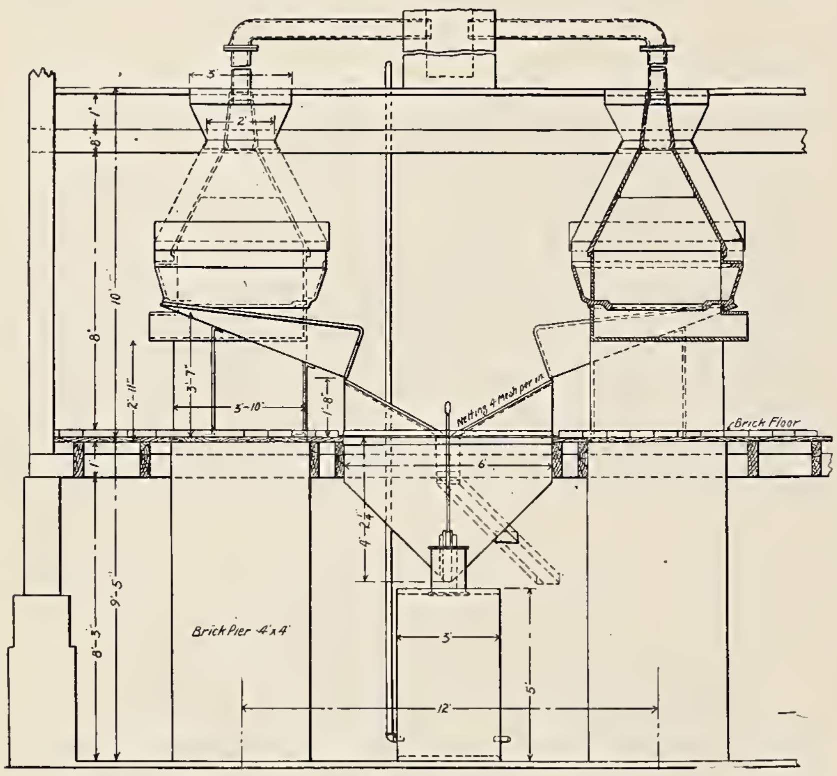


FIG. 1—GENERAL ARRANGEMENT OF SAND STOVES, C. B. & Q. LINES WEST

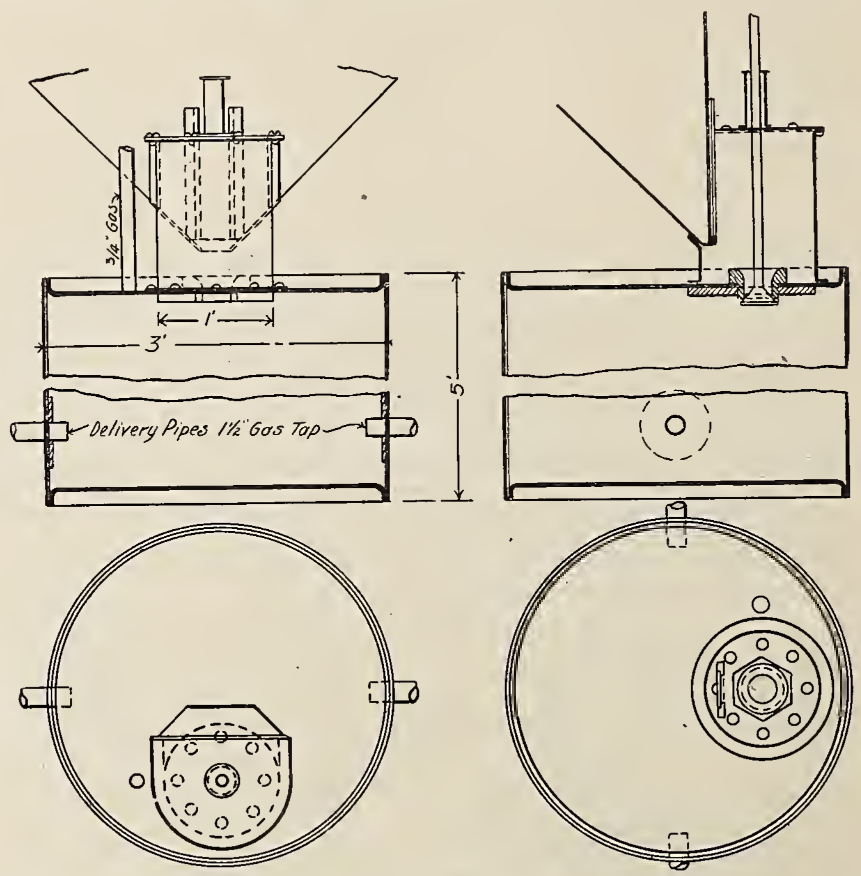


FIG. 2—HOPPER AND RESERVOIR FOR SAND DRIER, C. B. & Q. LINES WEST

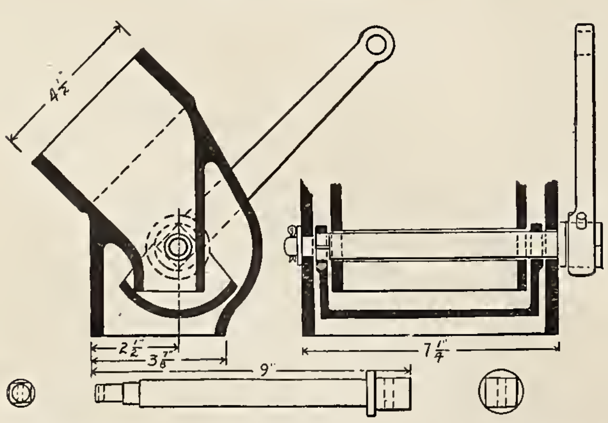


FIG. 4—DELIVERY SPOUT VALVE, C. B. & Q. LINES WEST

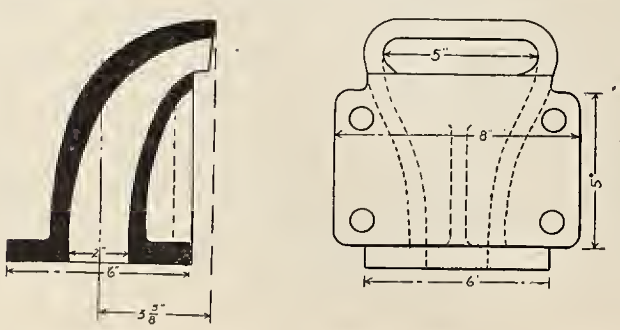


FIG. 7—CASTING FOR INLET OF SAND TOWER, C. R. R. OF N. J.

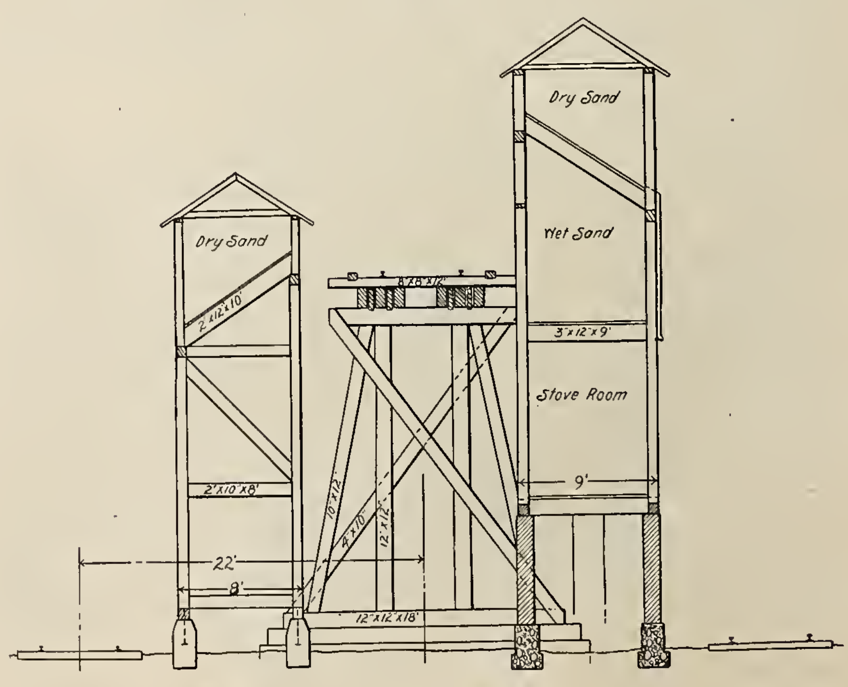


FIG. 3—SAND HOUSE AT ALLIANCE, NEBRASKA, C. B. & Q. LINES WEST

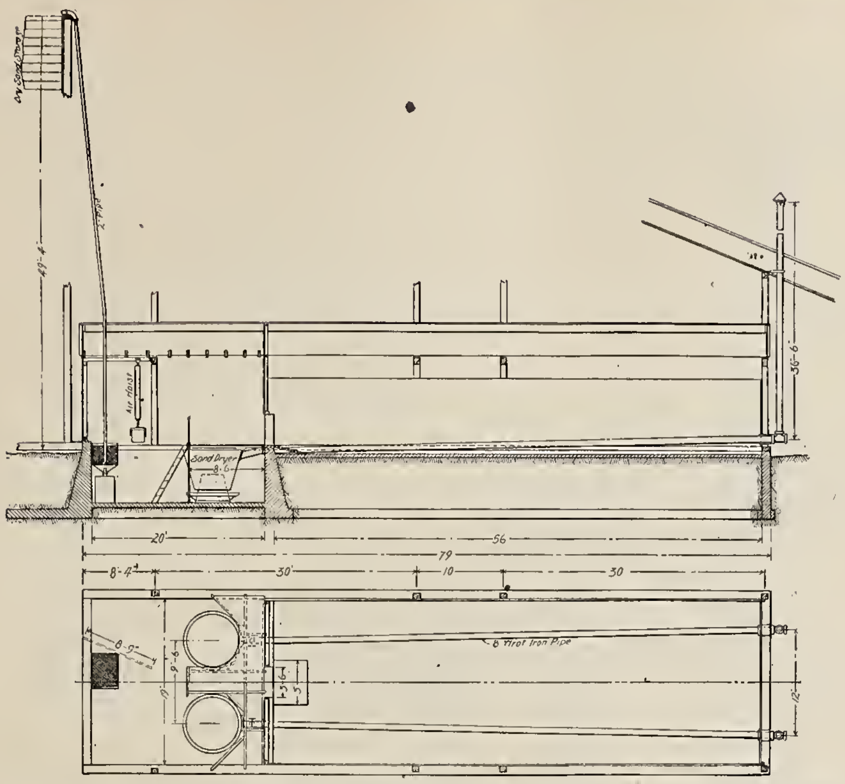


FIG. 5—ARRANGEMENT OF STOVES, PIPES, ETC., OF ELIZABETHPORT SAND HOUSE, C. R. R. OF N. J.

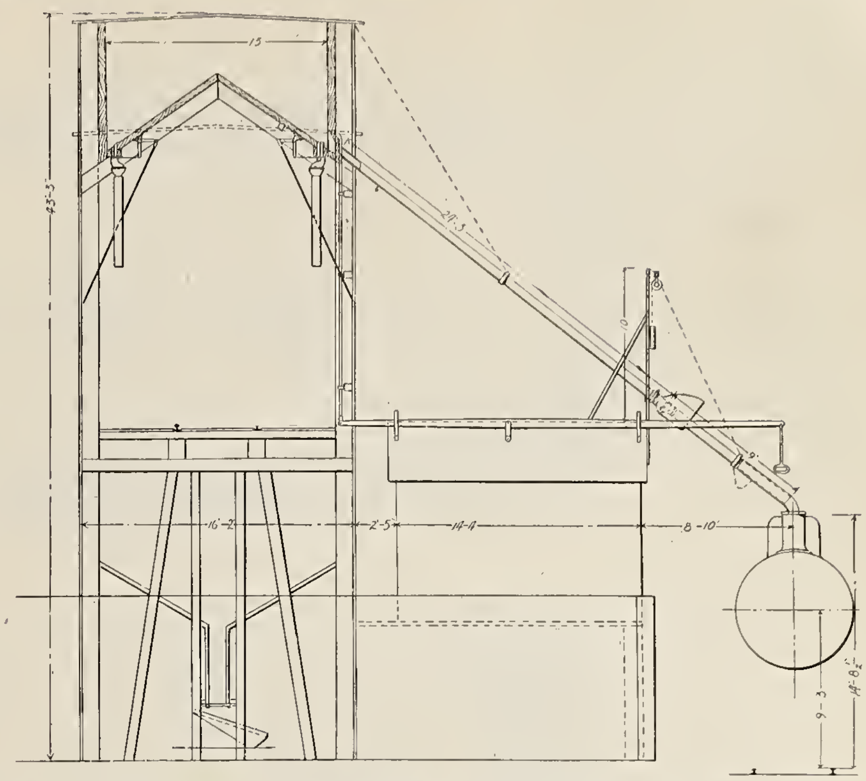


FIG. 6—OPERATING MECHANISM CENTERVILLE SAND HOUSE, C. R. R. OF N. J.

sand bin. This utilizes all of the heat by partially drying the sand as well as keeping it from freezing during the winter months. After being dried the sand is screened and elevated by compressed air to the storage bin above.

The wear of elbows in the pipe leading up to the sand tower was taken care of by a special designed casting shown in Fig. 7. This has an extra amount of metal on the outer side to take care of the wear.

The operating mechanism of the Centreville sand house of the same road is shown in Fig. 6. This is operated on the same general principles as the one at Elizabethport, explained above.

We are indebted to Mr. W. McIntosh, S. M. P., for the above illustrations and descriptions.

The general arrangement of the sanding and coaling stations of the Baltimore and Ohio is shown in Fig. 8. In this the wet sand storage is placed at the head end of the coaling trestle, and the cars containing the wet sand are placed over the storage bins into which the sand is discharged from self-dumping cars. These bins have a

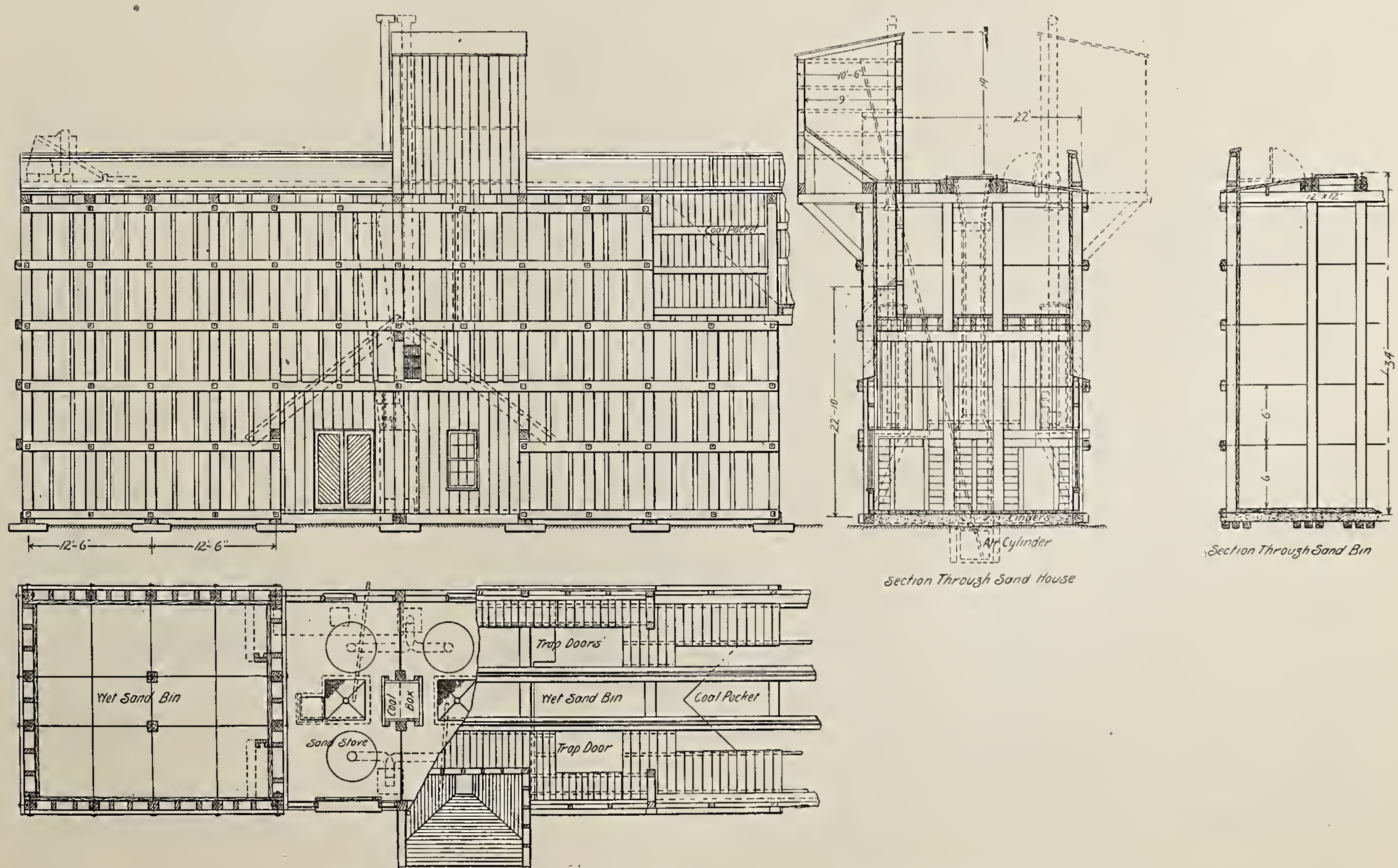


FIG. 8—GENERAL ARRANGEMENT OF SAND HOUSE AT COALING STATIONS—B. & O. R. R.

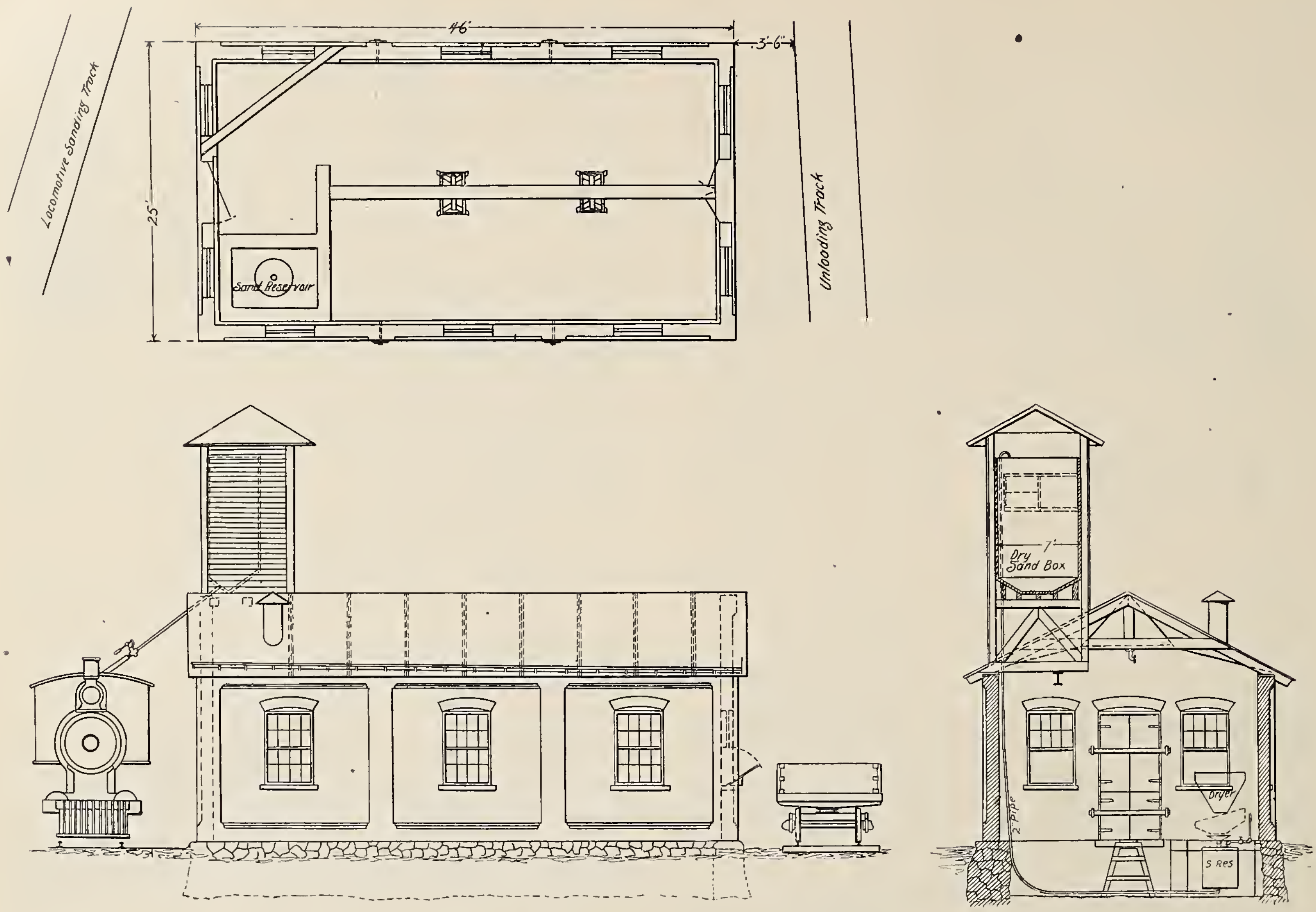


FIG. 10—SAND STORAGE HOUSE—N. Y. O. & W.

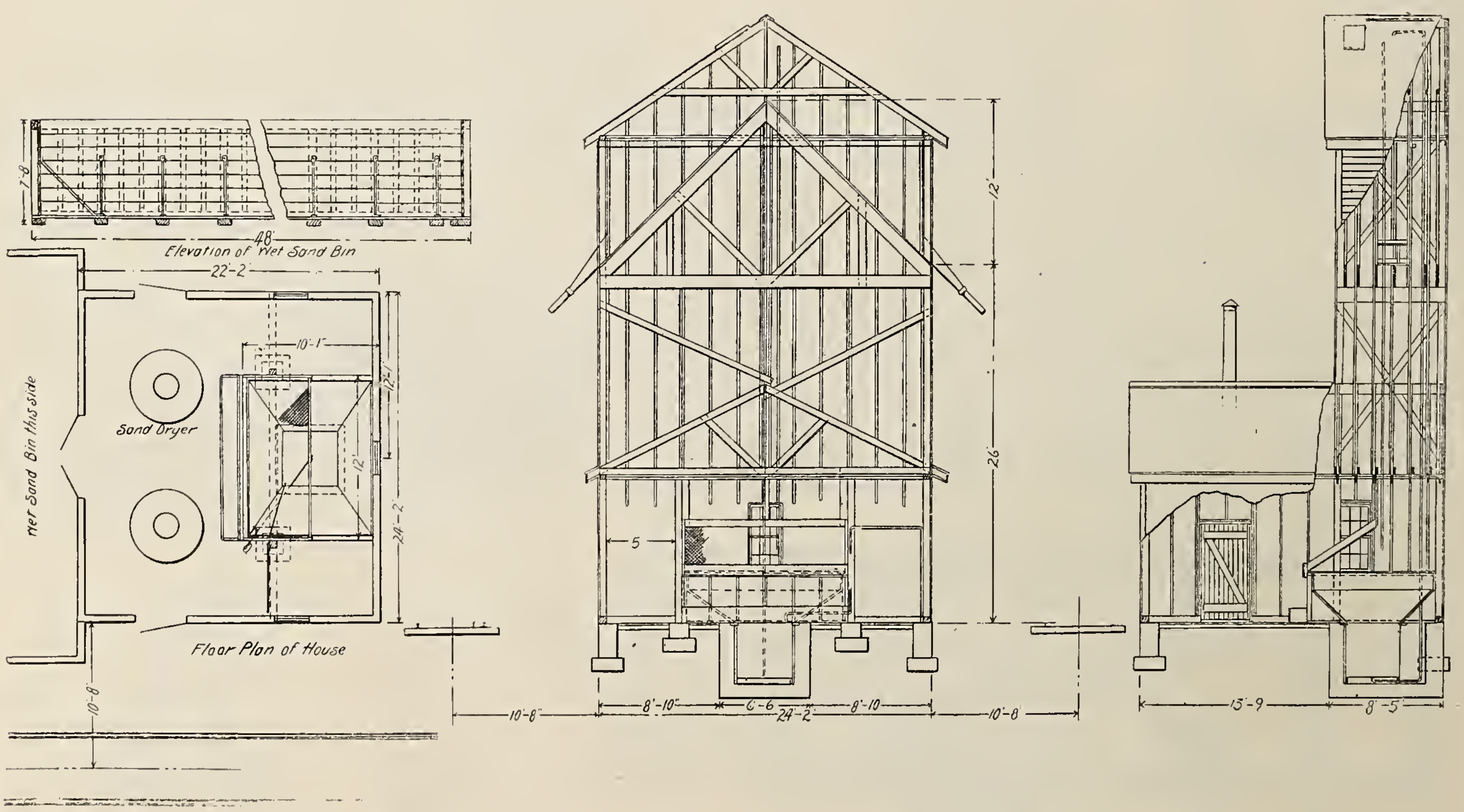


FIG. 12—STANDARD PLAN FOR PNEUMATIC SAND HOUSE, UNION PACIFIC R. R.

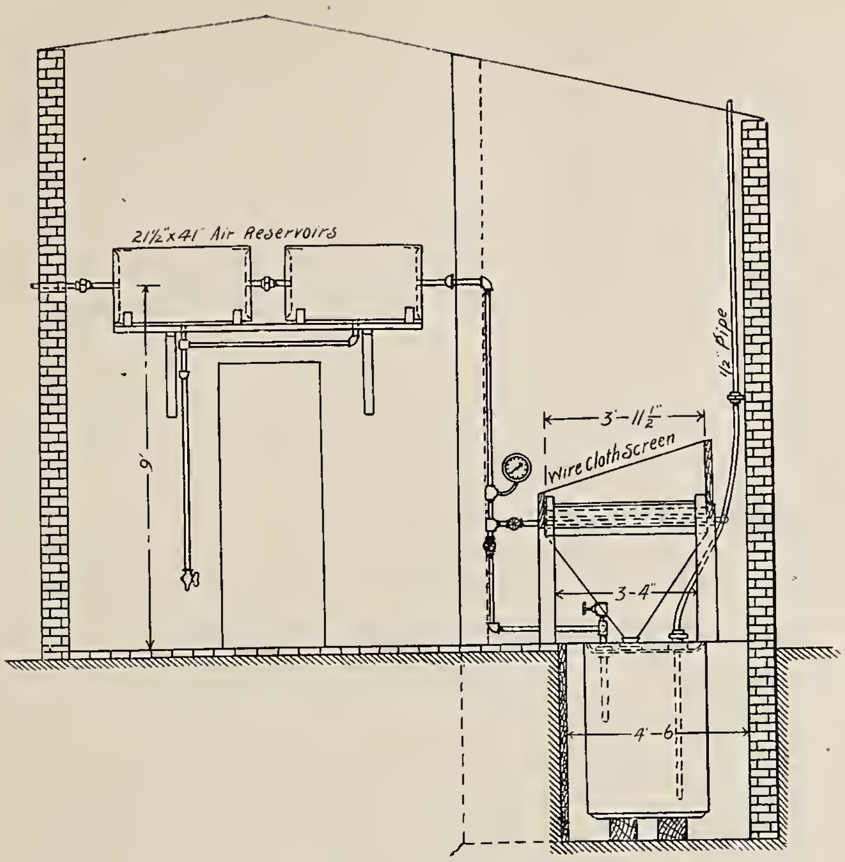


FIG. 9—BOSTON & MAINE SAND ELEVATOR

capacity of seventy car loads or twenty-one hundred tons.

The drying room is located in the center of the wet sand storage bins, and as long as the wet sand is stored on a level with or above the eaves of the roof of the drying room, it is conducted into the hopper of the sand stoves by gravity. When the amount of sand in storage comes below the roof of the drying room, it is shoveled into the stove hoppers.

When any part of the stand in the stove hoppers becomes burnt and thoroughly dry, it flows through the meshes of the netting and falls to the floor onto the dry sand hopper, from which it is conveyed to the sand tanks by gravity. When the dry sand tank is filled, the application of about fifty pounds of air pressure closes the sand inlet valve, and automatically forces the dry sand upward into the dry sand storage bin, from which it is conveyed by a suitable arrangement of valves and spouts into the sand boxes on the locomotives.

We are indebted to Mr. J. E. Muhlfield, Gen. S. M. P., for the above illustration and description.

The sand house of the Boston and Maine is shown in Fig. 9. In this the sand is dried in an ordinary sand stove, after which it is shoveled on the screen above the hopper. As it drops into the hopper it is ready to be let into the elevating reservoir, which raises it to the storage bin by means of compressed air. In order to have dry air and not make too much of a drain on the air pump, two 21½ in. x 41 in. reservoirs are placed in the sand house. These are equipped with draining devices to insure all of the moisture being taken out.

We are indebted to Mr. Henry Bartlett, S. M. P., for the above description and illustrations.

The arrangement of sand house shown in Fig. 10 is that of the New York, Ontario & Western Railway Co. The illustration shows the drier located above the hopper and screens on the elevating reservoir. This arrangement did not work very well, so the stove was placed on the floor and dried sand shoveled on the screen, which was found to work better. The general scheme of operation is on the principle of a modern factory. That is, the raw material starts at one end and comes out at the other ready for use. In this case the wet sand is unloaded at one end into bins from which it is worked into the driers, then into the elevating drum, from which it is elevated to the tower above by means of air pressure. From this locomotives are supplied with the necessary dry sand.

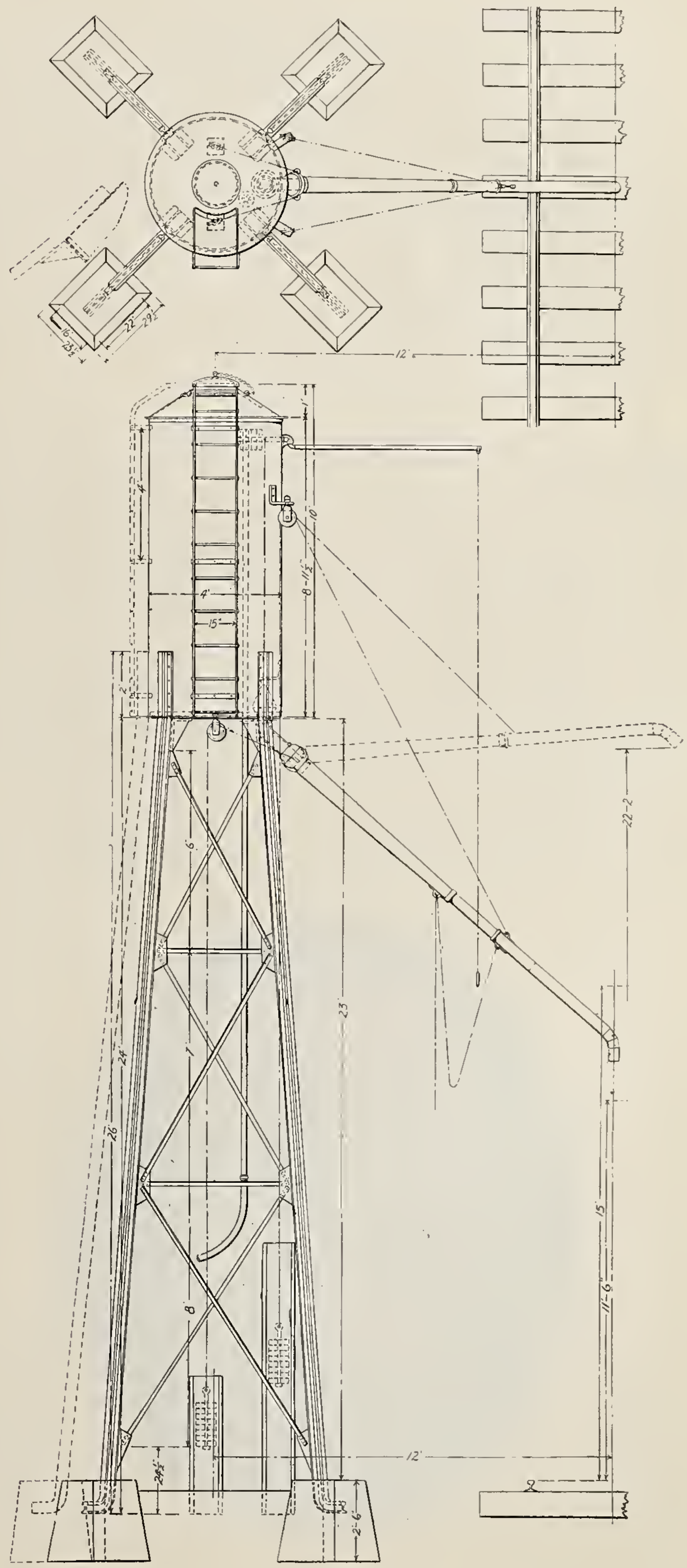


FIG. 11—SAND TOWER NORTHERN PACIFIC RY. CO.

We are indebted to Mr. Geo. W. West, S. M. P., for the above illustration and description.

Figure 11 shows a sand tower on the Northern Pacific Railroad Co. This differs from the average tower used for the purpose in that it is constructed entirely of steel. The tank is a cylindrical steel tank, four feet in diameter and ten feet high. This is suported 23 feet above the ground on four rails which have the bottom end imbedded in concrete. This tank is riveted directly on the rails.

The sand is dried in a bin filled with steam pipes in the roundhouse and raised by air pressure though a 1½ inch vertical pipe to the tower.

We are indebted to Mr. David Van Alstyne, mechanical superintendent, for the above illustration and description.

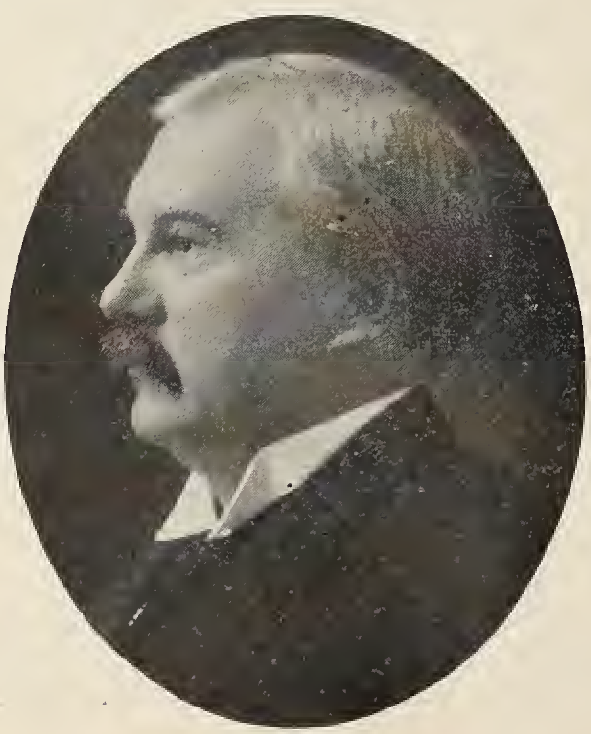
The standard plan for pneumatic sand houses on the Union Pacific R. R. is shown in Fig. 12. In this the wet sand is stored in a bin 48 feet long, as shown in detail in the upper left-hand corner. From this it is put into the stoves in the drying room and then on the screen above the hopper leading into the elevating drum. From the elevating drum it is raised to the tower above by means of compressed air.

We are indebted to Mr. J. B. Berry, chief engineer for the above illustration and description.

Albert J. Pitkin

ALBERT J. Pitkin died at his home in New York City, November 16, after an illness of several months, the serious character of which was not appreciated or widely known among his closest friends, and the news of his death was a surprise to all. Mr. Pitkin was of the type of men which the world needs and can least spare. While the loss is great to individuals because of his personality and character, it is greater to the community because of the principles for which he invariably and unalterably stood.

As the head of the greatest industrial organization of its kind, Mr. Pitkin's leadership extended in circles which are international in their scope. The work of his life is such as to endure. From the beginning of his career of activity he was associated with the locomotive. He realized the vital relationship between the locomotive and human welfare, and was inspired by the desire to develop and improve it to the utmost. The high position which the Schenectady Locomotive Works attained among industrial establishments, was chiefly the result of Mr. Pitkin's high ideals and earnest, unceasing efforts. As the managing head of these works he exerted an influence which reached far beyond the locomotive itself. Many improvements in motive power matters and methods originated with him, and he was deeply concerned in an effort to uplift and uphold the locomotive and motive power management. As an argument he often said: "The locomotive earns every dollar brought into the treasuries of railroads. It therefore merits the best attention railroad men can give it."



ALBERT J. PITKIN

Mr. Pitkin was successful. He was thorough, conscientious, enthusiastic, and his personality inspired his associates and subordinates to their best efforts. His leadership and his influence, combined with his ability, integrity, uprightness of character and unswerving devotion to duty, brought success as a matter of course. He loved his work and was successful as a youth, and later as a young man, owing his rapid advance to his willingness to accept responsibility, and to his conscientious service. In a large sense his life-work was accomplished, and it will endure as a living monument, yet his last days at his office were filled with plans and provisions for the developments of the future, and he was sure to be crowned with still greater honors.

Mr. Pitkin was born at North Hampton, Ohio, in 1854. At the age of 17 he entered apprenticeship in the stationary engine works of the Webster, Camp & Lane Machine Company of Akron, Ohio. He prized most highly his certificate of apprenticeship. He spent a year in the locomotive repair shops of the Cleveland, Akron & Columbus Railroad, after which he entered the drawing office of the Baldwin Locomotive Works, for which he had prepared by diligent evening study. From this time he gave his attention to locomotive work. After five years at the Baldwin Works he became chief draughtsman of the Rhode Island Locomotive Works, and two years later, in 1882, was appointed Mechanical Engineer of the Schenectady Locomotive Works. In two years he became Superintendent of the Works. Upon the death of the President, Edward Ellis, Mr. Pitkin was made Vice-President and General Manager, and from that time developed the commercial, as well as the manufacturing features of the business which gave these works their high standing among the locomotive building companies of the country. Upon the formation of the American Locomotive Company Mr. Pitkin naturally became its First Vice-President, and upon the death of Mr. Callaway, on June 1, 1904, Mr. Pitkin was made President.

He never lost the impress received in the home of his father, a Presbyterian Home Missionary in Illinois, and his life was that of a consistent Christian man. He was deeply interested in religious matters, in foreign missions, and was a warm friend and supporter of the Y. M. C. A. movement. He was a most generous and considerate employer, and was sincerely interested in the welfare of his great army of men. His home life was delightful; his ideals in everything were of the highest, and it is given to few men to be so honored and esteemed.

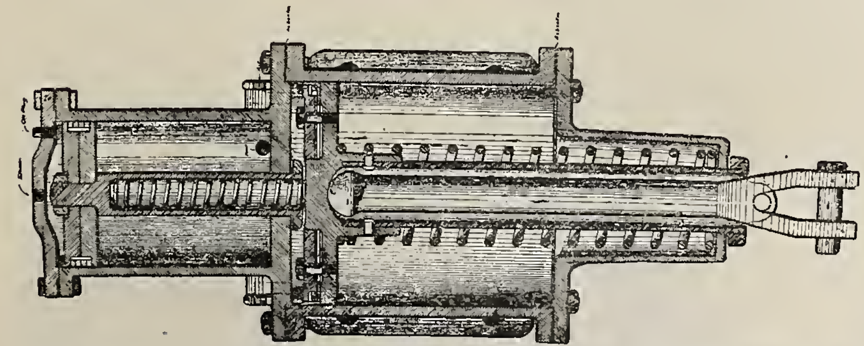
Birthday Celebration on the Erie.

THE seventieth birthday of the Erie road was celebrated Nov. 10, at Deposit, N. Y., on which occasion a monument was erected to commemorate it. The celebration exercises consisted of songs, and an anthem entitled "Erie" which was an original composition, by a chorus of 250 people. The address of welcome was made by Assemblyman J. B. Rogers of Binghampton, which was replied to by J. B. Stanchfield of Elmira. The stone marking this most important date, was taken from the railroad right of way. The plate on the monument bears an inscription reading: "Here, on the morning of Nov. 7, 1835, ground was broken for the construction of the Erie railroad, designed to connect the Atlantic ocean with the Great Lakes. Its completion to Lake Erie was publicly celebrated in the city of New York, and along the route to Dunkirk, May 14, 15, and 16, 1851." The monument marks the spot where the first spade was driven into the virgin earth. Among the most notable persons present was Col. G. D. Wheeler, whose father was a land owner near the place of celebration. Mr. Wheeler is now 87 years of age, and was full of reminiscenses of the day when the Erie began its career.

The Butcher Fluid Pressure Steam Auxiliary Attachment for Driving Brakes.

THE accompanying illustration shows a steam driver brake attachment as patented by Mr. G. W. Butcher, of San Antonio, Texas. This can be applied to any locomotive brake cylinder at very small cost. It can be made to suit any size standard driver brake cylinder. The total change necessary is to remove the air cylinder head and apply this, together with the extra piping, which can be done in a few hours. An ordinary three-way cock in the cab is all that is necessary to operate.

The movement of steam pressure piston against air operates the brake with the present brake connection, thereby giving the engineer perfect control of the engine on heavy grade, as there is a brake on your engine as long as you have boiler pressure.



BUTCHER FLUID PRESSURE STEAM AUXILIARY ATTACHMENT FOR DRIVING BRAKES

In handling engines at terminals, under steam, this device makes it absolutely safe for the men to clean their fires and work under the engines, and obviates any danger from wild engines getting away from various causes. When engines are placed in roundhouses, the brakes can be left on with the result that there is no leaking off of brakes as long as there is boiler pressure.

The brake can be operated independently either as an air or steam brake with the attachment.

The L. & N. Shops at South Louisville.

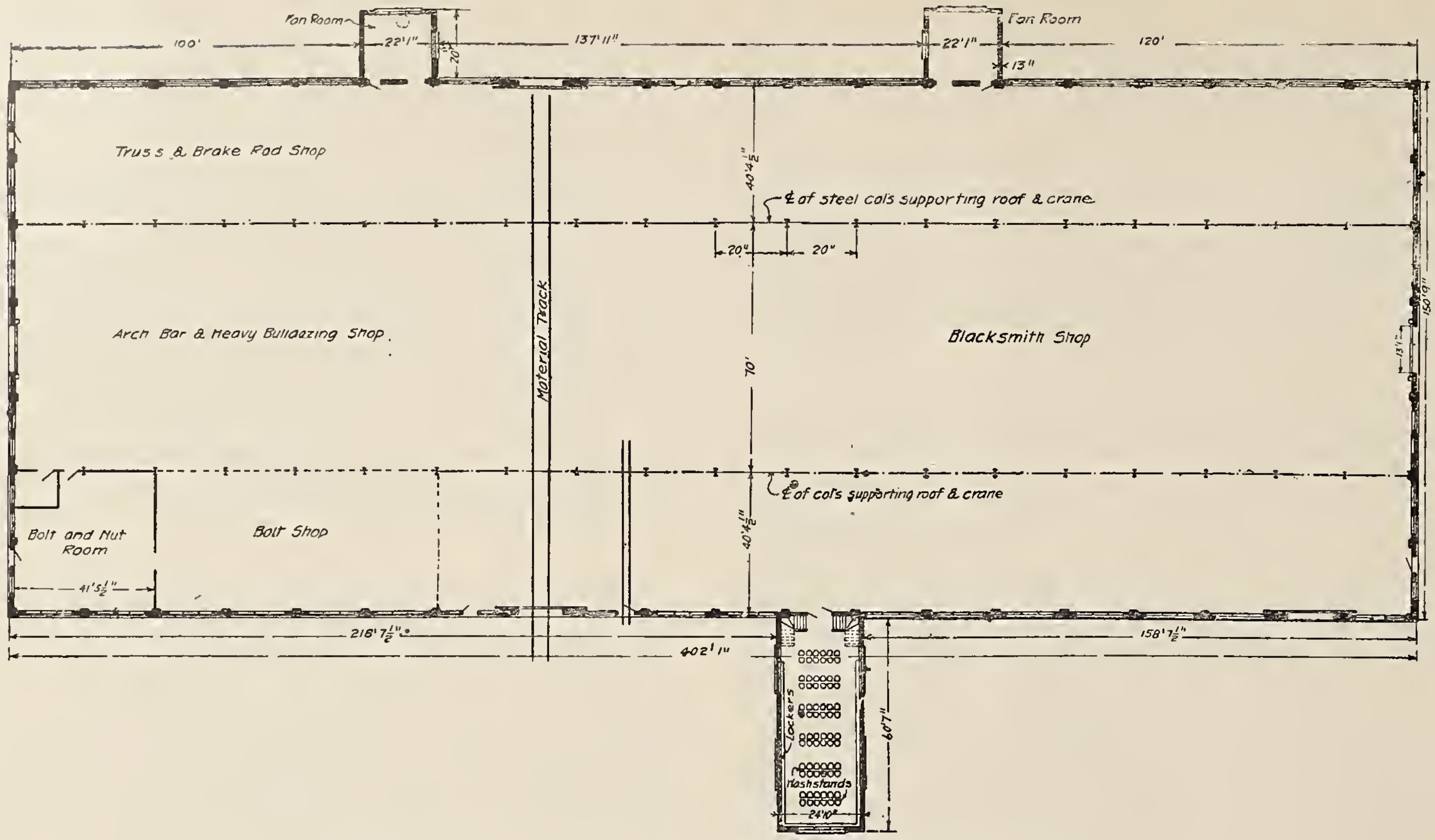
(Continued from page 401)

BLACKSMITH SHOP BUILDING

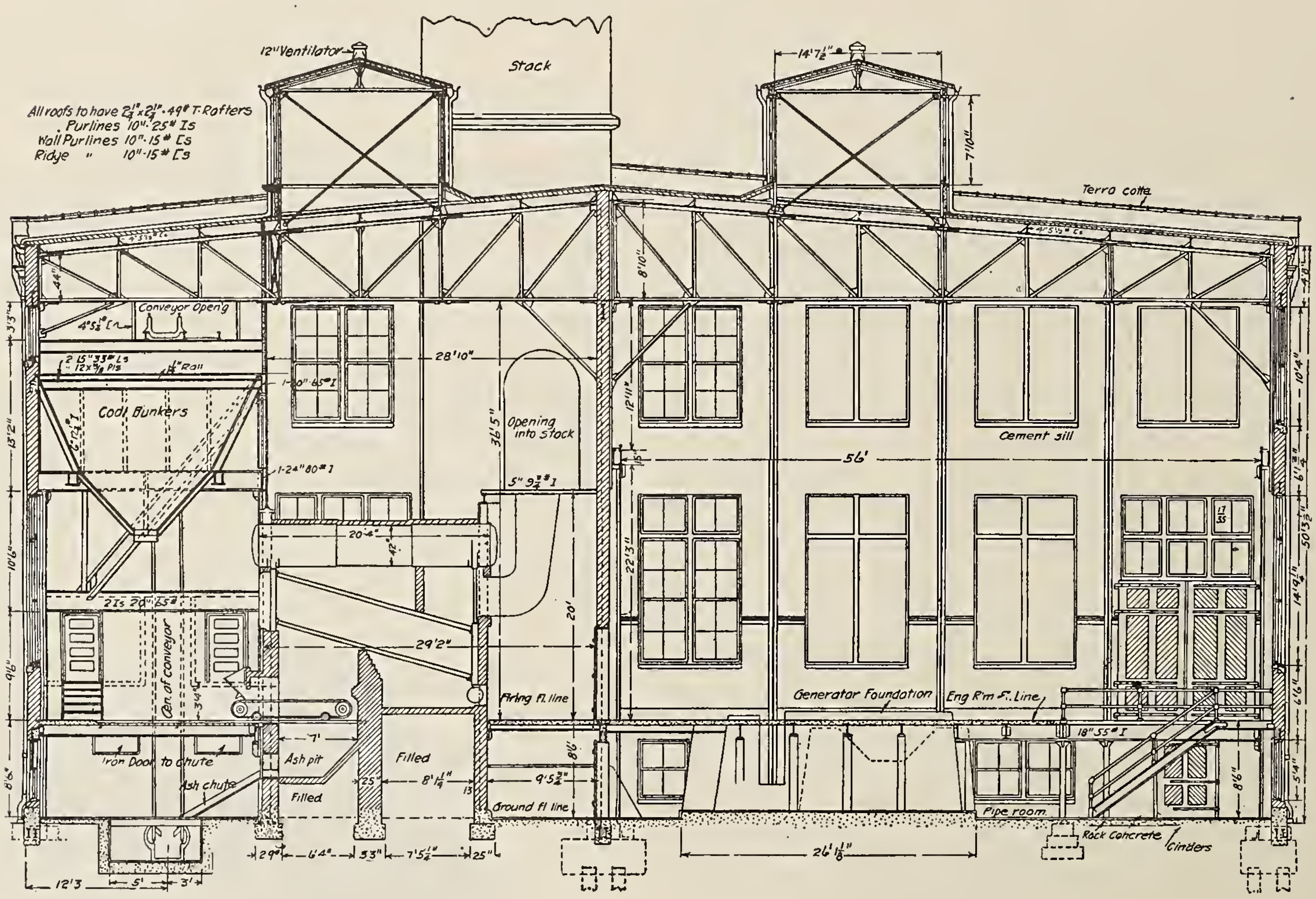
This building is 150 ft. 9 ins. x 402 ft. 1 in. outside dimensions, and presents the same general appearance architecturally as the locomotive shops. It is divided into three bays longitudinally by the rows of steel supporting columns, the center bay being 70 ft. wide and 2 stories in height and a side bay on either side about 40 ft. wide and one story high. The center bay is spanned by a 10-ton crane running the full length of the building.

The general features of construction of this building are shown in the cross sections herewith. The center bay is covered by a gable roof supported by a simple design of steel trusses, the bottom chords of which are over 35 ft. above the floor, and which are 10 ft. in height at the center. There is a high monitor about 30 ft. wide in the center, extending nearly the full length of the building. The two side bays have a roof sloping outward and supported by a steel truss, as can be seen in the cross section. The space between this roof and the eaves of the gable roof, as well as the sides and ends of the monitor, are solid steel and glass. All sashes being arranged to swing open, and operated by a chain from the floor. The windows which form a large proportion of the side and end walls are also movable. The vertical columns which support the crane runway and the gable roof are tied together in pairs by horizontal and diagonal tie rods, which aids in stiffening the whole structure, a feature which needs closer attention in this building where heavy steam hammers are working. It will also be noted that the roof trusses have diagonal braces at their end connections.

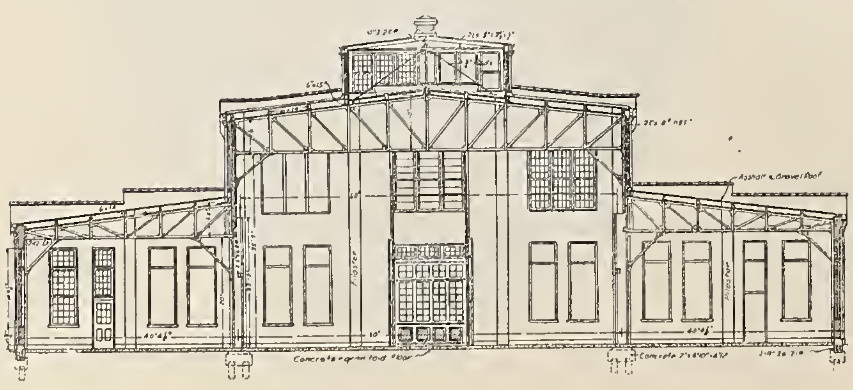
There are two fan rooms and a wash room with two floors, located in connection with this building, as shown on the plan. The floor is of clay and there are no hoods or other smoke conveying devices over the forges, in spite of which fact, owing to the excellent circulation from the many open windows, the air is very clear at all times.



PLAN OF SMITH SHOP—L. & N. SHOPS AT SOUTH LOUISVILLE



SECTION OF POWER HOUSE—L. & N. SHOPS AT SOUTH LOUISVILLE



CROSS SECTION OF SMITH SHOP—L. & N. SHOPS AT SOUTH LOUISVILLE

POWERHOUSE—L. & N. SHOPS AT SOUTH LOUISVILLE

Blacksmith Shop Equipment.

The interior view of this shop, shown herewith, gives a good idea of the general appearance. The center bay is occupied largely by open forges with hand anvils and small steam hammers in connection. There are also a number of heavy Ajax and Oliver forging machines, bolt-headers, and connecting Ferguson oil furnaces from the Railway Materials Co., in this bay. In general, the locomotive work is done in the west end of the shop and the car work in the east. The large frame hammer with its furnaces, above which are the boilers for furnishing steam to all hammers, is in the northwest corner. The center bay is spanned by a 10-ton crane and considerable space is available for storage of material below the crane. In the car-shop end of the building are the machines for doing heavy bulldozing and arch-bar work, truss and break-rod shop, as well as a bolt shop for manufacturin new bolts and nuts.

Power House Building.

This building, of which an exterior view, cross section and side elevation are given herewith, is a steel and brick structure of simple design. It is divided into two parts by a brick wall, making a boiler room of 48 ft. 8 ins. x 138 ft. 11 ins. and an engine room 58 ft. 1 in. x 138 ft. 11 ins. The roof is gable, the peak coming over the dividing wall, and is supported by a steel truss which rests on steel columns at either end, and also a row of columns under the peak. There are two monitors 7 ft. 10 ins. high by 14 ft. 7 1-2 ins. wide, extending nearly the length of the building, one over both the engine room and fire room. The bottom chord of the roof truss is 36 ft. 5 ins. from the floor line, which in turn is 8 ft. 10 1-2 ins. above grade line. There is a 5-ton crane spanning the engine room, the runways for which are supported by columns independent of those of the building.

The floor, as before stated, is above grade line, and is of concrete laid in arches between I-beams, leaving a basement below, which is lighted by windows through the outside walls. The floor beams are supported by cast-iron columns wherever necessary, and by the machinery foundations where possible. The floor of the basement is also concrete laid on cinders.

The stack, which is 182 ft. high, is built of perforated radial brick. These brick are made from a special selected clay burned at a high temperature, and especially constructed for each size of chimney, having radial sides and curved ends, allowing them to be laid with very thin mortar joints. The flue is 9 ft. 6 ins. crete supported on numerous creosoted piles driven to a to a solid foundation.
in diameter and the wall of the chimney is 40 ins. thick at the base and tapered to 8⅝ ins. at the top. It has a fire brick lining carried on bracket projections from the inside of the chimney. Opposite the entrance
In the boiler room there are eight Sterling boilers of
of the flue into the chimney is an opening of the same size and shape as the opening for the intake, which is closed by a dummy wall. This is put in for the purpose of providing for equal settlement on the two sides of the chimney, and to prevent cracking or getting out of line. The foundations are of heavy con-

There is a special steel construction supporting the coal bunkers and conveying machine which is virtually independent of the building. The building walls are of brick and rise above the roof at the ends, being capped with a terra cotta coping. The eaves are drained through an ornamental design of copper trough and pipes. The window sills are concrete and there is a reinforced I-beam over the top of the window casings. The generator and boiler foundations are of course independent of the building. The interior of the engine room is finished in brick in two colors, the darker forming a high wainscoting.

Power House Equipment.

305 horse power each, six of them being equipped with Green automatic stokers. Two of these, as well as the remaining two of the eight, are arranged for burning shavings, which are fed directly on to the grate by means of the blower system which draws them from the mill.

The stokers, which are of the traveling link style, are driven through ratchet wheels operated by eccentrics on a horizontal shaft which is driven by a 6-horse power oscilliating engine. Each stoker has 67.5 square feet of grate area, and is designed to burn bituminous slack. There is a pit below each grate, extending beneath the boiler-room floor level into which the ashes accumulate, being dropped from the end of the grate. From this pit there are chutes through which the ashes can be discharged into the conveyor. The grates are fed by spouts extending down from the coal bunkers above the boiler room and in front of the boilers. These feed by gravity, the hopper above the stokers being kept constantly filled.

The coal is fed into the bunkers or storage pockets which are of steel and concrete construction and have a capacity of 1000 tons, by means of a link-belt conveyor which passes horizontally along a pit in the basement below the boiler-room floor, rises vertically pockets and also a large storage bin for cinders, and at the end of the building, passes over the storage thence down the other side of the building. The conveyor is of the overlapping pivoted bucket type and can be discharged at any desired point. It has a capacity of 40 tons an hour at a travel of 40 ft. a minute. The coal is shoveled from cars standing on a track at the west end of the building into curved chutes which deliver it to the crusher, where it is crushed and passing through an automatic loader reaches a conveyor. The complete conveyor system was installed by the Link Belt Machinery Co. of Chicago.

The boilers are fed by two Laidlaw-Dunn-Gordon 16 and 18 x 10-in. duplex pumps. The feed water is heated by a Cochran heater which obtains its supply from a receiver tank placed in one corner of the boiler room, into which warm water from all sources is collected. There is a hot well outside of the boiler room for receiving the cooling water from the air compressor, and a pump is installed to supply the receiving tank from this hot well in case an extra supply is needed. There is also an extra reservoir between the heater and the pumps to act as an auxilliary in case of emergency. For regulating the height of the water in the boilers there are two Vigilant feed water regulators.

In the engine room there are three duplicate generating units, each consisting of a Buckeye cross compound engine 18¾ and 32 1-2 x 21 ins., which is direct-connected to a Bullock generator of 350 K. W. capacity. The two air compressors were furnished by the Ingersoll-Sargeant Drill Co., and have a capacity of 1400 cubic feet F. A. per minute each.

The engines have tail rods on the low-pressure cylinder and each cylinder is provided with a governor. The two governors, however, are tied together by a cross rod in the main engine shaft, which arrangement compels the cylinders to work together and give a more even speed. Both of these governors are of the regular Buckeye type of the centrifugal shaft style.

The generators have pole pieces built of laminated sheet steel, the edge of each sheet being cut back for half its length so that the face of the pole piece presents to the armature a reduced cross section, giving a magnetic field of very high density and preventing distortion. The armature rings are made from steel punchings supported by a cast iron spider, the winding being made up of bars insulated in the slots and held in place by hardwood wedges. A special feature of these generators is the brush oscillating device, in which the brushes are carried on the usual ring, resting on bearing wheels. These wheels are slowly revolved by a belted gear and oscillating clutches, and as they make a revolution are forced along their axis by a cam until they have moved about one-half inch, where the cam releases and springs return the wheels to their former place. By this arrangement, the brushes are continually moved across the commutator and prevented from wearing grooves.

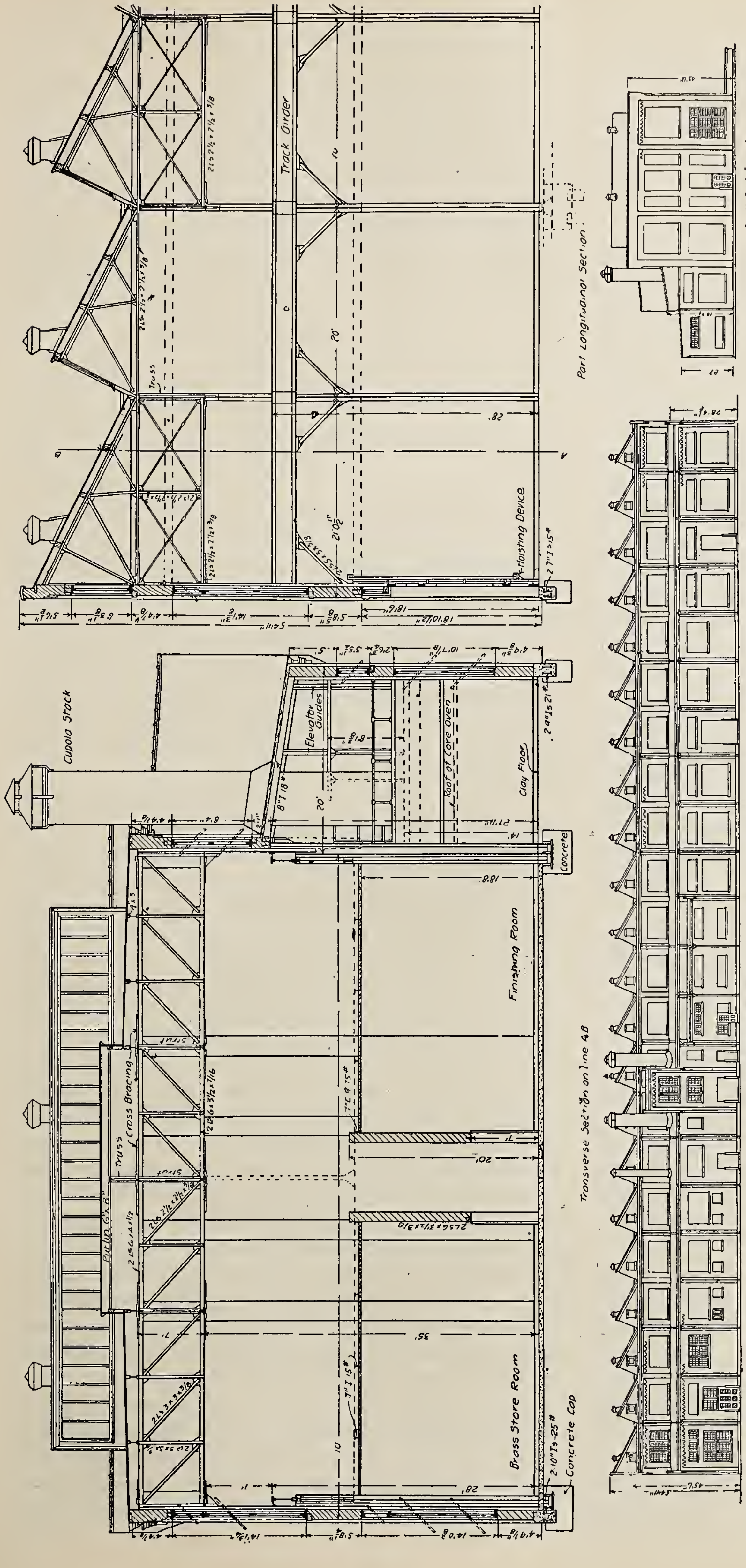
The air compressors have both steam and air cylinders of 18 and 24 x 21 ins. They deliver air at 125 pounds pressure in the engine room which, however, is reduced to 100 pounds in the piping system. There are no reservoirs or receivers used in this system, they being unnecessary because of the volume of the large distributing pipe, which is 10 ins. in diameter and 1,000 ft. long, and gives ample storage capacity.

As can be seen in the illustration of the interior of the engine room, a section of the floor is cut away, giving an opening to the basement, above the location of the large pumps. These consist of a large underwriters' fire pump, a Laidlaw-Dunn-Gordon service pump and the hydraulic pump. The first of these is an 18 and 10 x 12 ins. of a simple Duplex type, and has a capacity of 500,000 gallons an hour. The service pump, which supplies the water for the whole plant, has steam cylinders 12 and 13 1-2 x 12 ins., and water cylinders 12 ins. in diameter. The Snow pump for the hydraulic system has cylinders 20 and 4 ins. in diameter by a 12-in. stroke, and gives 1,500 pounds pressure.

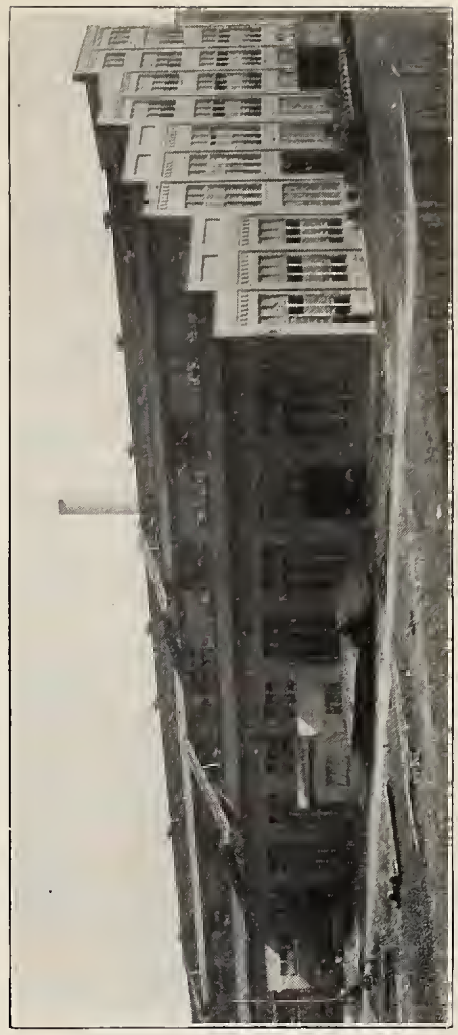
An ingenious method of control is used on the hydraulic pump, which consists of a weighted throttle on the steam line, held open by the pressure of water on the piston in a cylinder below, which is connected to it by a vertical rod. A line of pipe extends from this cylinder to a valve at the accumulator in the boiler shop which is automatically opened to either city pressure or atmosphere as the accumulator falls or rises, the weight on the throttle being sufficient to force the water out of the piping when the accumulator rises to the predetermined height and opens the valve to the atmosphere.

A noticeable feature in the appearance in this engine room is the absence of all piping above the floor level. This part of the plant was given much careful study, and is very simple and satisfactory. Directly back of the boilers is located the 12-in. main steam header, which is in two sections of about equal length. These main headers are paralleled by a 6-in. auxiliary line, tapped at each end, and there is also a 6-in line connecting between the headers, as well as an 8-in. connection between the two inner batteries of boilers. This use of the large and small parallel mains takes care of expansion strains and allows the use of a smaller pipe than would have been otherwise necessary. It also keeps the piping warm and avoids the necessity of ever cutting any cold headers into the system. The engine and pump connections are taken from the main header below the floor and rise to their connections. These lines and headers are carefully drained, and there has been no trouble from condensation. There is a 10-in. steam main carried from the main header through the tunnel for furnishing live steam into the shops. All piping and valves in the plant were furnished by the Crane Co. The exhaust steam, except from the fire pump, which is always open to the atmosphere, is used for heating, being carried through a tunnel line, or it can be thrown to the atmosphere if desired. The exhaust from the hydraulic pump, which works at nearly full strike, is carried to the dry kiln.

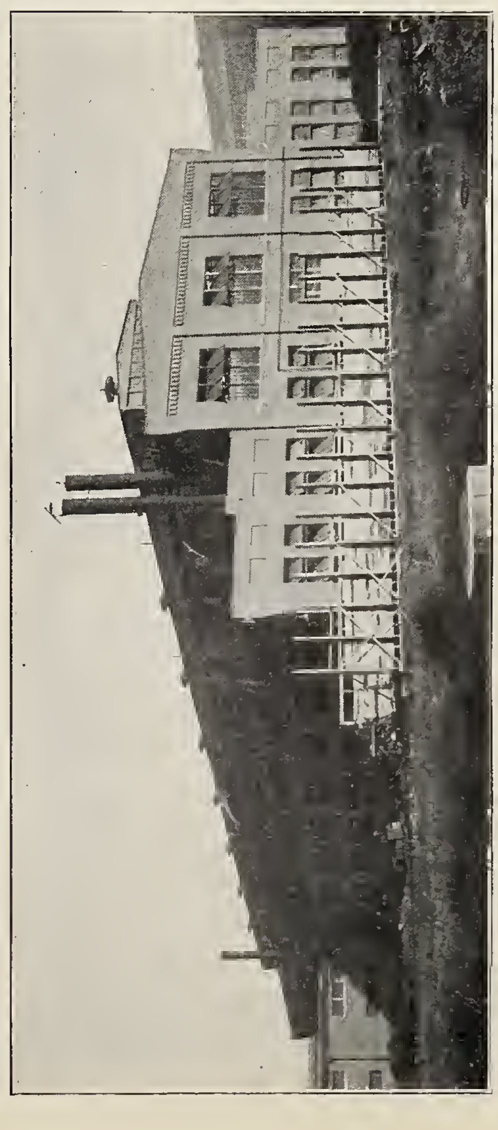
The main switchboard in the engine room contains nine panels, consisting of three generator panels, each having a double-pole circuit breaker, a 2,500-ampere ammeter and double-throw main switches. Next follow two instrument panels containing two totalizing ammeters, one for light and the other for power, two recording voltmeters, a 4,000-ampere integrating watt-meter for power circuits, and a 2,000-ampere in-



ELEVATION AND SECTION OF FOUNDRY—L. & N. SHOPS AT SOUTH LOUISVILLE



WEST END ELEVATION OF LOCOMOTIVE SHOP— L. & N. SHOPS AT SOUTH LOUISVILLE



BLACKSMITH SHOP—L. & N. SHOPS AT SOUTH LOUISVILLE strument for lighting circuits. Also ground-detecting devices, tie switches, station volt meter switches, etc. The four remaining panels are for feeder circuits containing circuit breakers, ammeters and switches. These switchboards were built by the Western Electric Co., according to plans and specifications prepared by Ward Barnum, electrical engineer of the L. & N. Railway.

The Foundry.

This building is located in the most northerly position of the group as can be seen by referring to the general layout published in the November issue. It is placed in line with the other buildings along the crane runway, which ends at a point about the center of this building. The building itself is of the same general design as the others, having steel framework and brick walls with sufficient window area to give good light. Nearly all of the windows in the side and end walls are hung on pinions and can be swung and held at any desired angle by gearing operated from the floor. The main or upright part of the building is 70x318 feet, and is covered by a single span, there being no intermediate posts. There is a narrow addition on the west side, 20 feet wide, running the full length of the main section. Most of this area is included in the main floors, but part of it is taken up by the cupolas, sand storage bins and core ovens.

The general construction of the steel work can be seen from the cross sections shown herewith. The roof over the main floor is of the saw tooth type, with the side nearer the vertical facing the north. This section is practically all glass while the sloping sections and flat portions are of wood covered with composition roofing. The roof over the annex is of concrete covered with composition roofing.

A 20 ton Niles electric crane spans the whole width of the main section running the whole length of the building. The runway supports are independent of the building columns but are placed adjacent to them. The floor is divided into three sections by low brick walls about 4 feet high, above which is about 8 feet of open iron work. The largest area, comprising about two-thirds of the total is the iron foundry. The next section is for core work and the next the brass foundry, beyond which are two separate rooms, with a passage between them, one of which is used as a general store room and in the other the tin and babbitt work is done. The floor of the iron foundry is of sand and the others of cement.

At the south end of the iron foundry are the benches and emery wheels for cleaning, and on a platform on the east side are the rattlers. This platform extends outside the building and is at the same height as a car floor. A loading track is located along its east side. It is also under the crane runway, and from it all loading and shipping is done.

The larger and heavier castings are moulded at the north end of the floor and there is a core oven in the annex near here. A pit is provided for the cylinder flasks so that they can be poured from the level floor. The foreman's office is about the center of this floor on the east side on the main floor level.

There are two Whiting Foundry Co. cupolas, of 80,000 lbs. capacity each placed in the annex at about the center of the iron floor. The charging floor is reached by an elevator and an outside stairway just back of and between the cupolas. A system of narrow gage tracks reaching all storage yards for pig iron, coke, scrap, etc., and equipped with turntables at junctions, has a track leading into the elevator, which is also equipped with a turntable. On the charging floor, two tracks, one to the door of each cupola, are provided. Scales for weighing raw material are located near the outside entrance. The blowers are driven by motors, both of which are hung from the charging floor, one set on either side of the cupolas. A narrow gage track runs from in front of the tap holes along the west side of the floor to near the north wall. The large ladles are on cars, fitted for this track. They also have bails by which they can be lifted by the crane.

A two story addition to the west of the building has wash rooms and lockers of expanded metal, furnished by Merritt & Co. There are also shower baths in this building.

In the core room are benches and floor space for mixing and moulding of cores. The ovens, of which there are four, are heated by open coke fires, the stove being placed in one corner of the oven, with a small vent over it. The cores are placed in racks along the sides and are handled by hand.

In the brass foundry is a liberal space for flasks on the cement floor and benches around the sides. The metal is heated in a double Rockwell melting furnace of 1,000 lbs. capacity and a Schwartz melting furnace of 1,200 lbs. capacity. Both of these use oil for fuel. The rotary blowers, one for each, are located near by and driven through a counter shaft from an electric motor. A small coke oven of the Eli Milletts patent and furnished by Manning, Maxwell & Moore, is provided. This is for small cores which are dried on swinging shelves in a brick framework forming the flue.

In the tin and babbitt department is the apparatus for filling car brasses, pouring piston and valve rod packing, turning crossheads, etc. A lathe is provided for turning packing and two boring machines for car brasses. One of these is a two spindle machine from Niles Tool Works and will turn eight brasses at a time. A machine for magnetically separating the iron from brass trimmings and filings is in this room. This is a Ding's Electric Magnetic Separator and consists of a series of magnets on a plate revolving horizontally and just above the trough down which the filings are passed. The magnets attract all the iron, which is scraped off into a separate chute.

A three story building just west of the foundry includes the pattern shop and storage rooms. The shop occupies about half of the first floor, the remainder of which, and the other two floors are used for storage. An elevator in the center provides communication between the floors.

A track running into the foundry also enters this building. The building itself is entirely fire proof, being built of steel, concrete and brick. The windows are of wire glass. The shop has a number of pattern makers, benches and the usual pattern shop tools, including band saw, buzz planer, rip saw, turning lathes, etc. These tools are mostly from J. A. Fay & Egan Co., and the Oliver Machinery Co. In the storage rooms are racks for patterns, one of which is shown herewith. These are constructed of old boiler tubes and make a very clean, light and fire proof rack.

Truck Shop and Sub Store.

This building, which is located along side of the crane runway between the foundry and the blacksmith shop, is used for building new trucks in one section and also has a large store room for freight car material as well as a pipe shop.

The building itself is about 90x200 feet, built of steel frame work and brick walls. The roof is gable with a wide high monitor running the full length of the building. The sides and ends of the monitor are nearly all glass, giving a well distributed light on the floor below.

About a third of the building, in the end toward the foundry, is used for truck work. Two erecting tracks which continue outside underneath the crane runway are provided. A complete equipment for turning axles, boring wheels and pressing them on is found here. This consists of three Niles double ended axle lathes, two single axle lathes, three Niles steel boring machines, a wheel lathe, two wheel presses and an emery wheel. Air and chain hoists are provided for handling wheels and axles to the machines. All of these machines are driven from counter-shafts belted to motors. The shaft in the case of the boring mills is placed on the floor alongside of the machine.

There are several tracks just north of this building which pass under the crane runway and the full width of the building for the storage of mounted wheels. A large area to the west of this section is used for the storage of wheels and axles.

The stock of bolsters, springs and castings is stored beneath the crane runway opposite the building. The arch bars and bolts are made in the east end of the blacksmith shop nearby. From this it can be seen that all the material for the manufacture of new freight car trucks is convenient and trucks can be erected very rapidly.

The freight car store room which is about the same size as the truck shop, is simply a large room with shelving along the sides where material for freight car repairs, including small castings, brake rigging, car roofs, air hose, nails, screws, etc., are stored. No heavy material is kept in this room.

The pipe shop, which occupies the south end of the building, has large racks for storage of pipes, benches and vises for pipe work and two pipe threading machines. There is also an apparatus in this room for fitting up air hose.

Personals.

Mr. B. H. Hawkins has been appointed master mechanic of the Delaware Lackawanna & Western at Buffalo, N. Y., succeeding M. F. W. Williams, resigned.

Mr. Benjamin H. Glover has been appointed superintendent of motive power and way of the Metropolitan West Side Elevated Railway at Chicago.

Mr. Arthur C. Colson has been appointed master mechanic of the Dunkirk Allegheny Valley & Pittsburg at Dunkirk, N. Y., to succeed Mr. Clarence A. Sherman.

Mr. W. L. Garland has been appointed assistant general foreman of shops of the Pennsylvania Railroad at West Philadelphia, Pa., succeeding R. T. Garland, deceased.

The title of Mr. W. F. Ackerman, master mechanic of the Chicago Burlington & Quincy, lines west of the Missouri river, at Havelock, Neb., has been changed to superintendent of shops.

Mr. J. A. Blair has been appointed master carpenter of the West Pennsylvania division of the Pennsylvania Railroad at Pittsburg, Pa., vice Mr. C. W. Richey, transferred, effective on November 1.

Mr. W. H. Wilson has been appointed superintendent of motive power of the Buffalo Rochester & Pittsburg, with headquarters at DuBois, Pa., vice Mr. E. E. Davis, resigned, effective on November 15.

Mr. T. B. McCarthy, who recently resigned as general foreman of shops of the Southern Pacific at Ogden, Utah, has been appointed machine shop foreman at the Pittsburg works of the American Locomotive Company at Allegheny, Pa.

Mr. L. Strom has been appointed master mechanic of the Mexican Central at Mexico City, Mex., succeeding Mr C. H. Burk, who has been transferred to Chihuahua, Mex., as master mechanic, to succeed Mr. W. J. Wilcox, resigned, effective on November 1.

Mr. W. G. Hodgkinson has been appointed roundhouse foreman of the Lake Shore & Michigan Southern at Collinwood, O., in place of Mr. W. F. Kuhn, who has been appointed roundhouse foreman of the Dunkirk Allegheny Valley & Pittsburg at Dunkirk, N. Y.

Mr. W. G. Tubby, heretofore general storekeeker of the Great Northern, has been appointed chief of the division of materials and supplies of the Isthmian Canal commission,, with headquarters at Cristobal, Canal Zone, succeeding Mr. E. C. Tobey, paymaster, who has been recalled for service in the United States navy.

Mr. E. A. Williams, heretofore assistant general manager of the Erie, has been appointed general superintendent of motive power of that system. Mr. G. W. Wildin will continue as mechanical superintendent, with jurisdiction over the eastern lines, and Mr. J. H. Manning, heretofore superintendent of motive power of the Deleware & Hudson, has been appointed mechanical superintendent of the western lines of the Erie system, including the Cincinnati, Hamilton & Dayton and Pere Marquette.

The sudden death of William E. Wood, division agent of the Lackawanna Railroad at Syracuse, is keenly felt not only by the officials of his company but the entire personnel of the road. Mr. Wood was thirty-five years old and was connected with the company for more than eighteen years prior to his death, which occurred at his home in Syracuse. Starting as a local agent Mr. Wood gained promotion by his loyalty, integrity and ability, while his personal qualities endeared him to the communities in which he lived. When the present management of the Lackawanna Railroad assumed control Mr. Wood was local freight agent at Syracuse where his admirable work at once attracted notice and his loyalty, faithfulness and ability gained recognition in the promotion to the position of division freight agent, having jurisdiction of Lakawanna territory north of Binghamton. In that position, by his energy and personal charm, he not only gained substantial increase in business for his company but won the deep and affectionate regard of a wide circle of friends. Both by officials and employes he was held in the highest esteem and while he had not been in good health for a number of months his sudden death came as a severe shock to all. He leaves a wife and one child.

Poldi Tool Steel.

At this time when steels for tools and for high speed cutting are exciting the attention of the shop manager, anything new in that line is of interest. Poldi steel, which is a product of Austria, is a high grade steel well known abroad, but not as well known in this country, as it will be now that the old house of Peter A. rasse & Co., of New York, is handling it. These steels are made of the purest Styriars Eisenburg Iron which fact places them in the front rank among makes of carbon and high grade steel, especially high alloy steel such as the very hard, bath hardening, and high speed steels. Their use is indispensable for machinery subject to severe stresses and great wear, and one quality of this has the unique property of preserving its original shape under hardening and tempering, which makes it especially valuable as a material for taps and dies. This high speed tool steel is guaranteed to produce results in rapid output that will stand as a high speed record. The Brooklyn Navy Yard has recently made some extensive tests of Poldi high speed steel and have adopted it as a valuable factor in government work.

The Andrews Cast Steel Truck Frame.

The American Steel Foundries, Chicago, has now control of the Andrews cast steel side frame for car trucks, and as an earnest of what they propose doing with this important improvement in truck construction, report orders for it for 1,000 cars, from the Chicago, Lake Shore & Eastern, and for 500 cars from the Hocking Valley, besides the order to equip 1,250 cars from the Pittsburg & Lake Erie. As Whitcomb Riley would say, this is doing pretty well. For the information of those who do not recall the prime features of the Andrews truck frame, in need of enlightenment, it will only be necessary to say that the steel side frame is a casting designed on engineering lines to take the place of the arch bars so long used in truck construction. Each side is cast in one piece, and of a section to give maximum resistence to the load with the least weight of material. This is done by making the top and bottom of the frame with flanges which are united by a central web. This design has the advantage of replacing three wrought iron arch bar members and a heavy cast iron truck column casting and its bolt, with one casting of steel. It is a move in the direction of making a truck safe under heavy capacity equipment, and for that reason will no doubt convert many who have been addicted to the arch bar habit.

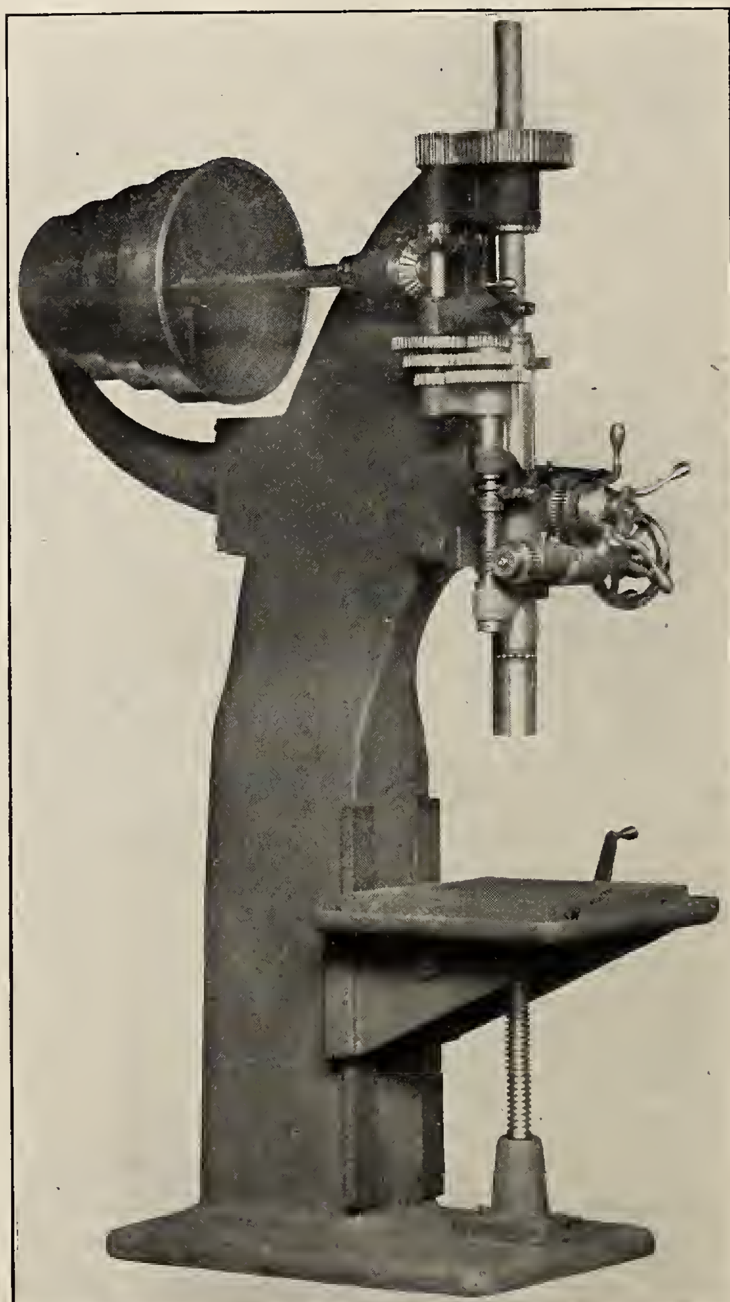
No. 20 High Duty Drill.

Recognizing the demands for a heavy single spindle drill of medium swing, but of great stiffness and pulling power, Foote, Burt & Co., Cleveland, O., have brought out the machine as shown in the accompanying illustration.

This drill has a spindle of forged high carbon, open hearth steel 2¼ inches diameter in the sleeve and 2⅛ inches diameter in the upper section. A No. 4 Morse taper is in the nose. The sleeve is 23 inches long, 3⅝ inches diameter with ball bearing thrust collar of their own make. The balls are ⅝ inch diameter which are absolutely guaranteed to stand up to the hardest usage continuously without breakage of balls or crushing out of collars.

There are three changes of geared feed, any one of which is instantly available by simply shifting a lever. There is no stopping of machine, shifting of or lacing belts. The lever is simply moved and one has the desired feed which can be either power feed, hand worm feed, automatic stop or quick return.

The miter gears are forged steel with planed teeth. The table is fitted to column by a square slide and clamped by the straps. It is furthermore supported underneath by a 2 inch square thread screw which acts as a solid jack and at the same time elevates the table. It is the most rigid construction possible out-



NO. 20 HIGH DUTY DRILL

side of a solid box. It is made in two sizes of 24 inch and 36 inch swing.

The principal dimensions are as follows:

Maximum distance from nose of spindle to top of table, 32 inch.

Power feed to spindle, 16 inch.

Size of spindle, 2¼ inch in sleeve.

Taper in nose of spindle, No. 4.

Distance from center of spindle to column 12 inch or 18 inch.

Three changes of feed to spindle, .007 inch, .016 inch and .033 inch.

Thrust of spindle is taken by hardened steel balls races.

Size of spindle driving gear, 10½ inch diameter, 2½ inch face.

Spindle feed rack is steel, 1¾ inch face.

Size of table inside of oil groove, 20x20 inch with two T slots.

Size of drive pulley, 13-15-17-19 inch diameter by 4½ inch face.

Countershaft running 225 revolutions gives 46-60-77-99 revolutions to spindle.

Weight of machine 2680 pounds.

Turret Tool Holders.

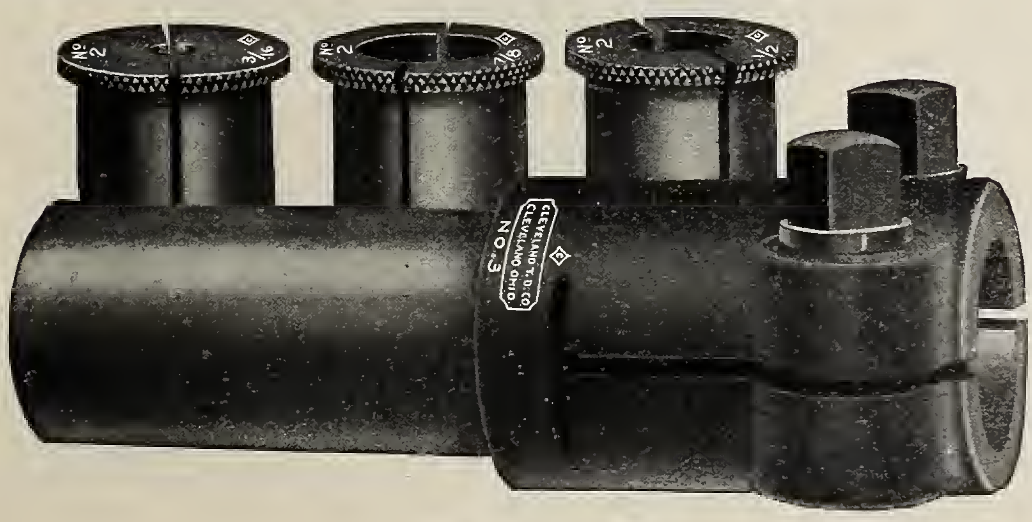
Tools in sets and designed especially for turret lathes and screw machines receive the hearty endorsement of all who are fortunate enough to have machines of this kind in their shops.

Having had considerable experience with machines of this nature and realizing fully the needs of others, the Cleveland Twist Drill Co., Cleveland, O., recently designed tools in sets to be used for turret lathes and screw machines. Some of the advantages in having tools in sets may be obtained from the following example. Supposing an article is being operated upon that must have a 13-16 inch finished hole. In this case a 25-32 inch twist drill, one chucking reamer to follow drill, and one finishing reamer of exactly 13-16 inch diameter would be used. When these tools are furnished in sets all would be practically of the same length with the same sized shank. Their uniformity of size and adaptability will save considerable time in setting up the job, and, therefore, lends considerable assistance toward reducing the cost of production at the same time insuring accurate duplication.

In connection with these tools the tool holder illustrated herewith is of considerable interest. This idea was worked out through their own demands, so its efficiency was carefully demonstrated in actual practice, and they now feel that their patrons should share in the benefits derived from its use.

The holder consists of a piece of special high grade steel, spring tempered with a round shank on one end and a hole for the collets at the other end. This hole is split and has two clamp screws for holding the collet. The clamp screws are made of tool steel and hardened. The shank of holder is ground to fit in the turret, and is held in the usual manner. The spring collets are ground to fit the holder and when the tool is inserted and clamped it is held rigidly in a central position. The collets are split within a short distance of the back ends and when in proper position extend beyond the slot in the holder, preventing oil from running out. The regular style spring collets are intended for straight shank tools, but can be made with taper holes if desired.

The holders are made in three sizes with collet holes of ¾ inch, 1 inch and 1¼ inch diameter. The collets corresponding to these sizes of holder have holes ranging from 23-64 to ⅝ inch for the ¾ inch, ½ to ⅞ inch for the inch, and ¾ to 1⅜ inch for the 1¼ inch. Holders and collets of different sizes can be made on application. The manufacturers would be pleased to give further information upon application.



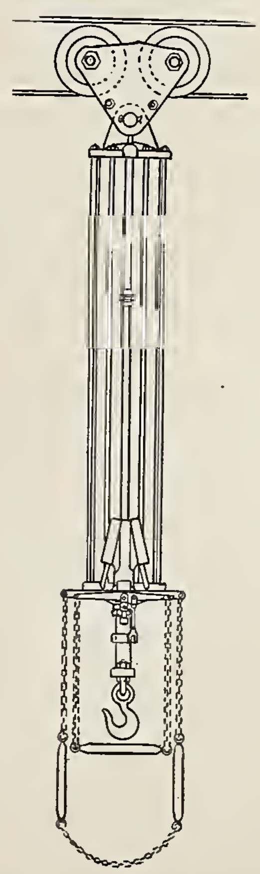
TURRET TOOL HOLDER

Air Hoists and Cranes.

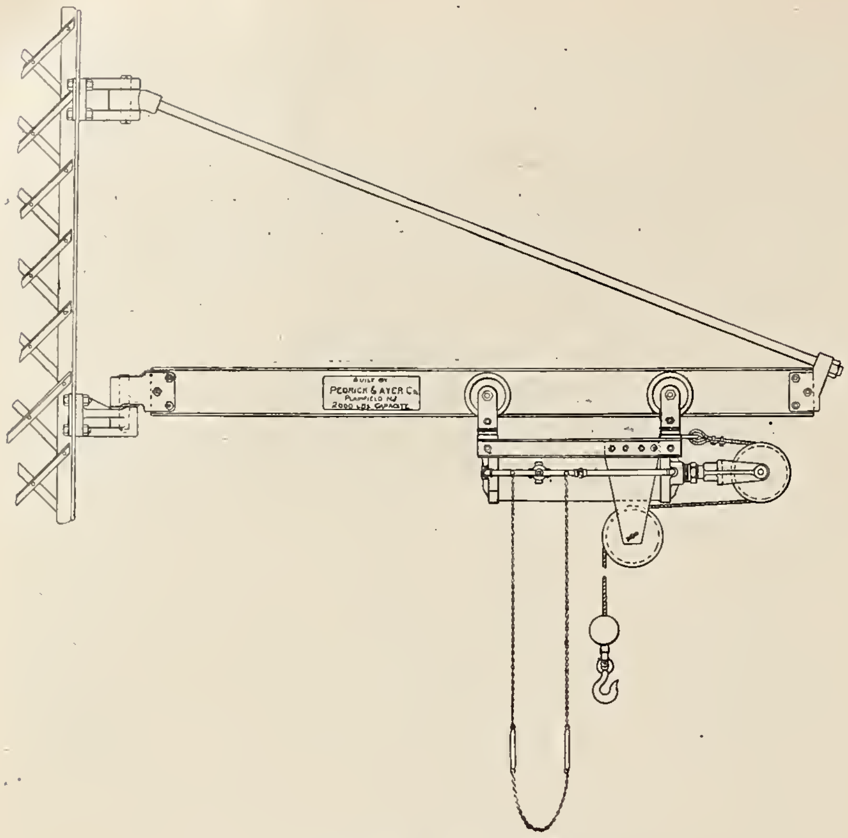
Our illustrations represent two designs of air hoists and the crane on which they operate to drive tools, and in assembling of heavy work. The cranes are of the simplest possible construction, having in their make-up nothing but an I-beam of standard section, on which the trolley carrying the hoist travels, and a tension member, both of which are fitted with steel castings and are pivoted to the wall or post, are not new as an idea for quickly handling loads in a shop, but it is a notorious fact that very few shops are equipped as they should be with these most efficient aids to expense reduction, and fewer still having hoists in commission that are as safely and easily manipulated as these, built by the Pedrick & Ayer Company of Plainfield, N. J.

They are air balanced, having pressure on both sides of the piston, and are fitted with a friction collar on the rod so that it is a matter of indifference in what position the hand chains are released, since the hoist will maintain its position as long as there is any air in the main reservoir. Even though the air pressure may be varied in the main reservoir, these hoists will sustain the load in position as long as there is sufficient pressure to lift the load. By means of the double valve with which they are fitted, the range of speed may be made to suit any requirement, one being for high speed and the other for slow movement, making it possible to get an adjustment of the load to a hundredth part of an inch in either direction, and such action is absolutely positive.

In the hoists shown we have one each of the horizontal and vertical types. The first mentioned is a special multiple hoist designed to have two feet of lift for the load for each foot of piston stroke, which adapts the hoist to situations where head room is restricted, and where maximum lift is



AIR HOIST AND CRANE



AIR HOIST AND CRANE

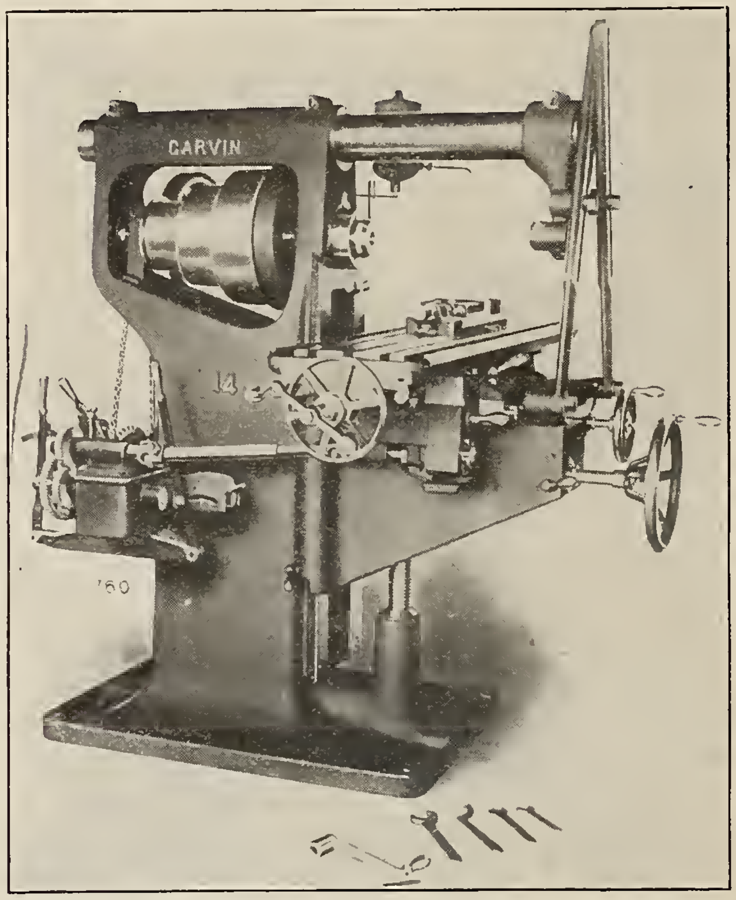
desired. This type of hoist is one of the most useful devices for heavy tools in confined places, as it is of 2,000 pounds capacity. The vertical hoist is of like capacity, but is designed for general use where room is unlimited. The shops when these hoists are built are fully equipped with the labor savers, as every other shop would find it to its advantage to be. There is too much valuable time squandered in handling material by the human vital force method in all shops, and railway shops are the greatest offenders of all in this respect, for there are too many of them that yet hold brawn superior to any other means for handling work in and out of machine tools.

Garvin No. 14 Plain Milling Machine.

The milling machine represented in our halftone is designed for heavy service, and has some exclusive features in combination with the general character of design to secure efficiency by a great increase in driving power, also in transmission of feed by the most direct means, as well as the very liberal dimensions of important details. The three step cone is made for a four-inch belt, and is back-geared eight to one. The arm is steel, of large diameter, and is provided with heavy braces, which can be attached to the arbor yoke, or to the end itself, independent of the yoke. The arbor yoke carries two style centers for tit or collar bearings for arbor. The spindle is of forged crucible steel, with a taper front bearing, and runs in a solid bronze box, self oiling, and fitted with hardened and ground thrust washers.

The construction of the knee is one of the strong points of the machine and covered by patents. The knee is absolutely closed on top and sides, which eliminates all spring, and also the need for cover plates for protection to the feed mechanism. The bearing on the column is also extended, increasing the stability of the knee against heavy cuts and feeds in overhang work. The table feed screw is extra large and of rapid pitch, giving one inch advance per turn. These screws will not start back when tripped under cut. The application of power to the feed screw is direct, by a large bronze worm gear on the screw, and driven by a hardened tool steel worm running in oil. Reverse is provided for in the feed box. The feed drive is through a change gear box in which fine feeds are positively driven from the spindle, and coarse feeds from the countershaft. A safety shear pin is provided in the box, to prevent a smash-up from carelessness in setting trips. All these points are subjects of patents.

Tests made by the makers of this tool have demonstrated that 30 per cent. of the power of a spindle belt is used in driving the feed at high rates, and when the feed is driven from the countershaft, the spindle power is increased by that much, and the saving, in addition to increasing the back gearing and widening the belt, has resulted in more than doubling the power of the machine. The table feed screw has two nuts, one of which is adjustable for take up; the saddle in and out screw is also provided with a take-up nut. The elevating screw of the knee has a ball thrust, and also telescopes, so that no hole is



GARVIN NO. 14 PLAIN MILLING MACHINE

required in the floor. The hand wheels on the knee are interchangeable for the convenience of the operator, and micrometer adjustments are on all feeds. The spindle speeds are in geometrical progression, and the spindle has No. 10 B. & S. taper hole, with positive screw-drive and screw draw-in rod for arbor. The speeds range from 12 to 450 revolutions per minute. The feeds range from 0.004 inch per turn of spindle to more than 12 inches per minute. The machine can pull a cut 5-32 inch deep and 5½ inches wide at nine inches per minute with single belt on cone. The automatic feed of table is 28 inches; adjustment in line with spindle is eight inches, and the vertical adjustment under spindle is 19 inches. The machine set up ready for action weighs 2,520 pounds, and is built by the Garvin Machine Co., New York City.

The Landis No. 3 Universal Grinding Machine

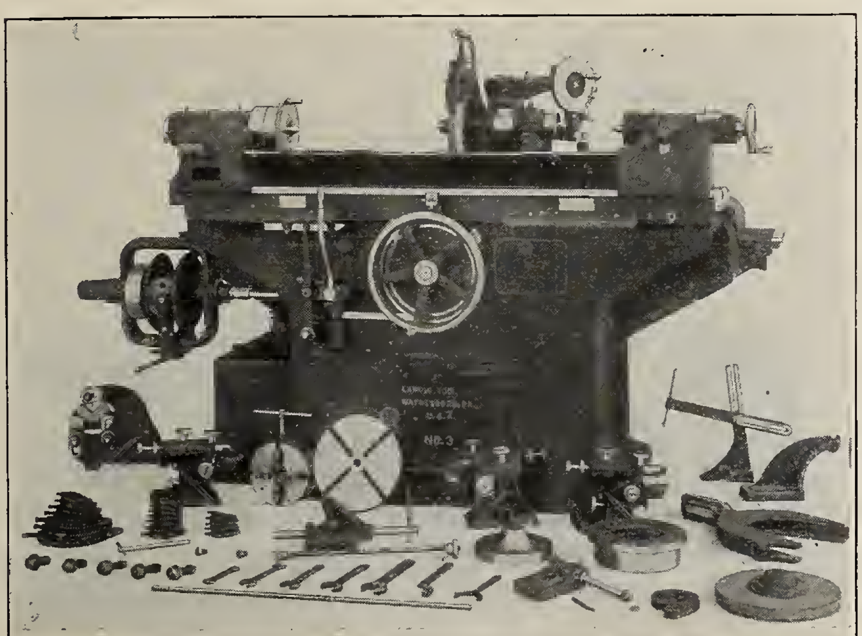
The universal grinding machine of the Landis Tool Co., Waynesboro, Pa., shown in our halftone, is one of the tools of its class that is especially adapted to either new or repair work in railway shops, being one of the indispensibles of tool rooms also, when equipped as it should be, with attachments which give an added value to a good tool. The term universal seems to be nicely chosen in this instance, for the machine is as near universal in the range of work it can do, as well as universal in its adjustments to accomplish results, as possible to make it.

The head stock is made to swivel, the amount of setting over being indicated in degrees. The spindle is of high grade hardened steel, ground to size, of liberal proportions, and works in bronze adjustable bearings. The table is made to swivel, and the degrees of taper are indicated as well as the amount of taper per foot. This setting is effected by means of a fine screw adjustment at the end, which affords a range of movement to the limit of the graduations. When such limit needs to be exceeded, the adjustment is made by simply lifting a pin. The foot stock spindle is operated by a hand wheel, and is arranged to be used with a spring tension or to be rigidly supported by the work. This is also made of high-grade steel and finished to size by grinding.

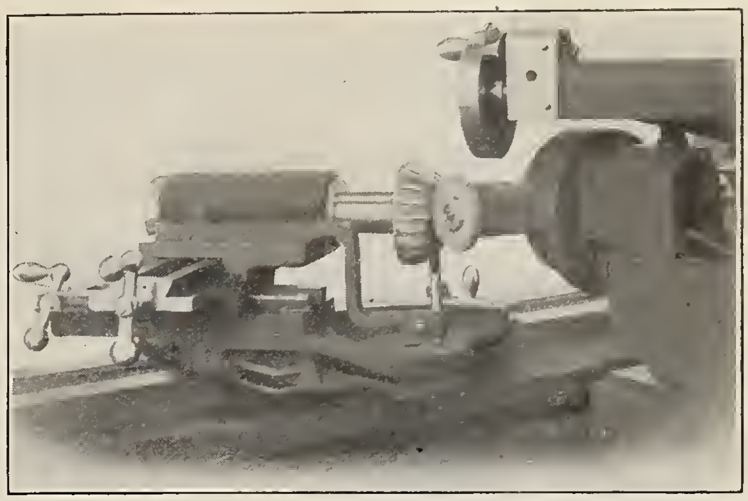
The emery wheel spindle is of the same material as the above and is finished to size by grinding, running in self-oiling boxes which are adjustable. A fine lateral micrometer attachment for the adjustment of the spindle, is graduated to read in the thousandths of an inch for grinding to shoulders. The emery wheel slider movement, is by means of a hand wheel graduated to read in thousandths of an inch on work diameters. The slider has a variable tension spring to take up loose action in the cross feed rack and pinion. The base on which the slider is mounted is also made to swivel and is graduated to read ninety degrees either side of the center line.

As a railway shop tool, the scope of this machine is practically without a limit. For grinding reamers (and there are few that don't need such treatment oftener than they get it), in backing off and bringing up the cutting edge; dressing up the teeth of milling cutters either plain, side, angular, concave or convex, or any other kind of a milling cutter, this machine has won a record unsurpassed, simply because it has the accessories to do the work.

One of the attachments is devised and used for the purpose of backing off and dressing up reamer teeth and grinding side teeth of side milling cutters as noted above. Another attachment to this machine recently gotten out, on the special order, and similar in its functions to those already named, is that shown in our halftone, of a device for grinding ball-joint cutters, which are also cutting tools used in every railroad shop on earth, on pipe work, and especially on steam pipe and nigger-head joints, and is also used on concave and convex surface mills. This attachment is designed for application to the Landis Nos. 2, 3 and 4 grinding machines. There are two slides which are set at right angles to each other, for adjusting and locating the point from which the radius of tooth arc is taken, the settings of which are indicated by graduated scales. The rest arm is clamped to a platform on either side of the work, carrying a spindle on the upper side, the surface lines of which coincide and are relative to horizontal center line of spindle in order that the point of the rest coincides with the center line with the same setting of the blade when using in either position, that is, resting work from below or above. The scales indicating settings of the slides are furnished with either ordinary or metric systems as required.



NO. 3 UNIVERSAL GRINDING MACHINE



CONCAVE AND CONVEX GRINDING ATTACHMENT

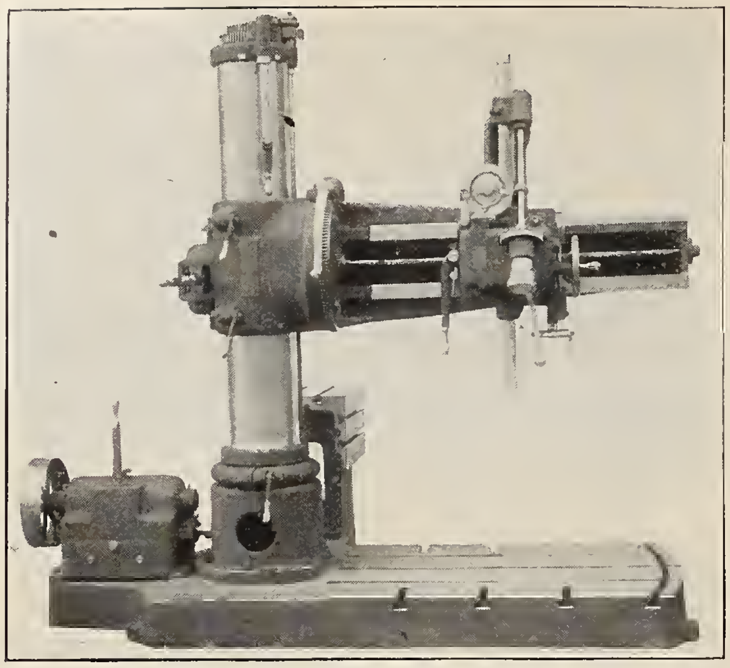
The Bickford Universal Radial Drill.

In the Bickford radial drill, which is represented by our half-tone, will be seen a tool that is the result of concentration of the best thought in drill design and construction, which is shown in the perfection of details that make for rapid and accurate output, a few of which are enumerated below. The driving mechanism located at the base of the machines is a long stride in advance of the cone device for the purpose, consisting of a pulley, four pairs of gears, two friction clutches and an operating lever, by means of which any one of the four speeds are instantly available, without the usual gymnastics attending the shifting of a cone belt. This is the new way, giving a constant belt speed, whereas, with the cone, the belt speed is lowest when it should be highest. The belt contact with a cone is least when it should be greatest, but by means of this single pulley drive it is always the same, that is, one-half of the pulley circumference, and this in turn makes it possible to use a belt of only 50 per cent of the width required in the old drive. In addition to the drive speeds, the spindle has sixteen changes of speed arranged in geometrical progression, and is provided with hand and power feed, quick advance and return, safety stops, automatic trip, dial depth gage and lever reverse.

The back gears are fitted with friction clutches which, without stopping the machine, give four changes of speed for each position of the driving gears.

There are eight rates of feeds ranging in geometrical progression from 0.007 to 0.064 inch per revolution of spindle, each of which are, like the speeds, at the hand of the operator, and requires but the slightest move to be put in instant action. The automatic trip operates at as many different points as there are depths to be drilled at one setting of the work. It leaves the spindle free, after any intermediate tripping, to be advanced, or raised and advanced, or traversed its full length, without disturbing the setting of the dogs, and besides these convenient features, it also throws out the feed when the spindle reaches the limit of its movement. A double advantage is had in the use of the depth gage, which, besides giving accurate readings from zero to any depth, eliminating all anxiety as to where the drill point is, it supplies an accurate means of setting the automatic trip, the graduations giving at once the location of each dog for releasing the feed at any desired point. The saving of time alone by means of this depth gage, not to consider the absolute accuracy of results, will strike the user of these machines as one of the finest things ever devised for a drill.

There is a tapping mechanism incorporated in the head of the machine, that is a close second with the above for favorable comment, since it allows the backing out of taps at any speed within the range of the machine, without any reference whatever to the speed used in entering them. It is fitted with a friction clutch which is operated by the lever seen pro-



BICKFORD UNIVERSAL RADIAL DRILL

jecting down over the face of the arm, this lever starting, stopping and reversing the spindle.

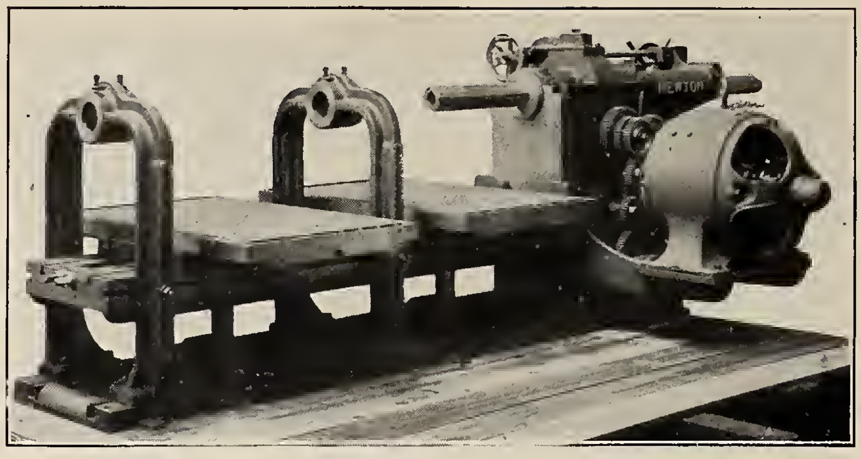
The head works at any angle and has an improved locking device, which, instead of compressing the faces of the arm, expands them in the saddle, whereby the combined twisting and bending stresses are effectually overcome. These drills are also designed for electric drive when so desired. As they stand, however, it will be conceded that there is little room for improvement in them with any character of drive, and that they are in truth entitled to the term universal.

Some Newton Machine Tools.

Our illustrations of tools built by the Newton Machine Tool Works, Philadelphia, represent some machines designed expressly for use and now in service in railway shops. Strictly modern in every sense, in all points of design, and with electric drive, they are seen to be up to the highest standard of the American tool builder.

The horizontal boring machine shown is a tool furnished the Juniata shops of the Pennsylvania R. R. for boring driving boxes. The spindle of the machine is five inches in diameter and has a continuous automatic feed of 60 inches, with 6 changes of gear feed running in geometrical progression from 0.0072 to 0.2646 per revolution of spindle, and has hand, slow and quick adjustment. The spindle is driven by a phosphor bronze worm wheel and hardened steel worm of rapid pitch running in oil, and has a ratio of eleven to one, through back gears of a three to one ratio. The ten h. p. motor has a speed range of three to one, and with back gears in, the machine has a total driving gear ratio of thrirty-three to one.

The worm and gear is a particularly advantageous drive where work of this character is to be machined, that is, where the hole to be bored is not a complete circle, as the motion is continuous, having no back lash as is found in spur gear drives, the smoothness of this drive eliminating all vibration and chatter. The machine has two carriages, 36 inches wide by 60 inches long, having a cross adjustment of 36 inches. The maximum distance from center of spindle to carriage is 26½ inches, and to knee 32½ inches. With the use of fixtures, four driving boxes are bored at one time, two being set up on the end of each carriage. While the first four are being bored, the operator is setting four more on the other end of carriage. When the first four are finished, the carriages are run to place, and the cut is started in the second four. Two yokes support the boring bar. Another machine of this same design, but having one carriage only, has a record of boring four boxes in two and a half hours.

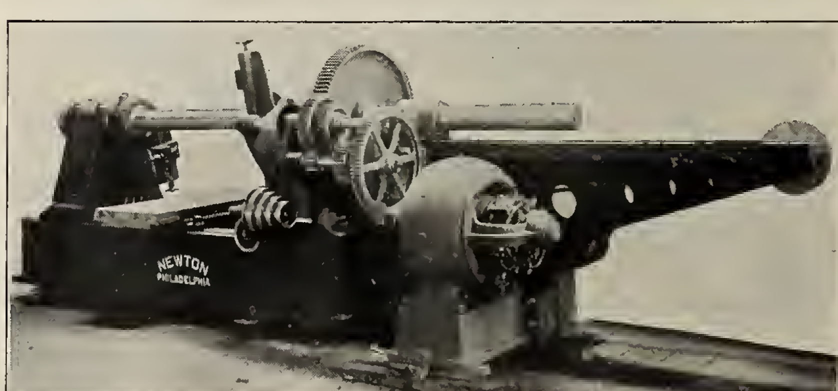


NEWTON HORIZONTAL BORING MACHINE

Many railroad shops are today using a lathe to bore driving boxes, yet with a good lathe and a good man behind it the best that can be done in four boxes in ten hours, or 25 per cent of the capacity of one of these new tools. Comparison with these stock removers only serves to emphasize the need of them in railroad shops.

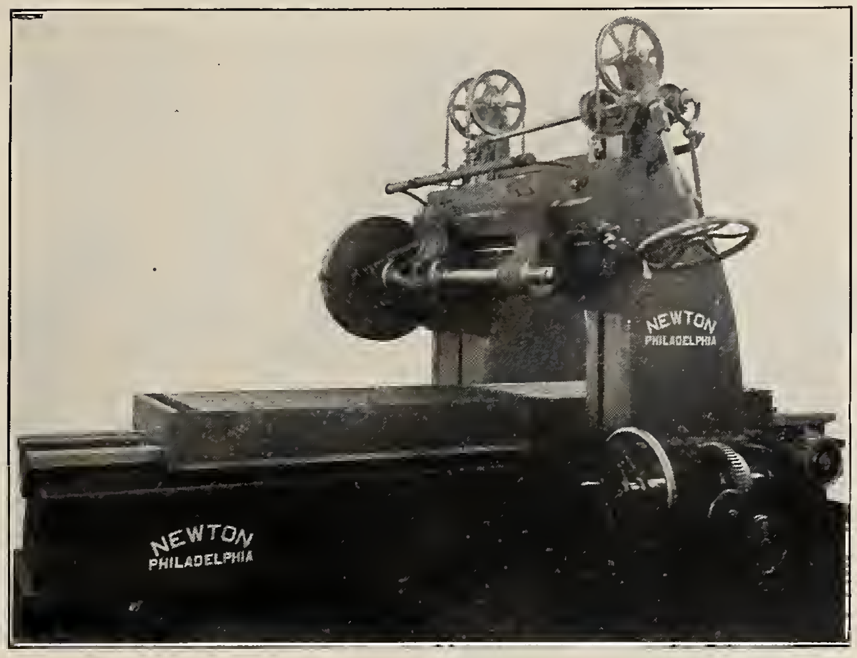
The No. 2 locomotive cylinder boring machine shown, is also one of improved railway shop tools designed for heavy work, having a spindle six inches in diameter, and a drive through spur gearing by a ten h. p. motor, which has a speed range of two to one, this being increased or doubled by slip gears, giving two changes of mechanical speed. This machine has a capacity to bore cylinders up to 30 inches in diameter, and will face both ends of cylinders up to a length of 42 inches, the travel of the spindle being doubled the length of the maximum length capacity of the machine. The spindle can be drawn out of a cylinder without resetting. The distance from the center of the spindle to carriage is 21⅝ inches. The carriage is 24 inches wide by 28 inches long, and has a cross adjustment for convenience in setting cylinders. The outboard bearing is adjustable so as to be brought close to the work. With this high class special tool within reach, there are still railroad shops that bore cylinders in a lathe rigged up with a boring bar, and doing the job at a loss.

In these days of fluted side and main rods, the necessity of a tool for doing the work is very apparent. The machine shown is a heavy rod milling machine, having a spindle six inches in diameter, and an adjustment on crossrail for convenience in setting cutters. There is a direct worm and gear drive, the gear being of phosphor bronze, and the worm of case hardened steel running in oil, actuated through gearing by a 35 h. p. motor, or, if belted, by a four step cone, as desired. The crossrail has an inclined face, designed to throw the thrust of the cut on the uprights. The center of the spindle is carried four inches below the point of rail, for "necking" rods. The design of the rail as shown overcomes the tendency to drop in when running from a wide to a narrow section, and with the long bearing on the upright, does away with the chatter found in the old design of tools. The uprights carrying the crossrail are made wide and narrow; the wide being 25 inches across, and the narrow 12 inches, the wider face taking the strain of the drive. The carriage of this machine is



NEWTON NO. 2 LOCOMOTIVE CYLINDER BORING MACHINE

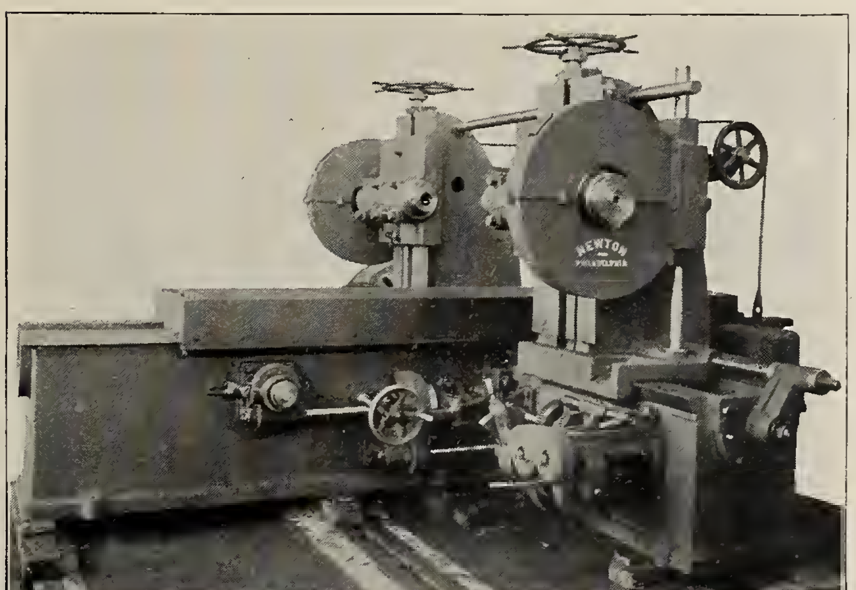
36 inches wide, and the table may be made of any length, that in the illustration is designed to mill 10 feet long. The capacity of width at uprights is 40 inches, and height spindle may be raised is 30 inches from carriage. This design of machine is made in several sizes, as a standard slab milling machine. The operation of the machine is the same as in the special rod miller, and has a vertical spindle four inches in diameter with an independent vertical adjustment of two inches. The latter machine is particularly adapted for milling the front frame sections of locomotives, and is useful on any job of milling. The American Locomotive Co., has ordered two of these for their



NEWTON HEAVY ROD MILLING MACHINE

Pittsburg works, and one each has been shipped to the C., R. I. & Pac. Ry., and the C., B. & Q. Ry.

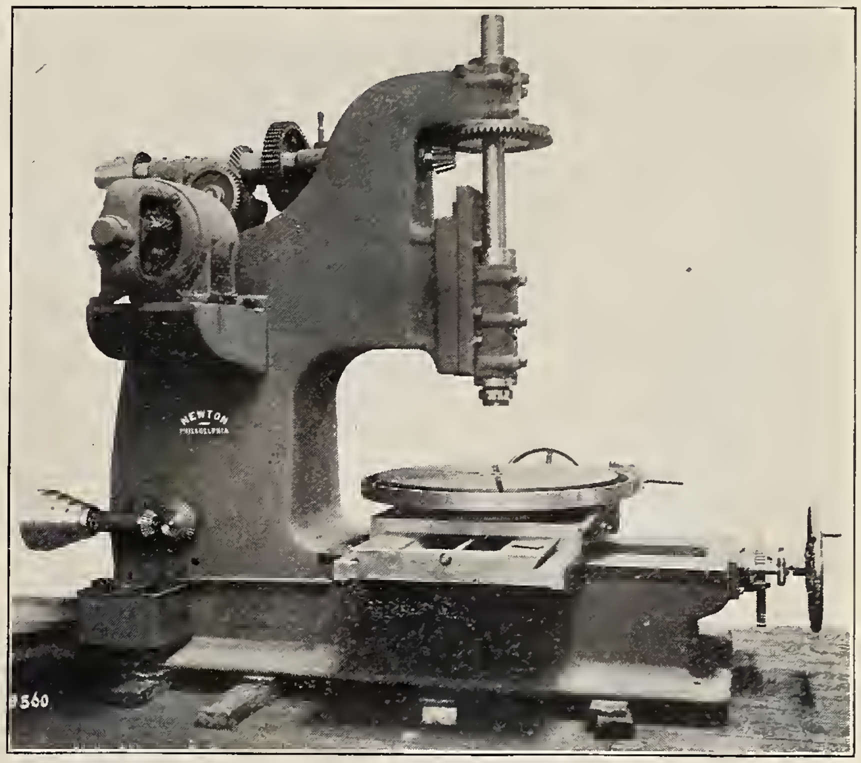
The special duplex milling machine shown is an example of a heavy tool for which use is always found in an up to date shop. This machine has a spindle 6 inches in diameter, and has a drive through gearing by a 25 h. p. motor, having speed range of two to one, and three changes of speed through gearing, and a direct worm wheel drive. The carriage is 30 inches wide and made to mill 10 feet long. Maximum distance between the ends of spindles is 18½ inches, the distance between uprights is 77 inches, and the minimum distance from center of spindle to carriage is 5 inches. The carriage is operated by spiral pinion and rack, and has power quick traverse in either direction with ten changes of feed. This machine was recently furnished The Westinghouse Electric & Mfg. Co., and was also furnished to a



NEWTON SPECIAL DUPLEX MILLING MACHINE

prominent railroad for fluting rods and milling the faces of driving boxes, and also frame fits of shoes and wedges.

In the series of milling machines built by the Newton Co., the vertical miller stands as one of the best. It is driven through gearing by a ten h. p. motor having a speed range of three to one through back gears, which doubles the speed range. The face plate is 48 inches in diameter on the working face, and 54 inches over all, with all feeds 36 inches. It will take in work under throat 20 inches high, and has a distance from center of spindle to upright of 38 inches. This machine has four changes of automatic feed in all directions, and each movement is independently clutched so that the machine may be conveniently con-



NEWTON NO. 4 VERTICAL MILLING MACHINE

trolled. For locomotive work, it is fitted with a self contained crane, which is bolted to the top of upright and swings on the spindle.

Notes of the Month.

On account of the great increase in business the Independent Pneumatic Tool Co. of Chicago intend to increase the size of their plant at Aurora, Ill. For this purpose they are now purchasing a large amount of machinery.

W. W. Butler, second vice president of the Simplex Railway Appliance Company, has been elected second vice president of the American Steel Foundries, to fill vacancy caused by resignation of W. D. Sargent, of New York. Mr. Sargent continues a director, having served on the board since the organization of the company.

Under date of October 10th, the Safety Car Heating and Lighting Company, New York, announce the following change and appointment. Mr. B. V. H. Johnson, General Agent at St. Louis, is transferred to Philadelphia, Pa., vice Mr. F. A. Brastow, deceased. Mr. Chas. B. Adams is appointed General Agent at St. Louis, vice Mr. Johnson, transferred.

Among the prominent manufacturers that have recently been supplied with machines from Wilmarth & Morman Co., Grand Rapids, Mich., are Chalmers & Williams, Blood Bros., Harron Rickard & McCue, Josiah Thompson, N. Y. Central, Fred V. Jarden, C. C. Wormer, Anderson Forging Co., H. Weston Lbr. Co., Barnes Mfg. Co., L. & N. R. R., H. H. Sprague Co., Bittenbender & Co., James Imp. Loose Leaf Spu. Co., Baush & Lomb Optical Co., Baker Motor Vehicle Co. and the Lemp Brewing Co.

The percentage in air-brake examinations which engineers, firemen and trainmen are expected to pass as a preliminary to promotion, has been raised on the Pennsylvania road. The circular referring to examinations shows that they will be rather more rigid than has been the case heretofore, and promotion will follow only on proficiency shown in accordance with the new standard set by the company. Trainmen must be up in their examination in all features of air, except the pump and engineer's valve; and the percentage of passenger trainmen being placed at 79 and of the freight trainmen at 76, while 70 per cent. is the limit which will be considered for either, passenger trainmen only being examined on air signals. Engineers for passenger or freight service are expected to reach 85 per cent, while 79 per cent will be the limit for yard service.

The New York Central has placed an order for 25,000 freight cars, which is the largest single order for equipment ever placed by any railroad, exceeding by 4,000 cars the order recently made by the Pennsylvania road. The order of the New York Central is for 1906 delivery, but there is some doubt as to the ability of the builders to meet the time limit owing to other orders now unfilled. This large order of cars has been divided among the following builders: The Pullman Co., 10,000; Haskell & Barker, 7,500; Pressed Steel Car Co., 3,000; the Western Steel Car Co., 2,000; and the American Car & Foundry Co., 2,000 cars. The last named company is already engaged on previous orders from the New York Central. The Pennsylvania road has within the last sixty days (including the order of 21,000 cars last week) placed orders for a total of 41,000 cars, which swells the total orders for freight cars this year to 225,000. The greatest number in any previous single year was 195,000 cars in 1902.

The scheme of shop extensions of the Pennsylvania road contemplates an increase of the capacity of each plant on the system, instead of the extensions on the larger plants only as has been the practice in the past. The Altoona shops and yards being an exception in this respect, as they will receive attention in the new plans outlined. A round house is to be put up at Hollidaysburg at once, and further improvements inaugurated this time next year. New car shops have received their final touches at Lucknow, and the yards at Enola while new, will be increased for the purpose of relieving the Altoona yards. Work was started and is being prosecuted on the new $300,000 locomotive and car shops at Dennison, and after the grade improvements now under way are completed, the Allegheny shops are to be enlarged. The Pennsylvania has been forced to make these extensions in order to take care of its immense equipment of over 200,000 freight cars and the power which now numbers nearly six thousand engines.

The Interstate Commerce Commission announced on Nov. 16, its decision in the proposed increase in the minimum percentage of cars in trains required to be operated with train or power brakes. In accordance with that decision the order has gone forth that the minimum percentage of air braked cars used in interstate commerce shall stand increased to 75 on and after Aug. 1, 1906. The number of freight cars in the service of the railway companies as reported to the Interstate Commerce Commission on October 1, was 1,790,113, of which all but 225,717 were equipped with train brakes. There are also 111,122 private freight cars approximately, all equipped with air brakes. "The desirability of weeding out the old lightweight and small capacity cars," says the commission, "is apparent. When these cars are used in trains with the modern heavy cars, buckling of trains is not infrequent on account of the failure to use more air, thus throwing part of the train on the adjacent track, on which passenger trains may be running."

Notice is hereby given that the Vacuum Cleaner Company has instituted suit in the Circuit Court of the United States for the Southern District of New York against the Sanitary Devices Manufacturing Company, of San Francisco, and its licensee, the Sanitary Compressed Air-Vacuum Company, of New York, for infringement upon their patent rights. The commercial pioneer in this country in the field of vacuum cleaning is Mr. David T. Kenney, of New York, and the commercial pioneer in vacuum cleaning in Europe is Mr. H. C. Booth, of London. The Vacuum Cleaner Co. has acquired all rights of both of these gentlemen in the United States, together with a patent of the United States granted to George L. Cummings, No. 460,935. Infringers will be duly prosecuted to the full extent of the law.

A number of the British railways are running steam motor cars, one of them utilizing old tank locomotives, building onto them a body of a car and a four-wheeled truck in the rear. In repainting, the tank engines are paneled to correspond with the rest of the car body. Motor Traction, in a recent number, has an article dealing with the variety of enterprises in the nature of rail and road motor vehicles with which the Northeastern Railway are working and experimenting. This road has a gasoline-electric rail motor vehicle in which an 80-brake horsepower gasoline motor, driving a dynamo, develops electricity which, through electric motors, is the driving power at the axles; electricity is also used for lighting and braking purposes. The 4-cylinder horizontal water-cooled gasoline engine is, placed in a compartment in the front of the car, but can be operated with almost equal facility from the rear by means of a duplicate throttle lever. The dynamo is driven at a normal speed of 420 revolutions per minute. The electric current, passing through two controllers, is led to two motors underneath the car on the front truck. Without the use of change-speed levers the controllers give varying speeds up to a maximum of 35 miles per hour. These gasoline-electric rail cars, according to Motor Traction, have been worked for a considerable time between Scarborough and Filey. The company also has three passenger road motor services and a motor charabanc (sightseeing "brake") service. The road motor vehicles of the company (omnibuses, characanes, and express and heavy freight wagons) are driven by a variety of motors, which variety of services will give the officials of the railway invaluable data for future construction. They have two steam chain-driven omnibuses, one of which has been running satisfactorily since April, 1904, and they have three 24-horsepower 4-cylinder gasoline omnibuses. They also have a motor parcels delivery van, or motor express wagon, with a maximum speed of 12 miles per hour, using a 2-cylinder gasoline engine, and they are experimenting with a large freight road vehicle driven by steam.

Technical Publication.

Mechanical Draft—Bulletin No. 75, by the B. F. Sturtevant Co., Boston, Mass., is something more than a bulletin for the reason that it gives in return for the time spent in its perusal the satisfactory feeling that the facts presented therein are worth investigation. In explaining its own proposition "what it does," this little work says: "It does what an ordinary chimney is incapable of doing. Its cost is from 20 to 40 per cent of that of a chimney. Its intensity (the draft) permits of the burning of finely divided or low grade fuel. It makes possible the utilization of the heat of the flue gases, which a chimney wastes in producing draft. It is independent of the weather, is automatically regulated to maintain constant steam pressure, decreases smoke, increases the capacity of an existing plant, and serves as an auxiliary to a chimney already overburdened. It saves space and is portable." To the average reader these claims may appear extravagant, but the Sturtevant people say they can prove them singly and collectively by plants in operation.

Proceedings of Sixth Annual Session of the Chief Joint Car Inspectors' and Car Foremen's Association of America

Wednesday and Thursday, September 6th and 7th, 1905, Hotel Hollenden, Cleveland, Ohio.

Meeting called to order by the president, H. Boutel, at 9:50 A. M.

Mr. Boutel: It is with a keen sense of high honor, and with great pleasure, that I, as President of this Association, preside for the first time at this, our sixth annual meeting since our permanent organization, and second meeting since changing our Constitution to admit car foremen as active members, also our second meeting in your beautiful city of Cleveland.

We have met this year under more favorable conditions, and we are thankful to Divine Providence for the blessings of peace and prosperity. We have been called together to perform duties incident to this particular branch of service on which we are employed, bearing in mind that we are one of the links of the chain that makes the railroads of this country the best in the world. Do not let us stop where we are, but let us strengthen our particular link in every way possible, so that when other departments offer advancement, we will be in a position to meet them more than half way.

Let us take up the work and solve it in a manner that will be a credit to the Association, and when we have reached home our Officials will say "well done."

In our discussion of the M. C. B. Rules of Interchange, we should keep in mind that they were framed for the whole country, and not for any one locality or point, and that, on leaving our meeting here, we should all have the same understanding of them, keeping in mind that they were gotten up by our superiors and for the purpose of running cars as long as they are safe and not to be stopping them on one minor technicality or another, but to remember that they are only earning revenue when moving.

If any one of us have any suggestions, that we think would be an improvement on the rules of interchange, present them and if a majority of the meeting think as you do, same will be presented to the M. C. B. Association for consideration.

Since our last meeting one of our active members has passed from our midst, Mr. Fred Baker of Kansas City. There has been a committee appointed to draft suitable resolutions, which will be read by the committee.

On behalf of the Association, I desire to thank our Secretary and to the Railroad Club at Cleveland for their splendid arrangements for this meeting, and to extend to the supply men our most grateful appreciation for the help they have given to make this meeting one of pleasure as well as business.

I have now come to the part of my address when speech fails me to express, as I should like to, my appreciation of the attendance of the most beautiful of human beings, the ladies, and I assure you that you have our everlasting devotion, and if there is anything that is not done for your pleasure that could be done, blame our friend Coffin.

To the Officers and Members, I desire to express to you my kindest feeling for your support in helping to make this meeting a success, and trust that after this meeting we shall all have gained something and the companies, which we represent, as well as ourselves, will be benefited. (Applause)

The President (continuing): I now have the pleasure of calling to your attention Mr. Cooley, who will represent the Mayor in delivering an address. Mr. Cooley.

Mr. Cooley: Mr. President, Ladies and Gentlemen. I regret very much that our Mayor Johnson is not able to be present in person and to welcome you to our city, but in his behalf, and in behalf of the Municipality, I am very glad to bid you a very hearty welcome.

I am sure that the Local Management will do their part, but aside of all this Special Association, there is the larger life of the Municipality, and in its behalf we are very glad to have you come in our midst, and to give this expression of welcome.

We are glad to welcome you for what you represent for human service. There has been great progress made in our century. The railroads form an important part of this. Formerly there were highways built up for the King; today the highways are built for all people, and you have so important a part in this service, a service which enables men to go from place to place, or transfer their goods from one end of the country to another.

Those who have not made a study of statistics would be astonished at the amount of traffic that passes over our roads in this country. Sad is the lot of any man in this day and in this age who does not do some human service, whether it is in the service of production or distribution. To be an idler, whether a rich one or a poor one, it matters little, is a disgrace. To be able to take one's place in human service in this complicated life is an honor and privilege, and I am sure you are to be congratulated this morning to be in Cleveland. Our Cincinnati friends will forgive us in saying the great Metropolis of Ohio, and one of the greatest cities in the world. We are proud of our city, as any man ought to be proud of his wife. We welcome you to what the city represents. Within the memory of men now living, the city has grown from a little village to the great metropolis of nearly half a million. And to have become a part of that which it represents, certainly is a great honor and a great privilege.

We are very glad to welcome the ladies. There are some exceedingly fine shops here in Cleveland, and I know they will enjoy them. And in our boulevards, and rides on the lake which will be given you, I know you will find pleasure.

In behalf of the Mayor, and in behalf of the Municipality, we bid you a hearty welcome, and trust your visit here will be a profit to all, and that you will go back to your homes well satisfied with the City on the Lake.

The President: On behalf af the Association, Mr Waughop will answer Mr. Cooley. Mr Waughop, our Past-president.

Mr. Waughop: Ladies and Gentlemen. On behalf of the Association, we desire to thank the Mayor and the city of Cleveland for their kindly invitation.

I notice that we were not presented with the key of the city, but I understand from the President that the lid of the city of Cleveland is not on. Coming from a city where the lid is on is rather peculiar. There are other cities where the lid is not on, as Cincinnati.

We assure you, on behalf of the Association, that the ladies will keep sober. We will not say so much for the men.

I had occasion this morning to meet several of your policemen, and they assured me that any one who wears a white badge will be taken care of. I assume from that that the Mayor has fixed the police department.

In coming to your city, of course I have been here before and a great many have not, being Missourians we like to be shown, and I believe that our friend Coffin, of your city, and Pop. Hart of Detroit, will see to that part of it.

Again thanking you and the Mayor for your courtesy; we thank you.

The President: I notice in our attendance this morning we have an old railroad official, Mr. John McKenzie. I would like to have Mr. McKenzie come here on the platform and say something to the ladies; I know he is very much of a ladies' man. Would like you to get up and tell the ladies how much you like them.

Mr. McKenzie: I am too old now.

The President: You like them just as well don't you?

Mr. McKenzie: You know that I am unaccustomed to speak in public assemblies, and our worthy President wants I should say something as to how much I like the ladies. Go to my house and you will find I like them pretty well, as I have four there.

The President: You live in Cleveland?

Mr. McKenzie: Yes, sir. The first I knew of this convention was this morning when I read of it in my paper and, being an ex-car inspector myself, thought I would come down. I am glad Mr. President, of having the honor of sitting on your platform, and I hope that this meeting will be like all others, of a great deal of value to the railway interchange of this country.

It has been said, of course, that a car inspector can turn more business away from a railroad than the freight agent can get, as a rule, but it is a fact, however, that when the car inspector says the business shall go, it goes, and it goes right. If you left it to our freight agent, I think a great deal of it would not reach its destination.

I feel that the traveling community of this country owe the car inspectors a great deal (I have left the railway service, don't expect to do anything more in that line), and I want to join the public in thanking one and all of you for what you have done.

The President: I believe the Ladies of Cleveland have arranged to entertain all the visiting ladies, and we will now adjourn for five minutes to give the ladies a chance to retire.

The President: Gentlemen, we will please come to order again and proceed to business. We will dispense with the roll call, as the attendance cards will answer.

The following were in attendance:

Brainard, W., J. F. C. I., Youngstown, O.
Boltz, V., C. J. I., Wheeling, W. Va.
Bunting, Geo., Gen. Foreman, Penna Lines, Cleveland, O.

Boutet, H., C. J. C. I., Cincinnati, O., Room 11, Great Central
Bailey, J. I., Car Foreman, C. & O. Ry., Russell, Ky.
Berg, A., F. C. I., L. S. & M. S. Ry., Ashtabula, O.
Chisman, A., F. C. R., P. C. C. & St. L. Ry., Cincinnati, O.
Charlton, C., Foreman, P. C. C. & St. L. Ry., Cincinnati, O.
Cottrell, Wm., Foreman Car Repairs, Erie R. R., Cleveland, O.
Dennerle, J. C., Clerk, L. S. & M. S., Ry., Cleveland, O.
Davis, Geo. C., General Foreman, C. C. C. & St. L. Ry., Indianapolis, Ind.
Dyer, J., C. J. I., Youngstown, O.
Eicher, F. B., F. Pass. Rep., Cincinnati, O., C. C. C. & St. L. Ry.
Ferguson, G. M., Supt. The Lake Terminal, Lorain, O.
Gainey, J. J., Gen. Foreman Car Dept., C. N. O. & T. P., Ludlow, Ky.
Givan, P. S., Foreman, L. & N., Cincinnati, O.
Hitch, Chas., Foreman Pass. Car Rep'rs., C. & O. Ry., Covington, Ky.
Hitch, C. M., Gen. Car Foreman, C. H. & D. Ry., Cincinnati, O.
Koermer, A., Gen. Car Foreman, Penna Co., Columbus, O.
Kohekepp, A., Car Foreman, C. A. & C. Ry., Columbus, O.
Lynch, Geo., C. J. I., Cleveland, O.
McPherson, J. G., Foreman, Mo. Pac., St. Louis, Mo.
McCabe, John, D. G. F., L. S. & M. S. Ry., Cleveland, O.
Meyer, F. L., Car Foreman, Vandalia, E. St. Louis, Mo.
McFadden, C. J., Foreman, Big Four, E. St. Louis, Mo.
O'Brien, J. J., Supervisor, T. R. R. A., St. Louis, Mo.
Rau, Gus., Foreman Car Dept., Frisco System, St. Louis, Mo.
Pearse, E. C., Gen. Foreman, C. C. C. & St. L. Ry., Cleveland, O. (Lindale)
Skidmore, S., Foreman Car Repairs, C. C. C. & St. L., Cincinnati, O.
Starke, Chas. S., Car Foreman, Salamanca, N. Y.
Stack, John, Foreman Car Dept., B. &. O., E. St. Louis, Ill.
Sebring, H. K., C. C. I., L. &. N. R. R., E. St. Louis, Ill.
Taylor, D. T., F. C. D., Burlington, St. Louis, Mo.
Wohrle, Jno., C. J. I., Columbus, O.
Waughop, Chas., C. I. I., St. Louis, Mo.
Ziebold, A., Car Foreman, T. & O. C., Columbus, O.

Visitors Present.

Brown, A. B., Westinghouse Air Brake Co., Buffalo, N. Y.
Berg, J. V., Clerk, L. S. & M. S. Ry., Ashtabula, O.
Bliss, S., Foreman, Ashtabula, O.
Crandall, F. M., Gen. Foreman, L. E. A. & W., Alliance, O.
Diem, C., Foreman, Cleveland, O.
Dixon, L. L., Air Brake Instructor, L. S. & M. S., Elkhart, Ind.
Eicher, E., Cincinnati, O.
Foster, Geo. L., Clerk, C. J. I. Office, Cleveland, O.
Griffin, H. G., Gen. Piece Work Inspr., L. S. & M. S., Collinwood, O.
Gerkins, J. H., Condr. Big Four, Cleveland, O.
Hopper, G. H., Clerk, L. S. & M. S., Cleveland, O.
Hamon, W. A., Inspector, Columbus, O.
Johnson, F. B., Asst. Chief Clerk, office S. M. P., L. S. & M. S., Cleveland, O.
Lawrence, Wm. H., Foreman, Cincinnati, O.
Macdonald, J. A., Chief Clerk, M. P. & C. Dept. S. A. & S. Ry., San Antonio, Texas.
Mitten, C. D., Asst. Foreman, L. S. & M. S., Collinwood, O.
St. Cyr, A. T., Car Inspector, Ashtabula, O.
Slaybaugh, H. B., Chief Clerk, S. M. P., L. S. & M. S. Ry., Cleveland, O.
Trace, A. A., Clerk, Erie R. R., Cleveland, O.
Wright, W. R., Inspector Interstate Commerce Commission.

New Members.

Bowden, Wm., Gen. M. M., T. R. R. A. of St. L., St. Louis, Mo.
Costley, C. M., C. J. C. I., Cairo, Ill.
Froley, E. J., Car Foreman, St. Louis Car Co., St. Louis, Mo.
McGreevy, P. J., Foreman, B. &. O., Cleveland, O.
Thomas, F. W., Car Foreman, W. & L. E., Cleveland, O.
Westall, Wm., F. C. D., L. W. A. & W., Alliance, O.

Members Absent.

Bockwitz, A. J., Gen. Foreman, B. &. O., East St. Louis, Ill.
Burns, L. J., F. C. R., C. & O. Ry., Covington, Ky.
Brady, John L., F. C. D., L. &. N. Ry., Central Covington, Ky.
Cable, Owen, C. J. C. I., Kankakee, Ill.
Cressey, Wm., C. J. C. I., South Omaha, Neb.
Creshman, E. N., G. F., T. St. L. & W. Ry., Madison, Ill.
Dobson, C. R., F. C. R., Erie.
Donegan, T. J., G. F. C. D., Kansas City, Mo.
Dunn, P. T., Gen. Foreman, P. C. C. & St. L. Ry., Cincinnati, O. (Pendleton)
Fenwick, W., G. F. C. D., W. & L. E., Canton, O.
Hamilton, Bert, C. J. I., Texarkana, Ark.
Hogan, Ed., Asst. C. I. I., East St. Louis, Ill.
Halloway, A., Asst. C. I., E. St. Louis, Ill.
Hoggsett, W. J., C. J. I., Ft. Worth, Texas.
Julien, B., G. C. F., Omaha, Neb.
Longden, M., Foreman, B. O. & S. W. Ry., Cincinnati, O.
Lowe, J. F., Foreman, Wabash Ry., Brooklyn, Ill.
Malone, J. B., F. C. D., Erie, Indianapolis, Ind.
Meeder, Otto, St. Louis, Mo., St. L. Refg. Co.
Merriss, E., C. J. I., Lexington, Ky.
Pearce, H. C., G. F., I. C. R. R., E. St. Louis, Ill.
Rieger, C. A., C. I. F., N. C. L., St. Louis, Mo.
Setzekorn, C., Foreman, A. R. T., St. Louis, Mo.
Smith, E. S., G. F. C. R., Sou. Ry., Princeton, Ind.
Wright, W. S., Foreman, E. St. L. & B., E. St. Louis, Ill.
Gilbert, Sam'l., Alton, Ill.

Honorary Members Present.

Coffin, W. E., Salesman, Cleveland, O.
Dewey, L. R., Chief Inspector, A. B. S. & F. Co., Chicago, Ill.
Hart, Frank, Detroit, Mich.
Martin, Geo. V., National Mall. Casting Co., Cleveland, O.

Members Absent.

The reading of the minutes of the last meeting is the next order of business. We will dispense with that.

The next in order is the admission of new members. I would suggest that this remain over until tomorrow and until Mr. McCabe is here.

The next order of business is the report of the Secretary-Treasurer. In the absence of the Secretary, I will read the report, a summary of same. The report, without any motion, would take the usual form and would be referred to the executive committee for one of our later meetings.

The next order of business is the assessment and collection of the annual dues. I would suggest that you fix the assessment of the annual dues to be collected tomorrow. Suggestion of two members of the executive committee was that the dues remain $1.50. It is up to you, gentlemen, what we will do. $1.50 and we send each member a copy of the Master Mechanic.

Mr. Taylor: I make a move that same arrangements be continued; publish our minutes in the Master Mechanic and in that way get the paper. Motion seconded.

Question was called for, and on being put to a vote, was carried. Dues to remain at $1.50 for next year.

The President: Any unfinished business from last year? Any new business?

Under the head of new business we will take up the Rules of Interchange.

Mr. Sebring: I believe it would be a good idea to pass a few of the rules around.

The President: I am very much surprised to hear a man from St. Louis say anybody came from there without any rules.

The principal object of the Association is to discuss the rules. We have a few copies here, and I think if those who haven't a copy will get next to some one who has, they will be all right.

The President: If there are no objections, we will proceed with the rules.

In the absence of the Secretary, we will have to call on somebody to read the rules. We have with us Mr. Hopper, who is representing our Secretary, Mr. John McCabe, and if there is no objections, he will read the rules.

We will read the rules section at a time. If there is any discusion, on the rule, we will hear the discussion on one section, that is where the rules appear in sections, where there is but one section of the rule, the whole rule will be read.

The preface first. Is there any discussion? No change from what there was last year, but possibly somebody will want to discuss this.

2nd section of preface. Any discussion.

Mr. Waughop: Mr. President, I move that we request the M. C. B. arbitration committee to define what is "rough usage," outside of the specified rough usage.

The President: You heard the motion of Mr. Waughop, what is the pleasure of the Association?

Mr. Taylor: I second the motion.

The President: Any remarks on the motion?

Mr. Dennerle: It seems to me that unfair usage is specified now, outside of the combinations.

Mr. Waughop: Very true, but get them to specify what they consider rough usage, and we will have it more specific.

Mr. President: Any further remarks on the motion?

Mr. Whorle: I don't exactly catch Mr. Waughop's meaning in this matter at all. There are lots of things specified that we know is unfair usage.

Mr. Waughop: My idea is to get on to the technicalities. The M. C. B. rules described in 46-54 certain combinations, and derailments and accidents. One may call a roof raked fair usage, and another man may say it is an accident. Personally I think it is rough usage. If we could get them to define what constitutes rough usage, the meaning of the word "rough usage," it would do away with a whole lot of wrangling.

Mr. Sebring: We have about ten end boards broken in, and load shows it was shifted, what would you call that?

The President: According to my understanding, if a load inside of a car forces car out, if it does not break more than two end posts, or one end post, and one corner post, it is a defect for which owners are responsible.

Mr. Taylor: I think the motion made by Mr. Waughop is good. We desire this information simply as a matter of simplifying.

The President: Any further discussion on the motion?

Mr. Dyer: I do not think there is need of any more discussion than has already been done. The rules state what is rough usage in combination, and it also states that any defects arising through derailment or accident are defects for which the handling road is responsible. A rake to side of car is certainly rough usage, and it only depends upon whether it is slight or whether the defect is large enough to issue a card for. One man lets it go and another issues a card, but if we ask the committee to define rough usage, they will ask us as to the defect. I do not think we should ask them until we have a reason.

Mr. Stack: A car is handled by a company until sills are worn and cut down and car is knocked off center, do you consider that unfair usage?

The President: To answer Mr. Stack, would say there is a decision of the arbitration committee which says that owners of cars are not responsible for *consequental* damage. They are responsible for loose wheel, but if that loose wheel is allowed to run the owners are not responsible for that. If a car is broken without creating a combination, the owners are not responsible for *consequental* damage. I believe that answers your question.

Mr. Waughop: Mr. President: the M. C. B. arbitration committee says that *consequental* damages resulting from a condition causing fair damage to a car, or a damage that would cause combinations, defects attending unfair usage, even though the first damage was a car owner defect, shall be charged to the party doing the work. The question Mr. Stack brings up is if the car is off center and cut two intermediate sills and damaged so they have to remove them. I hold there is no combination, it is car owners defect.

Mr. Taylor: There is nothing lost in having the committee define just what rough usage is.

Mr. Sebring: In regard to sills damaged. Rule states distinctly that two sills is car owners defect, and I do not see where a delivering line should be responsible for only two sills damaged. It does not say they have to be broken or damaged, so I think rule covers that in car owners defect.

Mr. Waughop: It makes exception; except car has been derailed then it becomes rough usage.

Mr. Sebring: I do not think delivering line should be held responsible for two damaged sills. I do not think there is any rough usage in it.

Mr. Skidmore: It appears to me as though members in discussing the question, have gotten entirely from the subject. Question was to have M. C. B. Association define what was a delivering line defect. I think we should confine ourselves to that question, whether there should be any changes made in it. As for myself, I think that the M. C. B. rules are very plain on that question. We have notes which make combination of defect and which makes delivering line responsible, and for some isolated cases the arbitration committee has made decisions which makes it a part of the rules, and for the M. C. B. Association to undertake to make a list of all the defects that may arise to cars, it would make such a large book of rules we probably could not keep it all in our mind, which we are supposed to do, and I think the rules as they now stand are very plain on the subject, and should remain as they are.

Mr. Sebring: It seems that what we come together for once a year is to get some understanding of the matter. We had better have the opinion of all and have one stand to go by.

Mr. Taylor: Can we have that motion again?

The President: The stenographer will read the motion as made by Mr. Waughop.

Motion was read.

The President: Any further remarks on the motion?

Mr. Dennerle: I for one am opposed to that motion. I question very much whether the M. C. B. Association would consider the proposition made by this Association.

Mr. Taylor: We are not asking anything from the M. C. B. Association. We are asking from the arbitration committee. They can specify in five words.

Mr. Hitch: I would like to ask how all rough usage could be defined in five words, or in 25, or in 105. They would have to go into details for information such as we now ask for.

Mr. President: Any further discussion: There appears none. Question was put to a vote, and lost.

Rule No. 1. Any discussion on that rule? There appears none.

Rule No. 2. Any discussion? It appears to me that there might be a "right smart" discussion on that rule, especially from the condition that prevails in Cincinnati and Detroit. For example we will receive at Cincinnati a car that is going to Toledo, or beyond Toledo. In our opinion at Cincinnati that car is perfectly safe to carry its load to its destination. We believe we have carried out that part of the rules. The car gets to Toledo, perfectly safe, but they transfer the car at Toledo, claiming that car would not be safe to carry load to its destination, and load it up with some other commodities at that point to go back again. My interpretation of the rule is that if that car is safe to carry load to its destination, it should be accepted. I would like to have the views of the Association on that.

Mr. Sebring: Well, we have about the same trouble at St. Louis regarding cars passing down the L. & N. They do not want us to allow any car to leave St. Louis that is not safe for return load. We transfer it and return car to the owners, and think this best policy to prevent hauling car back to road it came from on account of its condition. The rule is about right I think as it reads, and let every road suit themselves whether they will transfer a car or not.

Mr. Stark: While the rule specifies that the receiving line should pay the charge, I would like to ask our brother from St. Louis as to whether delivering line is responsible for that transfer or not. In case receiving line considers it policy to transfer that car on account of its not being suitable for certain freight that they wish to load in the car on its return trip, should not the receiving line be responsible or stand the expense of the transfer, or should the delivering line stand the expense?

Mr. Waughop: If I understand the question correctly; loaded car delivered in interchange, would say the chief inspector at St. Louis disposes of the question under the rules. Any car delivered in interchange with combination of defects, rules 46-54, except repairs can be made in 24 hours, shall be transferred at the expense of the delivering company.

The President: To put the question clearly before you. The general managers in our city tell me that I must run cars as long as they are safe to run without causing any danger of accident. I have a car of material, say for Detroit. That car is perfectly safe to carry that load to Detroit. When it goes to Toledo, the men at Toledo say car is not safe to take this load to destination and to load back to Cincinnati. Would it be proper for me to transfer that car at Cincinnati?

Mr. Wohrle: If car is considered safe under its present load, as Mr. Waughop says each road should decide as to whether it is safe or not. It is not a case of car having any defects, but is general condition of car. It may be fit for coal, but not for grain. I would hold delivering line responsible for transfer of car of coal.

Mr. Waughop: The receiving line must take the car regardless of its contents, and transfer the freight if necessary. The delivering company is responsible for transfer under certain conditions. Under other conditions, if they do not wish to run the car in its condition when delivered to them, they are at perfect liberty to transfer car at their own expense and return it empty.

Mr. Wohrle: Where car is received in interchange that is in safe condition to carry its contents to destination, that car should be accepted. I make that a motion. Seconded.

The President: As I stated there is quite a difference between Cincinnati and Toledo and I wanted to get an expression from others as to which party is correct.

Any further remarks on the motion? If not, we will call for the question. Question passed unanimously.

Rule No. 3. Any discussion?

Mr. Waughop: I move where a car is equipped with two brake staffs and no air brake, that the owners be requested through the M. C. B. Association, to stencil end A. & B.. Motion seconded.

The President: Any remarks?

Mr. Skidmore: I think that it will be unnecessary, as non air brake cars will be probably cut out of service before the cars could be stenciled and brought before the convention, and it would be unnecessary expense.

Question voted on and carried.

Rule No. 4; no discussion.

Rule No. 5. Rule is very plain, same rule we have had for 15 years. No discussion.

Rule No. 6; no discussion.

Rule No. 7.

Mr. Sebring: I should like to know just how many shelled out spots there should be on a wheel before it is unsafe to run. Some may have 18. and some 4. and what should be the limit of a shelled out spot average width of 1¼ inch.

The President: For benefit of the Gentlemen from St. Louis. Several years ago that same question was brought up before the M. C. B. Association. Some wanted it defined, others said it was almost impossible to define. Some wheel would be worn down pretty hollow and shelled, that wheel would be condemned before another wheel. Condition of the wheel would have a great deal to do with it. So far as a wheel that has broken from shelled spot, I have never seen one. I think most danger from shelled wheels is to track and bridges. While the wheel itself does not break, it pounds the rail or bridge pretty bad.

Mr. Skidmore: As the rule is at present, the owners are willing to stand the responsibility, and I do not see the necessity for having anything done further to define. If we condem a wheel as being shelled out, they are willing to stand for it.

Rule No. 8; no discussion.

Rule No. 9; no discussion.

The President: I trust that every one of you, whether you belong to theAsssociation or not, that every person here if there is anything in the Rule that we are going over that is not understood or they want any information on, that they won't be bashful, but get up and ask it. Let us have a free discussion as to everything that comes up before the association.

Rule No. 10. Any discussion? There is a change there since last year.

Mr. O'Brien: I would like to say, Mr. Chairman, that there is no consideration given in the limit of the thickness of the flange, particularly on a reinforced flange. Necessarily this Rule was put into effect before the reinforcing of flanges. It has been a question in my mind whether a flange can be worn to such an extent. Any and all of you who have seen the reinforced flange will observe there is more metal to wear, therefore it increases your tensil strength.

The President: You know the M. C. B. Association have adopted a standard wheel for certain capacity cars, and there is a certain limit they can go to, but they cannot exceed that,—doesn't matter whether it is reinforced or not. If the flange is more than 1 1-16" in thickness, it is condemable under 80000 capacity or over.

Mr. O'Brien: It is only a question of time before there will be a universal use of reinforced flange.

The President: There has been a committee appointed by the Master Car Builders, Engineers of Road Departments regarding the making of flange thicker. They have been trying to get together for some years.

Mr. O'Brien: The reinforced flange does not thicken the flange. Flange is always broken at the angle.

The President: The change in the rule is that it condemns an 80000 capacity wheel under same conditions as 100000 capacity. Previous rule allowed to run 80000 capacity wheels the same as 60000.

Rule No. 11; no discussion.

Rule No. 12; no discussion.

Rule No. 13; no discussion.

Rule No. 14; no discussion.

Rule No. 15.

Mr. Stark: It says under fair usage. Would you consider it under fair usage for a road to allow brake staff to become broke? Do you permit the use of brake club?

The President: You remove a wheel under a foreign car account of setting brake by club. Brake remained set coming down hill 6 or 7 miles. I do not think there is anybody that would charge that to the owners of car. If there is, I would like to hear from them.

Mr. Sebring: A car has brakes stusk on it coming down a hill. When car gets on our repair track wheel is cool; we do not know anything about it, remove the wheel and charge to owners.

The President: May I ask you a question in connection with that? Suppose you were standing in your yard and that wheel came in there bursted on account of brakes being set, you know it was set, no air on it.

Mr. Sebring: I was speaking where we did not know it is set by club. We remove and charge it to owners.

The President: Another way of putting it is, then, if you find car on your repair track with bursted wheel you charge owners for it?

Mr. Sebring: Yes sir.

Mr. O'Brien: Have you representative from Mountain Country?

The President: We have no representative here west of St. Louis, but we have a representative here from the O. & C., which is about as bad as those in the west, and also of the C. & O., which has about the same conditions. We can hear from those if you desire.

Mr. Waughop: I understand, Mr. President, that lines at Colorado Springs, Pueblo wheels bursted on account of the retaining valve pressure, are repaired at expense of line doing damage; that is my understanding from a former assistant of mine.

Mr. Sebring: If we know that a car coming off another road with bursted wheel; if we know it is caused by using a club, would we be justified in asking for a card?

The President: If you asked me for a card, you would have a great time getting it.

Mr. Taylor: It is a rather common occurence to find a broken wheel. A burst wheel, if caused from heat is indicated by the brake shoe being red or blue.

The President: It is possible it might have been red hot. My experience shows getting hot from friction, wheel turns blue when they are cold. Of course if it was an air brake car and air was stuck on it, we would consider that owners defect any how.

Mr. O'Brien: My object in asking for statements from our western roads was on account of the heating of wheel by application of the brake. Braking power will vary in different cars, particularly in passenger equipment, and heating of the wheel will naturally result, which also result in the cracking of the chill and the shelling out of these parts. I have seen that to a certain extent run up as high as 10 wheels per day. Caused by very uneven size of auxiliary reservoir. As to disposition of charges, we would naturally charge it to owners.

Mr. Gainey: Wheels now days, especially freight equipment wheels of cast iron, are supposed to stand a great deal of heat. If you go to a foundry where wheels are made, and you make your drop test and your thermal test and thermal test with flange in green sand for 2 minutes. That wheel is pretty near red hot, and with my experience in testing wheels you will very seldom find one where chill will crack. This is always the test applied, and wheel that will not stand it will crack clear through. Wheels are made to stand a great deal of heat, and I do not believe the application of brake causes very many broken wheels. Of course you will find some of them.

Mr. Skidmore: Arbitration decision 649 where a claim was made of unfair usage on account of long application of brakes. It was decided to be fair usage in the cracking of that wheel. Says wheels cracked account of long application of the brakes not allowed.

The President: Any further discussion?

Mr. Bailey: The C. & O. in the Allegheny Mountains have a great deal of trouble account of wheels breaking.

The President: Any motion to offer on that rule?

It is requested by the committee that we go to place of luncheon promptly at 12 o'clock, and it is getting near that time now. The Committee requests that you all remain and go to luncheon with them, everybody.

Mr. Skidmore: I think the members should be instructed to be back here promptly at the next opening hour because we have not fairly got started on the rules. We have been going over rules that have had no change for years in them and we will soon get to rules where there have been changes made, and there probably will be considerable discussion on those rules, and if we do not get together promptly and continue the discussion, we are not going to get through with the rules in the alloted time.

The President: I think the arrangements will be for us to leave here tomorrow afternoon. We want to give you a chance to see something of Cleveland before going to Buffalo. Would suggest everybody be here promptly at 2 o'clock in order to go on with the rules.

Moved and seconded meeting adjourn until 2 o'clock. Carried.

Meeting adjourned at 11:50.

Sept. 6th. Afternoon Session.

Called to order at 1:50 P. M. by the President.

Rule No. 17 no discussion.

Rule No. 18.

Mr. Sebring: In St. Louis we are having a good deal of controversy concerning chipped flange. That seems to be the fad down there at present. Chipped flange 1½ inch long and extends beyond center of wheel. Now does it have to be that long? will ⅛ inch over flange, will that condemn it?

The President: If the chip is ½ inch wide and 1½ inch long it will condemn the wheel. Or if it extends ⅛ inch past center of the flange, regardless of the length and width.

Mr. Wohrle: At Columbus we understand either one of those measurements.

The President: ½ inch wide, regardless of how long it is?

Mr. Wohrle: Yes sir.

The President: I am surprised at such diversity of opinion.

Mr. Skidmore: Rule is very plain. Our understanding is that if it is 1½ inch long and ½ inch wide it is condemnable.

Mr. Wohrle: Says if it is 1½ inch long.—

The President: And ½ inch in width. How about that Mr. Wohrle.

Mr. Wohrle: That is my understanding of it; either one of the measurements would condemn it.

The President: At Cincinnati we understand it has to be 1½ inch long and ½ inch wide before it is condemnable.

Any further discussion?

Mr. McPherson: I would like to ask the meeting if they have ever seen a car derailed from a chipped flange, as described in the M. C. B. Rules, that did not extend from the center of the flange? Did you ever hear of a derailment other than that account?

Mr. Waughop: Did you ever see a chip flange, cause of derailment, of any dimensions?

Mr. McPherson: No, never did, unless it extended from center flange.

Mr. Waughop: I would like to say for Mr. Wohrle's information that if chip is not 1½ inch long and ½ inch wide it is not condemnable; they both must go together.

Mr. Wohrle: Must be 1½ inch long and ½ inch wide?

Mr. Skidmore: Must the three conditions exist at one and the same time? What must be the length before you condemn it?

The President: I would state that you would not find those conditions prevail. You won't find a chip extending ⅛ inch beyond center of the flange unless it is 1½ inch long.

Mr. Wohrle: As I understand this rule it can be seperated in two different parts. It states if the chip extends 1½ inch long and ½ inch width, it is condemnable. If the chip extends ⅛ inch past center of flange. That would mean any dimension.

The President: It says that if it extends 1½ inch in length and ½ inch width, it is condemnable. It must extend both dimensions.

Mr. Wohrle: Mr. President, as I understand it any breakage extending ½ inch from center of flange must be condemned.

Mr. Waughop: Well, you will never meet the conditions.

The President: I wish somebody would make a motion as to their understanding of the rule.

Mr. Gainey: Mr. Chairman, I will make a motion that chip flange must extend 1½ inch in length and ½ inch in width before it is condemnable; or ⅛ inch past center, regardless of the length of the chip. Seconded.

Question was voted upon and carried.

Mr. Whorle: I do not believe but what we have gone and repeated the rule in our motion. If we should say that any breakage of the flange extending ⅛ inch past center would condemn the wheel. We have repeated the rule in the motion.

The President: It is true the rule was repeated in a way, but it is only done so we will come to a universal understanding.

Rule No. 19.

Mr. Sebring: I think at the last meeting there was a committee appointed to look after these combinations of slid flats, concerning those 2½ inch slid flates.

The President: No.

Mr. Bailey: That was slid flange wasn't it?

Mr. Waughop: I would like to comment on that slid flat business a little bit. That discussion has been up several years. It seems to be particularly so in my territory, the difference of opinion as to what constitute a slid flat wheel. The M. C. B. Association says that it shall exceed 2½ inch flat. All points of the guage must show no light under it to pass St. Louis as a slid flat wheel. All points of the guage must exceed 2½ inch and there must be no light under it.

Mr. Hitch: Rule does not define this flat sliding, does not say it has to be 2 inch wide or any width. Provides for flat spots slid flange 2½ inch or more in width. I believe that rule will cover slid flange, although it does not say so in so many words. I believe that flat spot caused by sliding either on flange or tread.

Mr. Waughop: I beg leave to differ with the gentlemen. Manner of applying the guage is with the roll of the wheel.

I move that slid flange wheel taking the guage as a slid flat wheel be condemnable. Seconded.

Mr. Skidmore: I do not quite agree with our friend that slid flange 2½ inch long should be condemned under all circumstances and conditions. Quite often flange slides along rail and may be 2½ inch long and only ¼ inch wide. Now to condemn a flange of that kind I think it should be condemned by flange guage and not by slid flat guage. Mr. Waughop speaks of method of guaging slid flat wheels. There is also a method of guaging worn flange or cut flange wheels. I do not think it advisable to condemn flange unless guages for that purpose condemn them.

Mr. Hitch: I do not believe flange can be slid to take a guage 2½ inch long but what any one would condemn it. Would have to cut considerable in the flange in order to get that flat surface.

Mr. Sebring: As a worn flange, that would become a car owners defect.

The President: The question it not as to whether it is car owners defect. Question is what point would we condemn it at. There is not any question who is chargeable with it. It is a slid flat wheel.

Mr. Waughop: Mr. Chairman, it is true that the rules give a dimension for guaging sharp flanges. That is a defect that is covered by the M. C. B. This is a defect that is not covered by any rule. Something new, something the Arbitration Committee have failed to answer us. To make it universal I think the motion should prevail.

The President: I am a good deal under the impression that Mr. Waughop is. If you can find a slid flange flat enough to put your guage on it, it will throw your car off quicker than any sharp flange you ever saw.

Question voted upon and carried.

Rule No. 20.

Mr. Meyer: I would like to refer back to Rule 18 and ask a question. If there is any chip on outside of flange that is cardable, delivering line is responsible according to discussion. I do not think there is anything but what are car owners defect.

Mr. Waughop: Certainly, if it passes past the center.

The President: Turn back to Rule 18. The question asked by Mr. Meyer,—

Mr. Waughop: If the secretary will read rule regarding chipped flanges on outside it will cover the question I think.

Secretary read rule relative to flanges chipped on the outside.

The President: Flange chipped same way on the inside would be considered delivering company's defect. The rules we used to have specified on either side you know, but they have made car owners responsible for the defects on the outside.

Mr. Meyer: All defects on the inside are car owners, except car derailments?

The President: If car has been derailed, the natural supposition is that we are going to take that defect as being caused by that derailment. Two or three years ago, Mr. Meyer, before Rule was changed making delivering road responsible for chipped flange on inside and outside, it was claimed number of wheels were chipped before being applied to cars. Quite a number caused by rolling wheels to gether.

Rule No. 21; no discussion.

Rule No. 22; no discussion.

Rule No. 23; no discussion.

Rule No. 24.

Mr. Sebring: Concerning Rule 24. I would like to understand this thing of cut journals. It has been customary, I believe, to apply brasses, and delivering line is responsible. I had a bill on my desk last week of several cars delivered to Cincinnati, carded for one cut journal, and followed with another card for two brasses for one cut journal. What bearing has that card to the first?

The President: In explaining conditions at Cincinnati. Rules provide if you deliver a car with cut journals to another road, you are responsible for the brasses that are required to replace that car. In 99 cases out of 100 same journal is not put back under that same car, but another axle with a pair of wheels is put under that car. Your company is charged with cut journals, and two bad brasses, because brasses removed from that car will not fit journals on new axle. The object of giving the card is to carry that information with it. Some of the roads do not want it, others demand it. It is simply more work for Joint Inspector.

Mr. Waughop: I agree with Cincinnati that the road responsible for the cut journal is also responsible for the journal bearing. The delivering road when they card a car for cut journal, that car carries with it "journal bearings if necessary to remove them and apply new ones." I think Cincinnati is wrong in requiring a card for journal bearings under those conditions. We do not issue, nor allow that.

Mr. Sebring: In case axle removed is applied to another car, why should the delivering be carded for defect that did not exist? We have some cars from the L. & N. and deliver them to the Big Four. In every case there was two brasses charged, and only the labor of truing the journals.

The President: If wheel was removed and card given for the rough journal. Another card given for the two bad brasses. That journal taken out and another pair of second-hand wheels applied to the car. All the Big Four could bill you on that would be the truing up of that journal, and the 2 brasses and price of removing wheel.

Mr. Taylor: The Burlington's method of handling this subject when journal is cut and wheel is worn, is to charge for brass, and labor for truing on the card and charge owners for the scrap wheel which is the proper way to handle.

Mr. Waughop: If I understand the charge, Cincinnati gives a card for cut journal and also a card for the bearings if necessary to remove, and they bill the road against whom card is issued for the truing of the journal and the journal bearings. In my opinion, according to the M. C. B. rules, Cincinnati people are wrong in their manner of carding. The rule carries with it the bearing without card.

The President: The object of giving the card, some of the roads are billing brasses on a separate bill than what their wheels are on. Object is, to convey information as to why those brasses were removed. Delivering line is responsible, for cut journal, responsible for slid-flat wheel and whatever material necessary to make those repairs. Does not matter whether I give one card or two, I have not imposed on the delivering line any more responsibility than if I had only given the one card. Simply give information to attach to the bill to show why it is made.

Mr. Stark: I believe we went over this matter a year ago, and it was universally understood at that time that only one card should be issued. There is a special ruling made for it, I understand, at Cincinnati. Rule 28 covers this. Regardless of previous condition of bearing, delivering company is responsible. The one card would cover the bearing.

The President: Except as I stated, it was just added to carry information to prevent the bills from coming back.

Mr. Stack: Would not they bill on cut journal or slid flat wheels and some billing clerk make additional bill on the card?

Mr. Waughop: Supposing the Big Four road receives a car from St. Louis with sharp flange wheel. Before delivering to the L. & N. at Cincinnati they remove this wheel. Would you issue a card?

The President: I certainly would not.

Mr. Waughop: What position would Mr. Skidmore of Cincinnati take in that case? It is simply helping out the billing clerk, nothing in it for St Louis.

Mr. Skidmore: Mr. Chairman, I think Cincinnati will agree with the rest of the members that a defect card is not absolutely required for that purpose. It is more convenient and furnishes proper data for billing. Now the Big Four in rendering bills for wheels make a separate bill for all their wheels and their brasses, journal bearings are included in the general bill of other defects. Of course if we get a defect card for cut journal, we know it carries with it authority to bill for journal bearings or box bolts. But I think in some cases in making seperate bills charging delivering lines for journal bearings on separate bill and no authority attached to it, they would take exceptions to that bill saying we have been charged for journal bearings on a foreign car, explain why charge. While with a defect card attached to that bill there is no question about it. They know they are responsible for the change of those journal bearings. That is all there is to it.

Mr. Waughop: We have with us to day the biggest end of the Big Four System. McFadden, how do you handle it?

Mr. McFadden: We never issue additional defect card, and we make separate bill, and never had one come back. Defect card is issued to show for repairs on account of changed wheel or cut journal, and separate repair card and separate memo for other repairs.

The President: Would state reason for commencing to give card for brasses was the C. H. & D. R. R. in two or three cases I removed wheels for cut journals. Billed for the brass, but as they did not have any card, bills were returned and quite an amount of discussion arose as to the matter, and bills went back and forth two or three times. At request of Supt. Motive Power, at that time Mr. C. H. Cory, I gave him separate card for brass, and give it to every road since that time. I am simply furnishing a data so there will not be any question as to the bills.

Mr. Wohrle: Some of the roads at Columbus object to issuing separate defect cards for brasses. Big Four runs in there and they asked me to issue separate card. Took it up with other roads and they objected.

Mr. Waughop: There is an opportunity there, Mr. Chairman, for a double charge; especially on cards for cut journal. At the same time he gives a card for journal bearings, he can apply them and charge on card, and also charge it on original card according to M. C. B. Rules. I move it is the sense of this meeting that no card be given for journal bearings under the provision of Rule No. 24. Seconded.

Motion voted upon and carried.

Rule No. 25; no discussion.

Rule No. 26; no discussion.

Rule No. 27; no discussion.

Rule No. 28; no discussion.

Rule No. 29.

Mr. Waughop: There is a local rule in St. Louis Mr President, that any car will be passed with brake shoes missing, that includes the key and key bolt, chargeable to the owners. I think it is proper that you know this that you may all know it. Brake shoes missing from cars in interchange is chargeable to owners, together with key and key bolts missing.

Rule No. 30.

Mr. Skidmore: I would like to ask what they are doing at other points with that rule. Whether they are rejecting cars on account of not being cleaned and stenciled as required, or letting them pass and cleaning them when an opportunity arises.

Mr. Waughop: The subject has been up in St. Louis. I think the best way is to discuss a matter of that kind is to state facts. We have had more trouble on account of uncleaned air on the Pennsylvania than any other system in our territory. Frequently we have them over 3 years. The man does not live that can tell by looking at the cylinder and noting notation when it was cleaned whether or not the break will work. As I understand the law 50 per cent, or I believe exceeding that will be called for hereafter, must be in working order? There is no way possible for an Inspector or a Foreman, nor an Interstate man, to know whether or not that brake will work until he has tested the case. That was demonstrated to me very clearly with some cars held account of uncleaned air. The Pennsylvania car worked very slowly, still it would work. At St. Louis we are passing all cars uncleaned. If the road that receives them wishes to clean the air, they are welcome to do it.

Mr Wohrle: At Columbus we pass the cars that way.

President: In other words, you pass them, and anyone wants them cleaned, it is up to them?

Mr. Chisman: We at Cincinnati, on the Pennsylvania road, take note of all cars stenciled cleaned within 12 months and place white card on them and send copy to master mechanic and he takes it up with the owners.

Mr. Waughop: After applying the card, do you do the work?

Mr. Chisman: No sir.

Mr. Taylor: Are cars supposed to be inspected?

The President: Yes sir.

Mr. Taylor. What do they do with them? The interstate inspector saw four cars in our terminal that were stenciled with chalk; and rubbed it off. May be that is the way they pass them.

Mr. Waughop: There is another little point you want to look into. My attention was called to a Private Line car coming from Omaha. Car was stenciled within 3 days from the date it got to St. Louis. Any car foreman in America would swear on oath before a jury that that car had not been cleaned within three years.

Mr. Wohrle: We do not pass cars stenciled with chalk. We require paint. We pass them, loaded cars going to another road, and let them clean them if they want to.

Rule No. 31.

Mr. Sebring: It is hard to distinguish whether hose is 1 inch or 1¼ inch.

The President: Under the new proceedings of the M. C. B. Association all hose that are bought will be stenciled. At the last meeting of the M. C. B. Association they adopted standard hose, and if requirements are met, it will not be necessary for that rule.

Rule No. 32.

Mr. Dennerle: I will make motion that it is the sense of this meeting that the words "Or torn air-brake hose" be stricken from that rule.

Mr. Sebring: I would like to ask about release valves. I believe that some roads are carding those, and some charging them as owners defect, putting on the stub as missing. Is this proper?

The President: Do you mean cars delivered in interchange or cars repaired?

Mr. Sebring: Cars not in interchange, but repaired by you on your line. The release rods are missing, you have lost them. Do they become a car owners defect, or do you have to repair them at your own expense?

The President: If I was repairing them I would bill the owners.

Mr. Waughop: There is once I agree with Cincinnati. Under the provisions of Rule No. 32 the delivering company is responsible, which signifies interchange.

Mr. Skidmore: Mr. Waughop has agreed with Cincinnati, I would like to disagree with him on that rule. Rule states that delivering line is responsible.

Mr. Waughop: That means interchange.

Mr. Skidmore: It does not mean interchange any more than any other rule means interchange. It does not say interchange. Says delivering line responsible. If any parts of air brake missing it becomes delivering line defect, and if a foreign car is on another line and they make repairs to any of those parts, they have no right to bill the owners of the car. It says release valves and retaining valves are parts of those items. The release rod is part of the release valve, and I do not understand where Cincinnati gets the idea that they can bill a car owner when it says plainly it is delivering company's defect.

Mr. Hitch: I agree with Mr. Skidmore, delivering line is responsible.

Mr. Wohrle: I agree with the Cincinnati Gentleman.

The President: Well, Cincinnati does not agree with themselves.

Mr. Stark. That is like the side door question. You can govern it by special rulings of your own. It is owners defect while in transit, but when it comes to be offered in interchange becomes delivering company's defect.

Mr. Skidmore: When does it become an owners defect?

Mr. Griffin: I agree with Mr. Stark. This would become an owners defect same way as parts under Rule No. 41 would be owners defect. Material missing from car offered in interchange; say for instance knuckle was lost. You would bill for that knuckle and charge delivering road, and I believe rod is just as chargeable as knuckle would be in this case.

Mr. Hitch: I do not know of a rule any plainer than those two rules. Rule 41 makes delivering company responsible and Rule 32 makes delivering company responsible for those parts, and cites parts delivering company is responsible for.

Mr. Waughop. Mr. Chairman, this rule is immaterial to the chief car inspectors, for the simple fact they handle no cars except in interchange. Reading the rule, it says delivering company responsible. I would take it that the M. C. B. contemplated parts damaged under fair usage, repaired and charge these defects before they deliver it, but after delivering it is a penality on them. It is immaterial to car inspectors because we have nothing to do with it.

Mr. Hitch: In case that part of the triple valve is lost out, when you repair that tripple do you charge it to the owners and say parts lost?

The President: I would not think they would, unless they wanted the bill to come back.

Mr. Waughop: I would like to ask the L. & N. man one question. Can you possibly take off the cap of tripple valve?

The President: There is no question as to the reading of the rule. So far as the general practice is concerned 90 per cent of the roads that have to repair release rod or broken release valve would repair it as a broken release rod.

Mr. Stark: Why not charge it as missing?

The President: Rule says it can't.

Mr. Stark: Rule 41 says it can.

Mr. Dyer: Rule 29 which governs these items, states what missing parts the owners are responsible for. There is no provision for release rod.

The President: Any parts of these items.

Mr. Dyer: I do not think rod is part of release valve.

*Mr. Boltz: An air brake hose torn is certainly an owners defect. Now then if that car was offered in interchange, it would certainly be defective if not repaired. If hose was torn off, receiving rod would not be protected if they did not have in their possession card for missing coupler. And torn air brake hose, according to ruling of Arbitration Committee, is owners defect.

Mr. Skidmore: I do not agree with Arbitration Committee that torn air brake hose is owners defect. At one time they did so, I believe, but since that time rules have been changed. Torn air brake hose is delivering lines defect. That decision is null and void since the rule pertaining to air brake hose has been changed. Decision was that hose that had been struck and torn off, owner was not responsible. At the time it was taken up with the committee a new rule was made making delivering line responsible, and it so states in the rules very plainly, that missing or torn air brake hose is delivering company's defect, and I do not understand that the rule is in effect that would charge the owner of the car for a torn air brake hose. We get defect cards if they are delivered to us with air brake hose torn off, and if we damage a car in that manner we make no bills for it.

Mr. Stark: Train pipe hanger. Is that part of owners defect?

The President: I would not charge it so, simply an appliance to hold air brake in place.

Mr. Dyer: In regard for billing for release rod, I would move that it is the sense of this association that missing release rod can be billed for in repairs, if the car is not in interchange.

Motion seconded and carried.

Rule No. 33; no discussion.

Rule No. 34; no discussion.

Rule No. 35.

The President: New rule gentlemen. Appears to me the rule is very plain. Does not affect us until March 1 '08.

Rule No. 36; no discussion.

Rule No. 37.

Mr. Griffin: Where a car is delivered to a connecting line under load. When that car is unloaded there are additional defects found, to end stakes. Man that unloaded that car wanted to include defect of damage to those stakes. Question was, as I understood it, whether delivering line could be asked for defect card covering inside stakes? The car was delivered, we will say, from the Big Four to the Lake Shore, and question of defect card came up after load was out of car. Man making repairs required defect card for stakes, although could not be found while car was under load.

The President: The Lake Shore receives car from the Big Four, as I understand it with damaged side plank under load. They return car to Big Four,—

Mr. Griffin: No, car was damaged on Big Four and delivered to Lake Shore and car was unloaded on Lake Shore. After car was empty, question of defect card was brought up.

Mr. Mitten: To side stakes.

Mr. Griffin: We know there is some interior damage. It is not the place of a man to try and discover any interior defect. His business is to take record.

Mr. Stark: Is not that almost parallel with refrigerator car damaged?

The President: We card for the inside when we see it. If the owners find it necessary to repair inside, they charge for it.

Mr. Griffin: I move that inside stakes on coal cars, when damaged, should be considered as concealed defect.

Mr. Gainey: I make motion where a car was delivered carded for side plank being burned on the outside; when that car was unloaded and they find the additional burning on the inside, that other card should be furnished to cover those defects also. Seconded.

Mr. Taylor: The question is when a car is damaged by fire is to get somebody to admit it. Inside of coal car is concealed while under load. That is a question depending a good deal on condition and judgment. I beleive it should be carded.

Mr. Givan: I think the motion is out of order. When card was given, they were willing to give all they knew of, why should not they give the balance? Card should have been given in full. The M. C. B. rule says that additional parts should be asked.

The President: I do not know what part of the rule says that Mr. Givan.

Mr. Givan: Did not the Big Four give card knowing they had record?

The President: Have you anything to say on the matter Mr. Lynch?

Mr. Lynch: I am rather at a disadvantage in not being present to hear the discussion on the question, however, this being a local case, I am somewhat familiar with it.

The Erie delivered the car to the Lake Shore loaded with coal having side planks damaged by fire on outside, and Erie card issued covering visible fire damage. There is nothing in the M. C. B. rules that would justify us in carding for possible further inside damage on cars in interchange. For instance, the load force the end of a car out, and car is offered in interchange, we do not strip the end of the car to see if there is a combination or not, neither do we unload cars, to discover whether there is further fire damage to the inside.

In my opinion the Lake Shore is not entitled to additional Erie card, unless car was damaged while in possession of the Erie. It seems to me car should be traced with a view of locating on whose line the damage occurred.

Mr. Bailey: Does rule 37 cover damage by fire? It states in there missing or damaged under fair usage. Damage by fire is not under fair usage.

Question was put and carried.

Rule No. 38.

Mr. Waughop: At St. Louis we are receiving to the limit, either way, 31½ or 34½.

The President: That is Cincinnati exactly. Empty or loaded. If the car is above or below dimensions, we refuse it. How about Columbus?

Mr. Wohrle: We agreed among ourselves there to let them pass over ¼ inch either way, and interstate commerce inspector allowed it.

Mr. Wright (interstate commerce inspector): Interstate commerce inspector may allow ¼ inch. I want to say it is not within his province to allow any portion of an inch.

Mr. Wohrle: I do not believe he had a right, but he said he would not report it.

Mr. Wohrle: I understand they allow 1 inch at Toledo, 1 inch below and 1 inch above.

The President: One inch variation each way, 35½ and 30½? There is one joint inspector that won't put himself on record as saying that, and he won't run them.

Mr. Wohrle: My committee ordered me to do so, and I would do it. I am working for a committee.

Mr. Dyer: Where I am located we receive empty cars going to mine for load. They are 31½ inch and invariably they go below the limit when loaded. At other points do they cut out the cars below 31½ inch?

The President: At Cincinnati they do.

Mr. Haines: Rule governing condition of cars in interchange.

If Railroad Company so desires to take their cars on shop tracks and make them proper height when empty, it is their privilege, and cars cannot be rejected in interchange when within those limits.

Mr. Dyer: I would take exceptions. Rule 2 states plainly that cars offered in interchange must be accepted if in serviceable condition. If car is 31½ inch and will sink down below under load, it is not in serviceable condition and can be refused.

The President: I would like to ask you did you ever see an empty car down to 31½ inch, and when car was loaded be up to 34½? Don't believe that, do you?

Mr. Dyer: Yes sir, I have seen it. As I understand you if you receive a car 31½ inch and you know positively, due to your knowledge of the equipment, that it would sink down to 30 inch, would you consider that car in serviceable condition?

The President: Yes sir.

Mr. Dyer: If it will sink down from 31½ inch you consider it as in serviceable condition?

Mr Waughop: Cars delivered in interchange at 31½ inch, interchange inspector has no business to contemplate what it will do. It is in serviceable condition when he sees it and it must go forward.

Mr. Cottrell: Is it practicable to good business to allow empty cars to run in interchange when they are down to 31½ inch? For the benefit of the service it should be changed.

Mr. Waughop: Bad practice, but it must go. Trouble we have had at St. Louis is very recent, in the last 90 days. Have had many B. & O. cars delivered under load that were correct so far as the height of coupler was concerned. When they were empty they were high. They were set back and were repaired. At the same time we have had a great many Big Four cars delivered under load which were correct, and when empty they were ½ inch too high, rejected and repaired. New cars.

Rule No. 39.

Mr. Skidmore: I would like to ask in connection with that rule if coal cars equipped with grab irons and sill steps on one end only is proper?

Mr. Waughop: Grab iron and sill step must appear on left side or left hand corner of the car before passing interchange.

Mr. Wright (interstate man): I wish to state that any cars that are found by interstate commerce men without sill steps and hand holds on left hand corner of car are reported as no holds and sill step missing, for the reason the M. C. B. have recommended that as proper place to have them located. With further reference to rule 39, I would suggest when it comes around to that part of the business that sill steps, steps, ladders, running boards or hand holds, I would suggest that it should be inserted "should not be offered in interchange."

Mr Waughop: I cannot quite agree with Mr. Wright on the running board. I think there is nothing in the law preventing the railroad from accepting car if it likes, regardless of the law on the running board. As to the sill step that is correct.

The President: I would like to hear from Cleveland on sill steps and grab irons on left hand corner of car.

Mr. Lynch: We do not object to cars not being equipped on the left hand corners. A man has no business up on that end of the car, as I know of, and if they are applied on each side of the brake end he has access to the brake on either side of the car. Cleveland is not taking any exceptions to those cars. I would like to ask Mr. Wright,—

The President: Mr. Wright stated his opinion a moment ago.

Mr. Waughop: I do not agree with Cleveland. It is just as necessary according to my opinion to have grab iron and sill step next to the pin lift for switchmen as it is to have ladder on car. It is very often necessary for switchmen in our yards to grab on car for the purpose of lifting rod in shunting cars, and that is proper place for it.

The President: I would state there has been quite an amount of discussion between Cincinnati and Cleveland. The Big Four has taken exceptions to our refusing Lake Shore cars having two grab irons on one end of the car and two sill steps, and nothing on the other end of the car. Cincinnati, with a view of getting what was correct, took it up with every interstate inspector that came around. They said that recommended practice of M. C. B. association is practically the law in the case. There is nothing in recommended practice we can go by, except sheet 19. Sheet 19 shows coal cars that they should have sill step and grab iron on left hand corner of the car. We had a great deal of correspondence and at last it went from Mr. Parish to Mr. Garstang, and two interstate inspectors on the Lake Shore, and they said it was not necessary to have grab irons on both ends of cars. Every interstate inspector, even to Mr. Mosely the secretary, stated that we were right. Now Mr. Wright is here and he expresses himself in same way. In fact he came from St. Louis to Washington, Ind., to take up with southern Indiana to compel those people to put those steps and grab irons on there.

Mr Wright: They are applying sill steps and hand holds just as rapidly as they can. Some of the roads are not accepting cars from them unless they are applied. Understand, Mr. Chairman, that the law does not specify where. But in order to bring about uniformity, interstate commerce has adopted M. C. B. as their standard. They should be strictly in accordance with M. C. B. rules:

Mr. Waughop: I would like to ask if there is a representative of the Lake Shore road here who has been requested to change cars from the right hand corner to the left hand corner.

The President: They are both on one end.

Mr. Waughop: I will state for St. Louis when cars come into our territory in that condition we apply hand hold and sill step to the left hand corner, as has been the custom.

Mr. Berg: Apply sill step at end of car in addition to grab iron?

The President: We are simply carrying out the requirements of the interstate commerce commission.

Mr. Berg: Do they require sill step? Understood they required grab iron on end of car but not sill step.

Mr. Waughop: They require it at diagonal corners.

Mr. Skidmore: In connection with that, so far as the law is concerned, it does not require sill step on end of car or any place, it does not mention sill steps, and I suppose if the Lake Shore so chooses by applying hand holds on left hand corner they cover what is required by the law, but as some of them have asked for what purposes it is intended, would say it is one of the most useful hand holds on a car. Switchmen will take hold of that with left hand and raise uncoupling lever with right. They use that 100 times where they use the other hand holds once. If I am wrong in regard to the law, Mr. Wright will correct me.

Mr. Wright: The gentleman is right, the law does not mention sill steps. The only reason we report sill steps as missing is because it is recommended by the M. C. B. Association.

Mr. McPherson: In regard to St. Louis, will state for a year and a half we have flatly refused to handle cars without sill steps on. We have billed for and collected.

Rule No. 40.

Mr. Waughop: I would like to ask concerning the custom here in the city, in regard to old defects on cars offered in interchange. Side of a car is raked very bad; do you apply defect card when offering it in interchange, or make record? At any point, at Cincinnati, Columbus or Cleveland?

The President: So far as Cincinati is concerned, if car is offered in interchange with defects such as raked side, roof or door that is old, and does not impair the lading of that car by leakage or otherwise, car is allowed to run without defect card, but record is made of it.

Mr. Wohrle: At Columbus we run cars on record. If we are asked for defect card, we give them our record that it passed there, but was old defect.

Mr. Pearce: So far as I know about Cleveland, if those gentlemen in the west allow this to go through on record, Cleveland don't pass them east that way. They are carded for, defects old or new, one or two parts, three or four.

The President: How about Wheeling?

Mr. Boltz: As a rule we card for old defects if owners of the car makes delivery to foreign road. Although it is a foreign car to both roads, old defects, we keep record.

Mr. Sebring: I will state that there is a great deal of confusion at St. Louis, or has been on account of this. The railroads at that point will take at least $200,000.00 to cover the old defects on cars that have gone west, and coming back, with old defects, were carded and forwarded on east and billed on. When you accept car with old defects on it, no matter how old it is, it would be well for you to protect road sending it here. We have a rule to not card old defects. If we demand a card from joint car inspector for old defects, we are struck for them right along.

The President: My view of that is that there are quite a few cars having been interchanged at 50 different interchange points. Car has been running with defects existing two years. Car has been in possession of the owners, possibly two or three times. If we attempted to hold foreign line, it would simply require all of us to issue a very, very large number of defect cards, making company that issued defect card last responsible for this damage, wherethe car would be repaired if in their own shop. I do not think that any defect card should be given against a company for a foreign car if defects existed when car was on its own line.

Mr. Sebring: When the car arrives there, defect card must be applied if demanded by receiving line.

Mr. Dyer: A car was received from Streets Western Car Line from stock yards, run east to Buffalo and passed by the

New York Central O. K. When it came back it was carded for damaged end sill. Car went to the stock yard, record taken of the defect, carded and passed east. In keeping with their custom at Buffalo they removed defect card and let car go on New York Central. When it came back it was carded against the New York Central again. Went back to Buffalo and the New York Central again, and defect card again removed. When it came back to the Nickel Plate, they passed it and let it go by. Went down to the stock yard, reloaded again for the New York Central; this time carded against the Nickel Plate.

The President: I think that is one point that car foremen and joint inspectors should come together on a great deal closer than they are, regarding old wooden defects. I think we should all endeavor to get closer together on the matter than what we are. If we are wrong at Cincinnati, we had better change.

Mr. Taylor: Let us carry that over until tomorrow.

The President: Do you make that as a motion?

Mr. Sebring: I make motion that we lay it over until Mr. O'Brien is present. Seconded.

Mr. Skidmore: The meeting has been called for on the 6th and 7th., and all members have been notified to that effect, and if they care to take part in the discussion and hear, it is their duty to be here. Our time is limited on the rules, and I do not believe in laying over anything and sacrificing some other part of the rules. Now if we have time after going over the balance of the rules, and can refer back after that and take up something else, I think it would be perfectly proper, but to refer back to this rule tomorrow, I would object to it.

Mr. Sebring: This would only be a courtesy to Mr. O'Brien, so he could discuss that rule tomorrow.

Mr. Skidmore: I make an amendment, that if we have time after going over the rules, we will refer back to what other rule that any member desires to discuss. Carried.

Rule No. 41.

Mr. Waughop: I would like to ask what is the practice at Cincinnati and Cleveland for small defects; if they demand a card for every small defect, such as lug bolts?

The President: Lug bolts are owners defect. Repairs made by delivering line.

Rule No. 42; no discussion.

Rule No. 43.

Mr. Stark: Suppose wrong repairs are made by any line. Wooden beam applied instead of metal beam. In the rules this would make delivering line responsible.

Mr. Skidmore: In reference to the wooden beam instead of metal beam, it has always been my understanding that in applying wooden beam in place of metal beam it would require an M. C. B. defect card in interchange in all cases. There has been no change in that rule I believe.

Mr. Waughop: Cincinnati is correct again, except that car should be stenciled.

Rule No. 44; no discussion.

Rule No. 45.

Mr. Wright (interstate commerce): You asked for an explanation on rule 39. I would suggest that in making recommendations of the M. C. B. Association that in rule 45 word "moving from" and "Points" be stricken out, and the words "Being moved" substituted, which would make rule read: Uncoupling attachments of M. C. B. couplers offered in interchange must be made operative before being moved. Delivering line would then make repairs, and would insure car being applied with safety appliances.

Rule No. 46; no discussion.

Rule No. 47.

The President: Would state for the benefit of interchange inspectors if the car foremen would pay more attention to this it would save much controversy. If you repair a car at an isolated point on your line, you should put on an M. C. B. defect card covering wrong repairs. There is not anything causing more trouble than wrong repairs without an M. C. B. defect card.

Mr. Bunting: Would state as far as the Pennsylvania is concerned in Cleveland, that this is done. We always aim to have a car properly carded before it leaves our repair track.

The President: That causes more correspondence than anything else, I think, in the car line.

Rule No. 48; no discussion.

Rule No. 49; no discussion.

Rule No. 50; no discussion.

Rule No. 51; no discussion.

Rule No. 52; no discussion.

Rule No. 53; no discussion.

Rule No. 54; no discussion.

Rule No. 55; no discussion.

Rule No. 56; no discussion.

Rule No. 57.

Mr. Skidmore: Before we start on those rules, that is headed "Instructions to Repairmen." Other rules were headed instructions to inspectors. I would like to have that defined. What is meant by instructions to repairmen?

The President: The chair is under the impression that rule 57 should come under instructions to inspectors and not to repairmen.

Mr. Sebring: I think it is for repairmen or foremen. This is for repairs of cars.

Mr. Skidmore: I brought up the question to see how different members understood it. I was under the impression that it is as our friend stated, that it is instructions to foremen and repairmen as to making repairs, how they should be made, but I wanted to see if it was understood by the other members, or was understood to be instructions to inspectors also.

Mr. McFadden: When inspectors inspect a car and passes to repair track, their duties end. It is then under control of foremen of repairs, and I think this rule would refer to them.

The President: I think possibly that you are correct on that question when I read the rule closely. It seems strictly a rule for the government of the foremen and repairmen.

Rule No. 58; no discussion.

Rule No. 59; no discussion.

Rule No. 60; no discussion.

Rule No. 61.

Mr. Skidmore: In regard to the coupler gauges. It is not practicable I believe for inspectors to gauge cars in the train when coupled together. For them to gauge the couplers, each car would have to be separated, and as these rules come under the head of instructions to repairmen, I am of the opinion that the coupler gauge should be used on all repair tracks with the cars separated and repair men see that they are repaired if they exceed the limit of the coupler guage. We have found in a great many cases that the cause of the couplers exceeding the limit was on account of the small knuckle pin and worn knuckle, but this defect could not be found by inspectors in the yard on account of it being coupled together, and it would be well for all car foremen to see that the repair men are instructed to gauge these cars while in the repair yard, and make repairs at that time, as it is not practicable for inspectors in the yard to gauge them.

Mr. Sebring: Cars brought into terminals and found defective, it is repaired. I do not think we should get all men in line for gauging couplers. You do not attempt to make car inspectors of all your car men.

The President: The object of Mr. Skidmore, as I understand it, is that he wants repair track men to look after cars on repair track, gauge couplers and have repairs made on repair track, and not for inspectors to gauge couplers in trains, for it is impracticable to gauge them unless there is a strain on the train.

Mr. Sebring: The fact is the inspectors won't do it, that's all. You have got to examine couplers on repair track, and not trust to some repair men. Take it off inspectors altogether, and let the car foremen go around and do those little odd jobs. As for putting car repairers at it, they won't do it.

Mr. Hitch: That comes under the heading of instructions to repair men, and I do not think it is wanted to have couplers inspected on repair track.

Mr. McFadden: I think convention of M. C. B. Association and railroad companies think these gauges should be used by repair men as well as inspectors.

Mr. Sebring: I do not think inspectors have time to do all gauging. He has everything to gauge, coupler, wheels, etc. I think this gauge is made for repair track men.

The President: It is not a question Mr. Sebring, of the work added to the inspector, but the question is, is it the law? it is quite unreasonable to suppose that any man, inspector or foreman, can accurately gauge a coupler when coupled together, particularly so in severe weather, or where the cars are compressed. If the inspector is required to make a correct inspection of a coupler in regard to contour line as prescribed in rule 61, it would be necessary for each train to be separated, each car, which at large terminals is entirely unreasonable and probably uncalled for.

Mr. McPherson: So far as that rule is concerned, we have been carrying it out a great many years on repair track. Either myself or assistant foreman are doing this. We repair all defects.

Mr. Sebring: It is almost impossible for an inspector to see from the head of the pin whether it is the right size or not, and cannot tell unless he gets under, and they seldom do that. I think it would be almost impossible for a man to do that in the yard.

Mr. Wohrle: If we put it on the inspector, I don't see when he can do it.

The President: Unless you put on more inspectors.

Mr. Wohrle: Well, he couldn't do it then. The coupler ought to be gauged full depth. He ought to have the couplers uncoupled to try his gauge as the rules require, and I do not see how he could do it properly. I think this work should be done on the repair track.

Mr. Boutet: (Mr. Waughop occupying the chair) I move it is the sense of this meeting that car foremen will endeavor to look after the couplers on repair track, but not give any instructions to inspectors. Seconded and carried.

Rule No. 62; no discussion.

Rule No. 63; no discussion.

Rule No. 64; no discussion.

Rule No. 65.

Mr. Sebring: In case of spliced sill, if any defect of that sill be left, should not I have a defect card for wrong repairs? Would I be justified in asking for card for wrong repairs?

The President: Well, I should say that that would be a question whether that split had occurred after repairs were made or before. Some parties would say split was caused after repairs were made; that would be owners defect. If you could show that the sill was split before that splice was made, it would be proper for the delivering line to furnish you a defect card, or the parties, rather, making wrong repairs, but unless you could do so, I would say it would become an owners defect.

Mr. Sebring: Then you can lop off about 3 feet of a sill, leaving some of the old defect. We have no proof that it was done before.

The President: In that case you would have to accept the car unless you could show the sill was damaged before the splice was made.

Mr. Sebring: I would call that wrong repairs. It is not a perfect splice.

The President: You know that the sill was split when the splice was made.

Mr. Sebring: They splice it, and not cut out defect.

The President: I would call that a case that would come under joint evidence, and if you could obtain joint evidence that wrong repairs were made, and that defect existed at the time of making wrong repairs, you would be responsible the same as any other case of wrong repairs. It rests with the owner of the car to show that the party making the wrong repairs did make them.

Mr. Sebring: That would be an impossibility, as application of repair cards has been a thing of the past.

Mr. Boltz: It may be possible that the sill after being spliced may have become damaged, and there is no evidence showing that sill was damaged by reason of an accident. If you could get joint evidence,—

The President: I would say that it was a case of joint evidence.

Mr. Boltz: Might just as well take car and say nothing.

Mr. Hitch: If sill has been spliced according to the rules, I do not see how it could be termed improper repairs. If it can be shown that damage existed at the time repairs were made, it would then be wrong repairs.

Mr. Waughop: I move chief inspectors and car foremen by a rising vote, extend thanks to the Cleveland Steam Railway Club for courtesies extended to this Association at this meeting. Seconded. Carried.

Mr. Waughop: At 7:30 it is desired by the committee that all members and their ladies meet in the rotunda and we will go to the theatre party in a body.

Rule No. 66; no discussion.

Rule No. 67; no discussion.

Rule No. 68; no discussion.

Rule No. 69.

Mr. Sebring: I think that refers more to machine men. We have got to take our wheels as they give them to us.

The President: There are some roads where car department is separate from the machine department.

Mr. Berg: We cannot except any mistakes on the machine department. Shops are liable to make mistakes, but we must not do it.

The President: That rule is very plain, and it refers mostly to the machine department.

Rule No. 70.

Mr. Sebring: Does that pertain to private line cars too? Very few cars have anything stenciled on them.

The President: If the car is not stenciled showing the capacity of the car; it appears that rule is very plain. If they do not stencil their car, they cannot hold you responsible.

Rule No. 71; no discussion.

Rule No. 72; no discussion.

Rule No. 73.

Mr. Sebring: Providing weighing has not been done, have you a right to demand defect card covering labor of doing this?

The President: What would you get for it?

Mr. Sebring: It is not what you would get, it is the number that amounts to something.

Mr. McFadden: In making repairs here in these rules, you have to restencil and reweigh without charge. Cannot bill.

The President: When cars are undergoing extraordinary repairs for something you are responsible for, you cannot make bill for that.

Mr. Sebring: I would like to have this point settled. I would like to find out whether we are entitled to defect card covering that work they have neglected, or whether we have to do it ourselves. We have a great deal of that in St. Louis.

The President: Let us read the rule again. (reads rule) Take an L. & N. car repaired on the Missouri Pacific. They put in new sills and new siding. They practically rebuild the car. Would you stand and beg simply because they did not put that car on the scales.

Mr. Sebring: They have done work M. C. B. rules say they should weigh car for. Suppose they repaired car and not weigh it and load it, what would there be to go by?

Mr. Waughop: The question Mr. Sebring raises is simply one of wrong repairs. If repairs made by foreign company are on the condition he states, there is no reason why company making the repairs should not reimburse owners of the car. The rule says weight must be applied; if it is not, it is wrong.

Mr. Boltz: It looks to me as though it is a case of not making repairs complete, and when they made those repairs, in order to complete it and comply with the rules, they should have weighed and stenciled it, and since they did not, and they made those repairs, they should certainly pay the owners for weighing the car.

The President: I think a joint evidence could be given and owners could collect from people making repairs. Your company has got car repaired, got better car than it had before, car in service and I think they should be very well satisfied to take that car, weigh it and put it in service.

Mr. Sebring: We do not assume all our cars have to be rebuilt. They will take a new car, they have not weighed the car as the law says they should; wrong repairs has nothing to do with it. Should they stencil the car, or give defect card covering it and allow us to do the work?

Mr. Waughop: I move you that in case a railroad company fails to restencil a car or weigh it that joint evidence, upon delivery of car to owner, is all that is necessary. Seconded.

Mr. Dennerle: Where we had joint evidence in those cases, we have never failed to collect.

Motion carried.

Rule No. 74; no discussion.

Rule No. 75.

Mr. Dyer: I have experienced on several occasions having issued defect card to delivering road for chain on cars, and later we have found chains billed against party to whom the shipment was made. Agent has collected the chains and sent them back to original point.

Mr. Skidmore: We have not just had the same trouble, but we have had some pine that was loaded up in Washington and came on through, and after the cars had passed through two or three months there would come along a tracer from the parties that shipped the lumber asking for the return of the chains, as the agent had been billed on for the value of them. I think that it is entirely wrong for the agents to handle the chain business in that manner, because it is covered by M. C. B. rules. In all those cases we have returned the chains to the point where we had received the cars from, consequently it caused considerable trouble in reshipping the chains back to the agent.

Mr. Waughop: I move that the sense of this meeting that when cars are chained together, they should not be offered in interchange except with the couplers intact on twin loads. Seconded.

Mr. Skidmore: I do not see that there is any necessity for the motion. Do not think any inspector would accept a twin load chained together unless the couplers were intact. If the coupler was defective, broken followers or broken coupler, he certainly would reject it, at least they do down in our country. In all cases where coupler was defective, did not make any difference whether chained together or not.

Mr. Waughop: At St. Louis load of that description offered in interchange, no matter what may be the condition of car, if safety appliances are operative, car must be accepted. Follower may be broken, spring may be broken. Follower may be gone, spring may be gone, only that coupler is operative.

Mr. Sebring: I think matters of that kind are covered by rules. Not necessary to go over it here.

Mr. McFadden: I do not understand these chains are out on twin loads because couplers are defective. Apply them on double loads for safety to keep the cars from pulling apart. I have never known of a case where car was pulled apart. We always take chains off and deliver them without any chains. Our orders have been to take them off.

Motion was lost.

Rule No. 76;

Mr. Sebring: I do not believe there is anything to discuss on repair cards any more.

Rule No. 77; no discussion.

Rule No. 78; no discussion.

Rule No. 79; no discussion.

Mr. Sebring: I move we adjourn until tomorrow.

Motion was seconded and carried. Meeting adjourned at 5:30 to meet at 9 A. M. next morning.

Morning Session, September 7, 1905.

Called to order at 9:15 A. M. by Pres. Boutet.

The President: The first thing in order this morning will be a letter from Mr. Ball of the Lake Shore. Please pay attention to the reading of same.

Letter read by secretary in which the Association was offered transportation to Buffalo, and return in order that the members with their families might see Niagara Falls.

The President: You have heard the reading of the letter from Mr. Ball; what is the pleasure of the Association?

Mr. Sebring: I move the letter be accepted by a rising vote of thanks. Seconded. Carried unanimously.

The President: The next thing in order will be the reading of communications. We have regrets from the following members who are unable to attend:

Acme Co.
Moseley, Edw., Secretary Interstate Commerce Commission.
Nealley, H. A., of the Joseph Dixon Crucible Co., Boston, Mass.
Sharp, W. E., of the Armour Car Lines.
Swift Refrigerator Transportation Co.
Gies, Geo. E., General Foreman, Penna. Co., Allegheny, Pa.
Carson, G. E., Gen. Foreman, P. & L. E., McKee's Rocks, Pa.
Tinger, E. P., Car Foreman, B. R. P., DuBois, Pa.
Marshall, W. J., Gen. Manager, L. S. & M. S., Cleveland, O.
Fenwick, Wm., Canton, O.
Mitchell, A. E., S. M. P., L. V. R. R., S. Bethlehem, Pa.
Dreyfus, T. S., Gen. Foreman, Penna. Co., Mahoningtown, Pa.
Davis, G. H., Foreman Car Dept., The Wabash-Pittsburg Terminal, Carnegie, Pa.
Merriss, E., Joint Car Inspector, Lexington, Ky.
Burns, L. J., F. C. R., C. & O. R. R., Covington, Ky.
Frost, John, Supt. Car Service, Oliver & Snyder Steel Co., Pgh.
Robertson, J. R., C. I. I., Kansas City, Mo.
Bailey, J. I., C. & O. Ry., Russell, Ky.

Following letters received from firms containing courtesies for our trip to Buffalo and Falls and Detroit.

American Steel Fdry's Co., St. Louis, Mo.
Belenford Axle Co., Davenport, Ia.
The McConway & Torley Co., Pittsburg, Pa.
American Brake Shoe & Fdry. Co., Chicago, Ill.
Armour Car Lines, Chicago, Ill.
Farlow Draft Gear Co., Chicago, Ill.
Galena Oil Co., by Alex. Turner.
Chicago Railway Equipment Co., Chicago, Ill.
Swift Refrigerator Transportation Co., Chicago, Ill.
McCord & Company, Chicago, Ill.
St. Louis Car Company, St. Louis, Mo.
Adreon & Company, St. Louis, Mo.
The Barney & Smith Car Co., Dayton, O.
Scullen & Gallagher Steel Co., St. Louis, Mo.
Railway Appliance Co., New York, N. Y.
Latrobe Steel & Coupler Co., Chicago, Ill.
W. H. Miner Co., Chicago, Ill.
The Westinghouse Air Brake Co., Pittsburgh, Pa.
Gold Car Heating & Lighting Co., New York, N. Y.

The President: You have heard the reading of the letters, and amounts contributed by different firms for our trip to Buffalo and Niagara Falls and Detroit; what is your pleasure?

Mr. Berg: I move that we send them a vote of thanks for their courtesy to this Association. Seconded and carried unanimously.

The President: Mr. McPherson, at our last meeting you was appointed a committee, yourself, Mr. Skidmore and Mr. Julian of Omaha, to have a report for this meeting as to the best manner of educating inspectors. Are you ready to report.

Mr. McPherson: Not ready.

Mr. Skidmore: Mr. President, Mr. McPherson and I have been talking the matter over, and we concluded that we could not very well make a report, and would like to have the time extended, if possible, until next year.

The President: You have heard the verbal report of one of the members of the committee; what is your pleasure?

Mr. Wohrle: I move that we give them the additional time. Seconded.

The President: I have no objections to giving the committee further time, providing they will devote some time to it. This is very important, manner of educating inspectors. I was in hopes last year that we had appointed a committee that would give this their attention, and I am very much disappointed that they have not a report. If this time is extended, do we know they will have a report next year? How about it Mr. McPherson?

Mr. McPherson: We will have it ready for next year.

Motion to give committee further time carried.

The President: We left off at the rules yesterday with instructions for billing, rule 80. Do you wish to go through those, gentlemen? I would suggest that instead of going through these, to take up some other rule. It will be necessary for a motion to take up any particular rule that you desire now.

Mr. Taylor: I make a move that we take up rule 75. Seconded, and carried.

Mr. Taylor: I make a move that the President appoint a committe of three (3) to define that rule. It seems to be inconsistent, and ought to be properly interpreted. The committee to rewrite rule 75 to conform with the subject and request the M. C. B. to place our interpretation in the book of rules. Seconded. Carried.

The President: Mr. Taylor, Mr. O'Brien and Mr. J. J. Gainey, I appoint as committee to prepare report, rewrite rule as they think it ought to be written and report to this meeting.

The President: Is there any other rule you want to refer to?

Mr. Sebring: Yesterday we agreed to refer back to rule 40; I move we do so.

The President: Motion was we could refer back to any rule we deemed advisable. Rule No. 40, moved by Mr. Sebring we refer back to rule 40 for discussion. Seconded and carried.

Mr. Sebring: Mr. O'Brien is here this morning. The discusion yesterday was put off until today so that he could make some remarks too. As he is here he can talk on the subject. I think I said all I had to say yesterday about it.

Mr. Taylor: I think this should be handled in a general way and not refer back to the rule.

Mr. O'Brien: I would like to say that I do not see anything in rule 40 wherein we could better it. After awhile we will be better able to take up the question concerning age of defects; not now.

The President: Mr. O'Brien in a personal conversation with you yesterday you wanted, at some time during the meeting before we adjourned, to take up the matter of interchange. It was brought up yesterday, rule 40, regarding carding of old defects. There seems to be quite a difference in all parts of the country regarding allowing a car to go forward on record. Some points they allow a car to go forward without card. It was also brought out that when cards are issued for defects, there are quite a number of bills made on same. and no repairs made to the car. Now, I think myself, the rule is an excellent one to discuss regarding uniformity of inspection at different points.

It will be necessary for a motion to either pass on from the rule or that we take certain action, or something to dispose of it.

Mr. Sebring: I make a move that we pass on to other rules.

The President: If we are going to have any discussion regarding interchange, there is not a more important rule in the book than rule 40. There is no reason why inspection should not be uniform, and only way is to take some action at this meeting. We did not discuss rule 40 as we should yesterday. If a car is safe to pass Cincinnati without a card on, it should be safe to pass St. Louis without a card, or Cleveland, or Toledo. Let us see if we cannot get together and get some uniform action of the Association so that the different joint inspectors will get in line.

Mr. Fitch: In order to get this matter properly before the meeting, I think it should be referred to a committee to report back their idea of the different defects; especially old defects, on cars that should be carded, and those that should not be carded. I understand that cars will pass some points now, and at other points they will not pass without cards.

Mr. Sebring: Committee work is very slow, and we are all together here, and it would be better to have us all hear what was said instead of the committee appointed for next year. I do not think committee business is very good when we are all together.

Mr. Hitch: My idea is to report right back at this meeting.

Mr. Bunting: As there are representatives here from a great many roads, I think the matter should be discussed, and it is my opinion that what is done at one point should be done at another, if it is according to the rules and practice, and I would say for one that the Car Foremen and the Car Inspectors should use uniform practice at different points. If defect is cardable, and defect is noted when car is delivered, then it should be carded, and not passed on to Cincinnati or St. Louis. I trink it is the sense of this meeting of car foremen and inspectors that its members are honest, and I do not think anyone would remove a card and charge without making repairs. So far as appointing a committee, I know how they work, and I think the matter should be discussed. There are men here who can bring this matter out, and I would like to hear from them.

Mr. Waughop takes the chair.

Mr. Boutet: I move that no card be given for old wooden defects.

Mr. Cottrell: I do not think it well to pass cars on notation at all points. Some might possibly like to make repairs. I would suggest that motion be amended that cars be passed on notation to all points of interchange, except with owners.

Mr. Boutet: If you will make that except when leaving the owner, I will accept the amendment. The motion now is that no cars be carded for old wooden defects, except at the time they are leaving the owner, or foreign car will not be carded in interchange for old wooden defects which do not require renewal for the safety of the lading of the car.

Member from Wheeling: I think the motion is to do away with carding of old wooden defects that would not be repaired. Now then if you draw a line on that—

Mr. Boutet: Motion is to card car when leaving the owners. Under motion it would be an owners defect when it is away from home, and if there is any card to be put on, let owner put it on when leaving home, then foreign roads would not have to provide for it.

Member from Wheeling: It should not be carded except when leaving the owners road.

The President: The chair would like to hear from Cleveland, owing to the fact that the Cleveland joint inspector, as I understood it yesterday, is now carding for any old thing, leaving any road to any road. Would like to hear from Cleveland.

Mr. Lynch: I think where the trouble is the old defects are not carded at the point where it leaves the owners. The defects become old, and when it comes to a point where they take no notations or check, the defects are old. I do not see how you are going to get around that any. Have a practice at one place of notation, and carding at another. In my opinion it cost the owner of the car just as much to repair the old defects as it does the new.

Mr. Sebring: Concerning old defects, it seems to be the rule to say that a combination existing shall occur at one and the same time. When a defect becomes 6 months old, how are we going to say that it all occured at the same time, so I would suggest that we cut out all claims where defect shows over 30 days old, even if the combination exists.

The President: Would like to ask you Mr. Sebring, how are you going to determine that the defect is 30 days old.

Mr. Sebring: You have got some high priced inspectors that ought to be able to judge that. I can do it.

The President: Guess we will have to hire you. I would like to hear from Mr. McCabe on this subject.

Mr. McCabe: From the remarks I have already heard, it appears to me that I am not capable to handle the subject as intelligently as I would like to. In the first place, if I understand our President right, he says numerous defects were billed on where repairs were not made. If that is so, we have a lot of dishonest men. It would be very hard to have uniform practice of inspection with such men amongst us. If there is one amongst us who would render bill without making repairs, every man working for a railroad should set a trap for them, as no railroad official will tolerate that. We should so work that our officials will have confidence in us to do what is right. Speaking of honesty, reminds me of a case I had with Mr. Boutet under rule 40 some time ago on a C. & O. car. The car was two weeks off the line of the owners, came to Cleveland with a load of coal. It had two center sills broken and end sill old. We unloaded the car here and sent it back to Cincinnati, and Mr. Boutet was called on to give a decision on the car, and he found that the defects were old, but the timbers were sound and not decayed. He decided it was a combination. Now in Cleveland, on any of the roads, if the timber shows any decay, the owners will accept. For instance car with two center sills broken and end sill decayed or rotten, we would not include end sill for the purpose of completing a combination.

Mr. Lynch: That's it.

Mr. McCabe: In regard to rule 40. As I said the first rule I believe in the book, or very near the first, says you are supposed to give all foreign cars the same care in inspection and oiling as you would your own. Now that bears close relationship to rule 40. Now if you men are honest and know your business, it is very easy to decide, if you will use the same judgment on foreign cars as you do on your own. That is all in our power to do, to be honest and treat the foreign car as you would your own, and if you bear that in mind you will seldom make a mistake. When you come to classify old defects, you can advance arguments that look good in a meeting. Those cars you all know may be away from home a year going all around the country. Now then, the question is, are any of us capable of saying how old the defects are on such a car? It is a good car, and for instance is wrecked on the Central Railroad of New Jersey in winter when it is snowing and rainy, but it is a good car and it does service down east for three or four weeks, say 30 days. It becomes water soaked. It is a Lake Shore car and moves around and comes back to Cleveland. It will cost us just as much to repair that car when it is old as when it is new. Now it only seems to me if the inspector will use good judgment and treat neighbors car as you would your own, you can tell from the general condition of car whether you would maintain it. Now if it is an old worn out car and defects are old but are not serious, can keep it in service as you would your own, a 30 or 40,000 capacity car, it would seem it is a question of judgment. I would not card it if the defects were such as would not impair the safe running of the car. If you take the rule just as it reads, there is no question whether defects are old or not. Now then, technically speaking, if a car is damaged, road doing so is responsible, and if you fail to detect on receipt of the car, it is equivalent to your wrecking it. I do not know as I could say much more.

Mr. Boutet: In answer to Mr. McCabe, I am very much surprised about his bringing up the case of broken sills. The car was billed home on the Lake Shore with two inter sills, one center sill and one end sill broken on account of decayed condition. The car reached home; the Q. & C. called my attention to the car, and I found the car had 3 broken sills, no more sign of decay about that car than any other car two or three years old. Sills were not decayed in any manner, but were square breaks, and I think the owners were entitled to have remuneration from the people who had caused the combination. The car having been billed from the Lake Shore, and as they acknowledged the defects existed when on that road, they should pay for it. To get down to carding old defects, we have a larger number of cars that we are all acquainted with. Some of them have nails driven in door and raked, and we have roofing raked. The car proves safe to carry commodities, the defect may have been in existence for a year or six months, and in that time car has been home several times. The car goes home and to the shop, and I will venture to say nine times out of ten repairs are not made. In some cases bill is made If that car has an old raked siding or raked roof, that is not going to impair the lading of that car, believe we ought to let that car go.

Mr. Lynch: He says on an old raked roof or raked siding, he takes notation. I would like to know what he means by that. Does he mean that delivering line is responsible, or does he leave it to the judgment of the next man to say whether it should be carded or not?

Mr. Boutet: I would say it is a judgment that there is a defect there and it is done for the protection of receiving road.

Mr. Lynch: I would say then, that the gentleman should card the car at the time, as this notation is equivalent to issuing a card. It would save correspondence and allow car to go through. I think if Mr. Boutet and all other joint inspectors would card when car is offered, it would save all trouble.

Mr. McCabe: I have got Mr. Boutet on one point just where I want him. He explained to you just what I tried to explain. Those sills were not decayed, but were sound timber. Now Cleveland I believe (am I right Mr. Lynch) will not card for those decayed timbers, even though two center sills and end sills, which you would consider a combination.

Mr. Lynch: Where combination existed with sound timbers, would issue a card.

Mr. McCabe: Boutet and Lynch agree on that. Is that right Mr. Boutet?

Mr. Boutet: Yes, sir.

Mr. McCabe: There are two purposes for running cars on notation; that is you must acknowledge you have not the ability to decide, or you are a fraud. Two things to look at when you run a car on notation; it is either for the purpose of fraud, or you admit your inability to decide. Now then if you are a capable man you can handle that foreign car as your own and card for it at the time. Treat it as your own car, and if delivering line is responsible, put defect card on it. If you are not capable of doing that, would say to run it on notation. There might be special cases, of course, where you know you are responsible, but through the kindness of your neighbor, you turn it over to him. But this thing of allowing inspectors all over the country to run cars on notation, I always opposed to that. I have tested it; made a special effort to see what was in it. We run cars from the Pennsylvania Company here in Cleveland that I know were damaged. Had defect card in the office, and I run the car. That car went from the Pennsylvania to the Lake Shore at Cleveland, and went somewhere in Indiana and delivered to the Big Four. We ran it on notation here to try it. It went up to Indiana and delivered to the Big Four and run 200 miles. Their inspectors missed it there and it came back in three weeks, and the Big Four was obliged to card it for all the defects, which amounted to about $45.00; a sample case of running on notation. If we had not been honest the Big Four would have paid for the damage for which they never were responsible for. If we had carded it here, it would have saved all that. We put on the American Steel & Wire Co's card and returned the Big Four card to the Big Four people. There is a sample of your notation. Just what I said before, you acknowledge your ability to judge the case, or you are doing it for the purpose of fraud. Then men say they never hear from it. Of course they do not, if they do not get graces back they are that much money ahead. To make the whole thing short, I am opposed to running cars on notation.

Mr. O'Brien: It appears the point of discussion here is the question of how we should dispose of a car that contains old defects, particularly in interchange. I have heard the explanation of some of you gentlemen just before me, and it is a question in my mind, with men holding position they have and do, as to whether they practice what they preach. If I am to be the judge of the classification of equipment which they move from the St. Louis and East St. Louis Terminals from all parts of the country, I should say they do not practice what they preach.

Mr. Waughop (in chair): The chief inspector of St. Louis knows that they do not practice what they preach.

Mr. O'Brien: Again gentlemen, we have operated under what is called he notation record system in St. Louis and East St. Louis. We have also of recent date operated under the practical carding system as it is termed. When we stop to consider that 60 to 70 per cent. of all equipment is defective, you can readily see the inconsistency of attempting to require inspectors to card for all those defects. I do not believe it is possible in the interchange of equipment to create a universal system of carding. I heartily agree with Mr. Boutet on this subject. As a choice for the St. Louis terminal between a record and carding system, I would say that the record system is very favorable to the extent of about $10,000.00 per month, that is considering the wheels through that point. One might ask you how we offset this discrepancy of an increase; simply the old question of repairs. What I have said just now has referred particularly to the exterior of body. When it comes to the wheels of the car, it compares just a little bit different. There is no definition between a decayed or broken sill, new or old, which forms a combination, and I believe that it should be the sense of this meeting that in order to form a combination of defects it must be done at one and the same time. Putting one and two together, it is simply a matter as to whether a car should be carded upon receipt or go on record as old defect. I prefer the latter.

Mr. Pierce: The chief joining inspectors at Buffalo in 1900 went over this same question very thoroughly. They passed a resolution that old defects on wooden cars should not be carded, but instead of that some parts of this country run along the same old way. and make combinations. For illustration. With cars from the Big Four commencing December 1903 up to June 1905. We have received cars at Buffalo several times with different cards on, and owners may possibly be making bills against the Big Four for 50 roof boards raked, old defects, 1903. Car running in that way up to the present time. I have written five or six times on this question, but never any card on car from owners, but as soon as it passes through Cleveland, cards are put on.

Mr. Lynch: That is a local matter. Our practice here in Cleveland in carding cars, we have a good record. Our practice is when we card a car to connecting line, for instance to Big Four, when that car returns we remove the card and send it to the local foreman. Should the car come back again we card it again, to protect receiving line. We again remove the card when it returns west. Should that car pass through 10 times in a month, we would card it each time going east so that receiving line is protected. We do the business correct here, in my opinion.

Mr. Waughop (in chair): The chair would like to ask Mr. Lynch, for our information in the west, do vou card all cardable defects leaving Cleveland, regardless of whether they are old or new?

Mr. Lynch: I would say yes, if cardable.

Mr. Waughop (in chair): You have either got a very poor lot of inspectors at Cleveland, or we do not find the condition that way coming to our point. We have a great many cars coming off the Big Four and through the Cleveland territory to our country that have defects that are cardable, that are not carded.

Mr. Lynch: Mr. Pesdietn, I will grant vou can find some isolated cases at all interchange points, we have got to allow for that. I think St. Louis must have a large amount of dishonest foremen, when bills would run up to $10,000.00 per month for defects and for cards that had been applied, repairs not made and bills made on the cards. It seems to me a great many of those cards issued and billed on, that the repairs have not been made.

Mr. Sebring: There are some of the foremen here, and I will defend them. I have failed to find one dishonest foreman.

Mr. Boutet: I am sorry to see this discussion get so personal. I have no objection to Mr. McCabe getting up here and rehashing me. So far as formen being dishonest is concerned, it is rather a serious thing to say. It is a pretty broad assertion, gentlemen. We are here to do business, and not to cast slurs on foremen at any point, unless we have positive information. I do not believe there is a foreman at Cincinnati that would take a card off a car and biil unless he made the repairs. (Applause). He would be discharged if his superiors knew it. I believe that when a card is placed on a car and defect necessitates that it should have the card posted on car, that card should remain on car until repairs are made: We find cars running through the country with old defects from six months to two years. Car passed in interchange from the owners and not carded at the time. It runs around through the country, goes where there is no inspector, car is allowed to get off on some other road, goes to the owner again and they demand a card for it. There are all kinds of cars running around the country with old defects. The situation is this: You can go in any yard in any part of the country, do not care where it is, and find 50 to 60 per cent. of cars hauling old wooden defects that are not carded for. About 90 per cent. of the inspectors are not carding for old defects. Why should I at Cincinnati put a card on there for a Lake Shore car that has been carded at some other point and the card taken off? Why should I put card on make a Cincinnati road pay for it? I say that Cincinnati is not carding for any old defects. When Cleveland says they are carding every defect that exists on a car, I do not believe it. We find cars coming down our way, not only from Cleveland, but from other points around the country; am I going to make a road paying me a salary pay for that car? It is not right. As I understnd the rules, if a card is placed on a car it should remain on that car until repairs are made. If that is done in all cases, then we won't have all the old defects, providing card remains on the car. We used to have a condition in East St. Louis; they said goats came and eat all the cards off.

Mr. McCabe: I appreciate Mr. Boutet's remarks very much. He practically apologizes when he says what he does about cards removed and repairs not made. His remarks would indicate little dishonesty among foremen.

Mr. Boutet: I simply state that one should have positive proof before saying any foreman is dishonest.

Mr. McCabe: In regard to defect cards at certain points, I would like to explain how Cleveland has always handled that to avoid tracing. Inspectors will always overlook certain defects, that they should card, every man makes mistakes. If chief joint inspector cards cars going west, the cars should have been carded at Buffalo. If those cars accidently come back via Cleveland, he figures the card carried the car back to Cleveland, and removed the card signed by himself and lets car go to Buffalo and let Mr. O'Donnell dispose of the car. That is possibly the way it occurs so many defect cards are issued in Cleveland. As Mr. Lynch explained, if an L. & N. car delivered to the Big Four and they card same and deliver to the Erie. Car comes back, takes Big Four card off and goes east, comes back again and goes to Cincinnati. Mr. Boutet can card or not, as he feels about it. The purpose of removing those cards is that it saves tracing.

Mr. Sebring: Concerning that charge of billing on cards where repairs have not been made. It is in some cases done through a mistake. Cards accumulate on foreman's desk. They cannot get card to the car, so they forward cards to the head office. The dishonesty is in the clerical department of the different roads.

Mr. Waughop: What do you call that, dishonest?

Mr. Sebring: In one way it is, and another way it is not. There are some cars billed on in error, and some of them been a little sharp practice, but the general assertion of dishonest foremen it throws a slur at me and every foreman at St. Louis.

Mr. Lynch: I think we are out of order; this is personal. In my opinion to get rid of this trouble there should be some uniformity of practice. I think the practice of M. C. B. should prevail.

Mr. Waughop (in chair): Mr. Lynch, the chair agrees with you on M. C. B. carding; if all points would use the M. C. B. card and leave the card on the car, but you do not.

Mr. Lynch: Mr. Boutet runs cars on notation. Why not card the car when he receives it. Unless we have this uniformity of practice we will always have a great deal of trouble afterwards.

Mr. Boutet resumes the chair.

Mr. Waughop: If practice of living up to M. C. B. rules was uniformily worked out throughout the different points of interchange in this country I have no doubt that it would save the largest interchange point in the country, and that is St. Louis, a great deal of work, a great deal of trouble and a great deal of expense. I want to say to you people that it has probably cost St. Louis, the different roads, over $50,000.00 during the months of May and June on the shortcomings of you inspectors. We had an order at St. Louis to card according to M. C. B. rules at that time. We did so. Unquestionably there are a great many cases coming in, hundreds of them, where the repairs should have been carded against the owners, particularly those at Cleveland. We have had cars there from the east via Cleveland with defects denoting unfair usage. They were old. The M. C. B. rules discriminate neither way, new or old, if the combination exists. We were compelled to card those cars under our rules at that time against the delivering company. The car would probably come back another route, and in the majority of cases probably it did. The owner grabs Mr. Card, it is a bank check, and charges St. Louis. At the same time car left owner in that condition, unquestionably so. You cannot make a defect old in three days, particularly so on a combination. If you will all live up to M. C. B. rules I will assure you that St. Louis will do so. But we cannot and live. There is not a road in the United States, particularly our part of the country, that can live up to the M. C. B. rules. If we do, there is not a company that will pay a dividend.

Mr. Pierce: This discussion, I understand, started on uniformity. On uniformity depends the life of this association; that is what we are here for.

The President: The motion was that it was the sense of this meeting that we would not card for any old wooden defects that did not impair the safety or that would not be repaired if car went in its owner's shop.

Mr. Pierce: Would it be possible to define uniformity? I have always said we should have uniformity throughout the country. So many defects are not detrimental to the running of the car. Here is a card I hold. We carded October 6, 1904, B. R. & P. car 1902 for 20 roof boards raked, old defect. The Transportation Department about that time was taking hold of the custom of sending cars home. That car was sent home to the owners for repairs. We had to card for those defects before the car passed through. Two months afterwards we traced it up and got an offset card. Ten months afterwards the B. R. & P. made repairs to that car and we passed bill. Now the question is whether that was really necessary, car in service ten months afterwards. That car never went west over our line at all. Came back to us routed home in a different manner. Speaking of these old defects, I have lots of stubs here that we passed bills on, that we did not get bills for months afterwards. I think the object of this association, object of your motion, that in case where it is not detrimental to the car, unless it is anything that will interfere with the running of the car, it should be allowed to pass through. That was your intention I believe in 1900, but the minority did not seem to think so.

Mr. McFadden: The matter of carding. While it may be all right to pass cars, it looks to me cars should be carded for all cardable defects, whether new or old.

Mr. Lynch: The New York Central Lines, Mr. Waughop, interchange from one to another and no card is issued whatever on any cars. In that way possibly those cars got through with cardable defects and no cards. We have no jurisdiction in that.

Mr. Stark: I believe on account of the lateness of the hour we have had discussion enough on this, and that it should be understood that the motion was well taken. The motion presented did not cover excessive damage, it merely covered slight old defects, and I do not believe but what every man in the country would pass the car with slight old defect on notation. We are passing away the time, have got other rules to discuss, and I do not see as it is necessary to continue this argument any further.

Mr. McPherson: I would like to make an amendment to that resolution. To run all cars on record for old defects and no card to be issued except where defect is new, unless repairs are made by owners.

The President: If the amendment prevails, it is going to kill the original motion.

Mr. McPherson: That is my motion exactly.

The President: I think we had better arrive at some conclusion. If Cincinnati is wrong, let the association take that action. If the other people are wrong, let them do the same thing. Let us get uniformity throughout the country. It is only the old wooden defects we have to card, and there is quite a number of cars carded in the country, cards taken off; at the next interchange it is a serious defect. I cannot entertain the amendment, that would kill the original motion. I would not think it would be parlimentary at all. Excuse me for taking that step.

Question put and carried.

The President: The report of the committee on Rule 75.

When two or more cars are chained together, or any cars which require switch chains to handle them *with couplers operative,* are delivered at an interchange point, the receiving road shall deliver to the delivering road at the time, an equivalent number of switch chains of the same size as the chains so used on the cars delivered, or, in lieu thereof, furnish a defect card for such chains.

Note change in rule underlined.

Mr. O'Brien: The object of specifying the word "operative" was to make it comply with the Safety Appliance Act.

Mr. Taylor: My interpretation of that rule is that it applies simply to card of double loads, chains applied for safety purposes. Rule does not say that, but the addition we recommend covers it.

Mr. Dyer: I would like to ask one question, whether the lever should be operative?

The President: No sir, it was not. Levers are disconnected in twin loads so cars will not become uncoupled in service.

Mr. O'Brien: I do not believe it is within the province of this association to quote anything contrary to the Interstate Commerce law. If I am correct, the motion that was adopted here was to offset mistake that was made yesterday in not conforming with the Interstate Law.

Mr. Wohrle: As I understand the question, some of the lines require the uncoupling chain to be disconnected on double loads to prevent them from becoming uncoupled.

Mr. Skidmore: I do not see any necessity for the addition to the rule. As the rule now stands it requires car to be delivered in safe and serviceable condition, and in accepting loads chained together, it is required that attachments are in good condition when delivered, and I do not believe the M. C. B. Association would pay any attention to any recommendations that have already been covered by the rules.

Mr. Taylor: I do not know, but Mr. Skidmore may have an inside track on the M. C. B. Association. We will never accomplish anything unless we try.

Question put relative to adopting recommendation of committee. Motion was lost.

The President: Mr. Waughop, there was a committee appointed to adopt suitable resolutions on the death of Mr. Fred Baker. Is committee ready to report?

Mr. Waughop: Mr. President, Mr. Fred Baker, Chief Inspector at Kansas City, died at Kansas City, Kansas, at his home on February 12th. The cause of death was appendicitis. Mr. Baker went to his home Monday evening, I think that was about the 10th. Physician was called and found that appendicitis was the trouble, and ordered consultation of physicians. They operated on Mr. Baker, and the operation caused his death. The funeral was very largely attended by both the inspectors and foremen of Kansas City, and on behalf of the joint inspectors. I procured a floral remembrance in the following way. I requested each person to wear for this funeral a rose which I presented them, and the effect was very similar to the McKinley Carnation Day affair.

I move copy of our records be sent to the widow and put in the minutes. We have lost one of our best members, in fact I believe our best member, who was a christian, a car inspector and a gentleman.

The President: You have heard the report of the committee, what is your pleasure?

Mr. Taylor: I move report of the committee be approved.

Seconded and carried.

The President: We have now come to that part of the proceedings if we have any recommendations to make to the M. C. B. Association we will make them. We have a letter from Mr. Dennerly of the Lake Shore.

Mr. McCabe: I would recommend that a committee be appointed in regard to the matter of running cars on notation. I would be in favor, if we couldn't do any better, to run all wooden cars with old defects. If we are not entitled to card for them, we should give every road in the country equal protection. You all understand different points over this country where men stationed in such cities as St. Louis, Cincinnati, Columbus, Cleveland or Buffalo, all the men are pretty well qualified, but you will find at very small points where men have not had the opportunity of wide experience, and Cleveland or Cincinnati will pass cars that they think no man should take exception to, but when it comes to a small point, they want defect card. To get equal protection to all, I would favor having a committee appointed and recommend as long as we cannot abide by M. C. B. rules, recommend to the association to do away with defect cards for old wooden defects. It seems to me that would be equal protection for all. I would make motion, Mr. President, that committee be appointed to recommend to the Arbitration Committee some different method of handling wooden cars with old defects. As it stands now, we have a book of rules that are unsatisfactory. You have got to accept the whole thing or nothing. I think it would be a step in the right direction to appoint a committee to make some recommendation, as we all should act alike.

Mr. Sebring: Second the motion. To name committee to form certain recommendations to the Arbitration Committee.

Mr. Lynch: Why allow those defects to become old? Why not card at the time the damage was done? Then you won't have old defects on cars running through the country.

Mr. McCabe: In regard to that motion. When we get out in our open field, we will still be at sea. By having a committee appointed, Mr. Lynch, to make such recommendations and have it inserted in book of rules, we will know where we are at. You got to take it up and by having something inserted in the book of rules we will get some definite understanding as to handling of defects, in a general way, and then we will come to a uniform practice.

Mr. Sebring: The road I represent has to earn close on to $12,000,000.00 a year to meet their operating expenses. That will make earning of each car $40,000.00. They have to make 10 per cent. of that $40,000.00 to make running expenses. By keeping cars in motion we can do this; instead of doing that we keep car on track waiting for cards and car would earn ten times that amount during that time with defects on.

The President: Before putting the question, I would like to state the object of the association. The object of our association is that we shall meet once a year for the purpose of going over the rules and arriving at some uniform understanding. If we are honest in that and we find practice in our locality is contrary to the rules, we will take it up with our officials on reaching home with a view of having our instructions changed. If we do not, do that, we had better disband and quit. Unless we propose to take some action when we get home. In 1900 we agreed to run with wooden defects. I took it up with my people when I went home, and we have been complying with it ever since. Our agreement was in forming the association that if the association agreed on any one thing, we would go home and take it up with our people, and if they would not allow us to conform to that, we would notify the rest. The ones that do not want to carry that out, I think the association would be well rid of them.

Mr. Lynch: I would like to ask where you draw the line on old defects. Do you intend to run all old defects?

The President: All wood defects such as raking of side boards. I do not mean the vital parts of the car.

Mr. Lynch: Such defects as are safe to run and safe for the lading?

The President: Yes sir, such as raked door.

Mr. O'Brien: I would like to say that I think it is imperative that this association take immediate action on running cars with old defects. I concur with our president in his views of this matter, that we should get right down to business here and not take it up through the M. C. B. association. We are all here representing the various lines throughout the country, cars in interchange, and it is a question of moving the traffic, not the detention of traffic. I would like to see at least immediate action taken in that respect. East St. Louis and St. Louis will start this at once, and will run wooden defects that will not impare the lading of the car.

Mr. Wohrle: Columbus will too.

Mr. Sebring: I think this will be found a good thing to keep cars moving. They are built for this purpose, and that is what we want to do, keep them moving. Action at once will be best way in place of a committee. Possibly next year we would have the same wrangling again, and as Mr. O'Brien says, I think we should take action right here.

Mr. Skidmore (in chair): All in favor of the motion as made by Mr. McCabe?

Motion was voted upon and lost.

The President: Any other recommendations? I have here a letter from Mr. J. C. Dennerle, which reads as follows:

Recommended by Mr. Dennerle that the word "torn" be eliminated from Rule 32. Making same read "Missing air-brake hose or missing or broken air-brake fittings, etc."

The President: You have heard recommendations of Mr. Dennerle; what is your pleasure?

Mr. Skidmore: The Arbitration decision was that owners were responsible for torn air hose. After that decision was rendered the rules changed by making delivering line responsible for torn air hose, which I think was just and proper, and the rule should remain as it is, for the reason that air brake hose are not torn off by fair usage. If the couplings on air brake hose are in proper condition, they will uncouple when train parts; when they are not in proper condition, it will pull the air hose in two, and if the couplings are in proper condition makes the line handling the car responsible, and I do not see any reason why the rule should not remain as it is and relieve the car owner of the responsibility of which some other road is responsible.

Mr. Berg: Is it always a fact that hose that is torn has defective coupling?

The President: That is the reason the rule was changed. Decision of the Arbitration committee was that they claimed the coupling on the car that the hose was torn on was alright, but the other car had a defective coupling, and the owner of the car should not be responsible for defective coupling on the other car.

Any further recommendations to the Arbitration committee? I believe Mr. Gainey had one yesterday he wanted to make.

Mr. Gainey: That is on Page 6, Mr. President; wheel defect gauge. I would like to make a motion, recommend to the M. C. B. association that they change Rule 20; change the gange from 1-16 to 1-8 inch.

The President: Mr. Gainey we made the same recommendation last year, and the Arbitration committee would not pay any attention to it.

Mr. Gainey: Well, we can ask them again.

Motion voted upon and carried.

Mr. McPherson: I would like to recommend a change in Rule 39. I would like to add after word law "Should not be offered in interchange." That makes the rule positive and makes it comply strictly with Interstate Commerce laws at interchange point, that delivering line must repair the car before it is offered.

Mr. Gainey: I cannot quite agree with the gentleman. Don't you think that would impose a great hardship on the private lines to live strictly up to that rule?

Mr. Sebring: I do not see any necessity of changing that. The M. C. B. association will not change a rule where it is plain, and you cannot deliver a car in interchange with defective grab iron or handle. If someone does do it, it is strictly against the M. C. B. rules.

Motion voted upon and lost.

Mr. Skidmore: I have suggestion to offer on rules of our association. Article 3 reads the Membership shall be composed of each joint car inspector and foreman of any steam railroad of the United States, and I would like to make an addition to that and add to it we will admit persons dealing in railway supplies as honorary members.

Mr. Sebring: I would like to amend that a little bit. The secretary write to superintendent motive power of each road of the country and ask if car foremen at different points cannot organize as car foremen and each lodge send a representative to this association yearly. We would then get in touch with the entire country.

The President: I would rather you would keep that out until the other is voted upon. This is foreign to original motion.

Mr. Sebring: I will withdraw it, of course, if desired.

Motion voted on and carried unanimously.

The President: So far as increasing the membership, every car foreman in the country is elligible to membership. We have offered every inducement to all car foremen, it only costs $1.50, and we would have to increase our assessment if we ask our secretary to write every superintendent motive power in the country. Secretary is not getting anything, and we could not expect him to do this for nothing.

Mr. O'Brien: I feel that in due recognition to the representative of the Federal Government on Safety Appliance Law, that it be proper at least that the chair appoint a committee to form proper resolutions in conformity of the Safety Appliance Act, and state what constitutes safety appliances. I would therefore ask the chair that he appoint a committee to draft necessary resolutions in recognition of the government.

Mr. Dyer: Would not that be conflicting a little bit with the Interstate Commerce instructions? They have already got up plans showing what was defective safety appliances. Now it might look as if we were finding fault to get up something different than that.

Mr. O'Brien: I want to have a clear definite understanding. I have observed where inspectors try to interpret the Safety Appliance laws they have gone so far into detail as to reject equipment probably for a running part or the fraction of a defect, and got into such detail as is entirely unnecessary, but in order to comply with the Safety Appliance Act, it does not appear too definite, and the inspectors would understand more clearly it is was more so.

Mr. McPherson: I think Mr. O'Brien's idea is to make a rule defining clearly what would be a violation of rule and not carry out in detail the instructions the Interstate Commerce Commission have given to their inspectors.

Motion was seconded.

Mr. Sebring: I do not see any reason why we should go into it any further or conflict the matter more. I think book sent to every one of us ought to cover this question.

Mr. Skidmore: I would not want to get up here as a member of this association and undertake to add to or detract from any of the defects furnished by the Interstate Commerce Commission. I want to say that I want to strictly comply with the instructions issued by the Interstate Commerce Commission to their inspectors, and anything that any of their inspectors informs me that is not proper and does not comply with the Interstate Commerce law, why I will try to comply with their ruling, and if, as a body, we should not live up to these instructions issued by the Interstate Commerce Commission, they would certainly set down on us very hard and want to know what business an association of this kind had with interfering with the Interstate Commerce Law.

Mr. O'Brien: I am satisfied that the gentleman just preceding me has not got down to detail as to my views upon the subject. I am simply asking for a uniformity defining in compliance with safety appliance. I would suggest that Mr. Waughop, who was sent to two or three different points, in order that they may get the benefit of the action taken by St. Louis and East St. Louis Association, give his views on the subject.

The President: Mr. Waughop?

Mr. Waughop: I think that the Interstate inspectors, and I so told Mr. Mosely, in some instances are rather rigid in their inspection. It is very true that they cannot do anything but follow instructions. A great many cases we have been fined on what I think they are wrong on, but it is only my personal opinion. I think it would be proper for the Interstate Commerce Commission inspectors to say to all car foremen just exactly what they would expect in the way of interchange. We have a great many cases of cars delivered in interchange with the couplers operative under load, and when the car becomes empty it is inoperative. We have had a great many cases, as I said yesterday, cars delivered in interchange under load and coupler correct. When car becomes unloaded it is incorrect. No way of getting car back, no way of correcting it except loading the car. I believe if the interstate inspectors would consider some of our people that have been making cars above the limit originally, would consider that the car would get low, or not low, but later come to the limit under U. S. law, they would not hold the companies for shortcomings.

Mr. O'Brien: Move a committee be appointed to draft a letter to the general managers and define the rules of what this Association would consider practicable to deliver under safety appliance law.

Motion voted upon and lost.

Mr. Sebring: I move that we do not discuss the rest of the rules as they do not pertain to interchange, so much as to billing.

Seconded.

Mr. Waughop: I beg leave to differ with you. I wish to call your attention to rule 117, formerly rule 115. I move you it is the sense of this meeting that we recommend to the M. C. B. Association that, inasmuch as the switching roads of St. Louis are practically owned and controlled and operated by 14 proprietary lines, that so far as St. Louis concerned, that the rule be abrogated.

Mr. Sebring: I do not think this Association has anything to do with local affairs.

Mr. Waughop: This recommendation can only go before the arbitration committee, and I move the recommendation be adopted.

Mr. Taylor: Second it.

Mr. Sebring: I do not think we ought to interfere with local matters.

Mr. O'Brien: Regarding Mr. Waughop's motion. I would like to say that the position which the switching lines of St. Louis occupy in the railroad world is vastly different than than other lines throughout the country, from the fact that it is operated and owned by 14 proprietary lines. It is within the province of this Association to make such recommendations to the M. C. B. Association.

The President: Question as put by Mr. Sebring is that we dispense with the discussion of other rules.

Motion carried.

Mr. Waughop: I move you, sir, that this Association recommend to the M. C. B. Association, through the arbitration committee, that, so far as St. Louis is concerned, that the switching roads of St. Louis be considered a railroad company.

Mr. Taylor: Second the motion.

Motion voted upon and carried.

The President: It is time we proceeded to the election of officers. You have a president, vice-president, secretary and two members of the executive committee to elect.

Moved and seconded proceed to election of officers. Carried.

Mr. McCabe took the chair.

Mr. Waughop: I move Mr. Boutet be chosen president, and Mr. Cressey of Omaha be vice-president.

Skidmore: Second it. I move the election of the two officers be made unanimous, and secretary ordered to cast a ballot. Carried. Secretary cast ballot for Mr. Boutet as president and Mr. Cressey as vice-president.

Mr. Boutet: (takes chair) I wish to thank you gentlemen, and say the honor you have conveyed upon me has a good deal of work, and I will endeavor to do as well next year as in the past.

Next in order is a secretary. Our secretary tells me on account of change in his occupation he cannot act any longer.

Mr. Waughop: I move secretary, Mr. McCabe, be presented with a badge, similar to the one presented to the president last year.

Seconded and carried.

Mr. D. T. Taylor of St. Louis was nominated.

Mr. Taylor declared elected.

Mr. Skidmore: I make a motion that the Association tender Mr. John McCabe a vote of thanks for his splendid work as secretary of the Association.

Seconded and carried unanimously.

Moved and seconded that the Hollenden Hotel, Railway Club, and everybody helping to make the meeting a success, be given a rising vote of thanks. Unanimously carried.

Moved that Mr. J. J. O'Brien and Mr. Steve Skidmore be elected as next executive committee. Seconded.

Mr. Waughop: I move secretary cast ballot for these gentlemen unanimously. Carried.

Secretary cast ballot for Mr. O'Brien and Mr. Skidmore as members of the executive committee.

The President: For the next meeting I presume we will take the same action as we did last year. It was referred to the executive committee. We have request from Cincinnati, and this will be referred to the executive committee.

Mr. Waughop: I move you the selection of next meeting place be left to executive committee. Seconded and carried.

Mr. Dennerle: I should like to make a motion that we tender a special vote of thanks, and I think the gentlemen are entitled to it for the excellent entertainment given at this convention, and that is Messrs. Bunting and Lynch.

Mr. McCabe: Second it. Carried unanimously. (with exception of Bunting and Lynch.) Adjourned 1:20 P. M.

Railroad Paint Shop

Edited by
J. H. PITARD
M. C. Painter, M. & O. R. R.

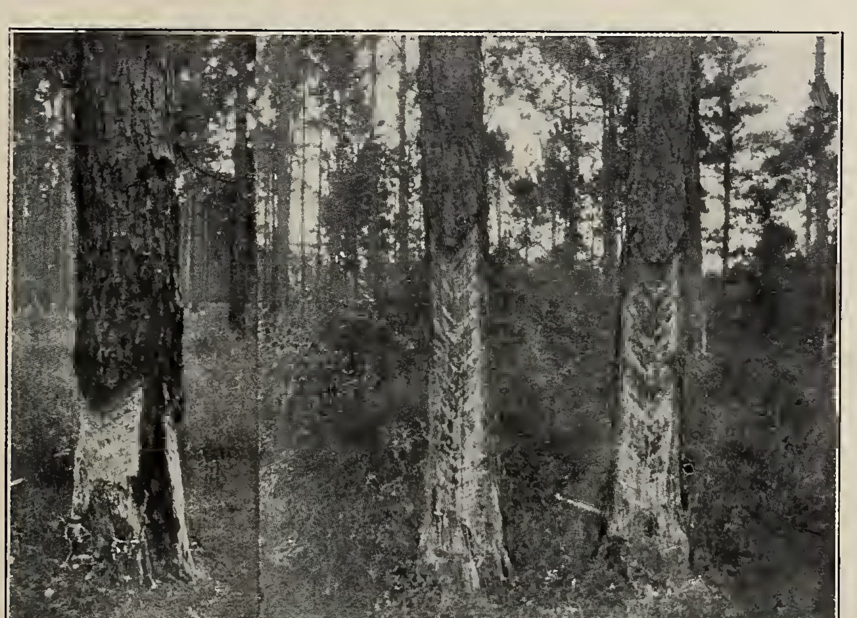
Devoted to the Interests of
Master Car and
Locomotive Painters

Official Organ of the Master Car and Locomotive Painters' Association.

The Turpentine Industry in the South.

The manufacture of turpentine in the south, while not one of the leading industries, has assumed considerable proportions, and yields a very large revenue to the southern states. Its process of manufacture, from the crude to the finished product, is very interesting, and a description in detail will doubtless prove interesting to our friends of the craft who were so unfortunate as to become knights of the brush, and consequently compulsory users of this important article of commerce. After the pulsory users of this important article of commerce.

After the first heavy frost, workmen or choppers provided with chipping axes, proceed to the pine forests and begin the work of boxing the trees. The boxing is always postponed until after frost on account of a bug that infests the pine forests, and which bores into and kills the trees, beginning at the point where the tree is boxed, and in order to avoid the depredations of his bugship, the boxing is postponed until after frost. Boxing a tree is done by cutting out a V shaped chip about fourteen inches wide and seven inches deep. The box is hollowed out in such a way as to form a pocket that holds about a quart of the crude gum, very large trees contain several boxes, and the small trees only one. As soon as warm weather begins, the sap or gum begins to flow, which is usually about March or April, then the collectors provided with an ox cart and one or two barrels make the round of the orchard, (an orchard consists of ten thousand five hundred trees, which is called a crop), and collect the crude gum which is conveyed to a nearby still. The crude gum is collected from the trees about once a month. What is termed "streaking" the trees, that is cutting a narrow groove through the bark of the trees, and extending from the box upward for several inches, this is done in order to induce a more copious flow of the gum. Chipping, that is cutting out another chip immediately above and adjoining the box is done every few months for the same purpose; this chipping is continued from time to time until it extends beyond the reach of the axeman, when the tree is abandoned as unprofitable, which is usually about the sixth year after it is first boxed. The first year's collection of gum is called "virgin," the second year's is called "yearling," and the third, "buck." It requires about seven and a half barrels of the crude gum from the boxes to make one barrel of turpentine, and if the gum that is termed "scrape" (that is the gum that dries on the chipped part of the tree and does not reach the box, and must be scraped off the tree), it takes more to produce a barrel of the spirits.



VIEW OF TURPENTINE FOREST SHOWING METHOD OF BOXING

The pine trees which grow on the hills or elevated lands produce considerably more gum than what is termed the loblolly pine, which grows in the lowlands and marshes; it also makes the best lumber as it contains more heart. But this is digressing from my subject.

The still, of which there are thousands scattered all over the southern states in the pine districts, is usually a very crude affair. It consists of a large copper kettle holding from five to ten barrels of crude gum, securely encased in a brick furnace. The "worm," which is simply a coil of copper pipe about two and a half or three inches in diameter, is placed in a tank of water, and having one end connected to the upper part of the copper boiler and the other end projecting out through the water tank at its lowest point, under which the barrels are placed to receive the flow of spirits.

As the turpentine is very inflammable the greatest caution is necessary in order to guard against fires. After charging the boiler it is securely covered and the fire is started in the furnace, when it reaches a temperature sufficient to vaporize the gum, the vapor passes out through the worm and is condensed by the cold water, and flows into the barrels in a slow but steady colorless stream. After a run is made, the residue in the kettle, which is termed resin, is drawn off into a shallow vat, and the kettle is recharged and the process is repeated. The resin passes through a strainer made of cheese cloth as it is drawn from the kettle, which separates from it all foreign matter, and while in its hot liquid state it is dipped up with long handle ladles and placed in barrels of crude manufacture, where it cools and hardens and becomes the beautiful amber colored resin of commerce.

A small proportion of this resin is utilized for making resin oil. This is done by placing the resin into an iron retort instead of copper, and is superheated, this drives out all the oil contained in the resin. This is known as resin oil. The residue in the retort becomes black and remains in a thick viscuous state, and is termed pitch. This pitch is used for various purposes, principally for sealing up the seams and coating the bottoms of wooden boats. The oil is a very slow drying, colorless oil costing about fifteen cents per gallon. It is used for painting the decks of vessels, and finds its way in some measure into the house painters' sphere, but more as an adulterant or substitute for linseed oil, as it does not compare with the latter oil for painting purposes.

The Trend of Fashion.

It has been truly said that history repeats itself, but how often we are not told. This we are left to surmise, but to the observant mind it is noticeable every day in many things, and just now it is very apparent in one thing that concerns the Master Car Painter, that of the exterior ornamentation of coaches. The tendency seems to be to abolish all striping or other ornamentation in the exterior of passenger cars. Some of the leading and wealthiest systems have abolished it entirely, while others have decreased it to such an extent that only a single wide stripe near the bottom extending the entire length of the car is the only reminder of a gorgeous and elaborate system of ornamentation which was the prevailing fashion only a few years ago. Whether the change is due to common sense or penuriousness we can only surmise. It is going from one extreme to the other while a happy medium would seem to be more desirable.

It is said that beauty unadorned is most adorned, paradoxical as this may seem it is doubtless true in many things, possibly also in the case of the modern passenger car of beautiful design, but the car of somewhat antiquated design possibly needs a moderate amount of embellishment in order to make it presentable. Striping or ornamentation on the modern passenger car is now doubtless regarded from a utility standpoint by the powers that be. Previous to the formation of the great railroad systems when there was keen competition between the various individual lines for the patronage of the traveling public, but its importance is greatly lessened by the disappearance of competition effected by means of the formation of the various great railway systems. While the system of ornamentation was in vogue it was greatly abused; in many instances it was carried to extremes, and is yet in a few instances.

In the building, ornamentation, and maintenance of the passenger coach, the comfort and pleasure of the traveling public is the main desideratum, and doubtless the portion of a car that most impresses the passenger is the part in which he comes in contact with the most, and that is the interior; here ornamentation is more desirable, and, being protected from the elements, is more cheaply maintained. The desires of the traveling public can not possibly be very much different when traveling from what their desires are at home. Taking the home as an example: Here we see neatness, but plainess on the exterior, while the interior is embellished with rich paintings, mural ornamentation, and costly wall paper galore, and other costly furnishings that contribute to the pleasure of the inmates. What is its significance? Does it not furnish a valuable hint to the railroads of the fitness of things in the construction and maintenance of their passenger cars. Would it not be infinitely better to prepare a nice smooth surface on the exterior devoid of all ornamentation or stripes except a belt line of gold about the middle of the car, immediately beneath the belt rail; this, supplemented by opalescent gothic sash, with brass trimmings kept neatly polished, with gilt letters and numbers, would produce a most pleasing effect. A good smooth surface on the exterior is absolutely necessary in order to keep the car clean. A rough surface on a car, like a rough board, will collect and hold the dirt, thus necessitating an extra amount of labor and friction to remove the dirt, with a corresponding injury to the varnish; while a smooth surface cleans easily with the least possible rubbing, thus insuring longer service to the varnish to say nothing of the better appearance while in service. Where there is much striping on a car it interferes with its rapid handling as it passes trough the shop, therefore it is not in keeping with the progressive spirit of the day.

A SCROLL BY WARNER BAILEY

Fewer stripes and better surfaces on the exterior and better care of the interior would be more consistent with the present age.

Cleaning Locomotives

I have often thought of inquiring through these columns if any members of the painters' association have any way of cleaning under parts of engines, such as frames, wheels, trucks, etc., preparatory to painting, other than benzine, scrapers and putty knives, or, in other words, is there a more modern or up to date method of doing this class of work. Of course it is a very simple matter to clean these parts of an engine while they are in the erecting shop undergoing repairs, then drivers and wheels are removed making the task comparatively easy. But that which I wish to mention applies to an engine in the roundhouse receiving minor repairs. Perhaps only five hours' time is allowed the painter to complete his work, so that the engine can be returned to service.

From a painters' standpoint we all know the condition of a freight engine that has been in service from ten to twelve months and no doubt under parts have not been wiped since last shopping period, and covered with grease and dust to the thickness of one-half inch. This I find to be the case nine times out of ten.

I have asked a number of inventive minds—of which all shops can boast of a few—what they could do in the way of an air or steam appliance to remove the grease and dirt, but to date none have come forward with any new ideas. However, I have been told that on some roads this kind of work is being done by the aid of steam, holding the flow of steam on the work until the grease melts and drops off. As we are in the same position as the majority of painters on other roads, machinist, coppersmith, carpenter and painter all on the same engine, and all finish at the same time, I think this steam proposition would not be a very great success with us as the other mechanics would have to take to the tall timber until "the man with the hose" finished his "*stunt.*"

While at the convention at Cleveland I asked a number of members how they did this work, and they all replied "benzine and scrapers." I am not criticizing this method as not being good for it is the best I know of, but perhaps the idea may start such air experts as Mr. Quest or others into developing some sort of a machine that would relieve all us painters of this dirty, tiresome and vexatious cleaning. When you figure it out this is quite an item in the expense of engine painting, and could we overcome it by some cheaper method I believe we would have solved a very economic point in engine painting.

E. L. Younger,
Foreman Painter, St. L., I. M. & S. Ry., Baring Cross, Ark.

Bro. Quest let us hear from you on this subject.—Editor.

The following interesting article we clip from "Drugs, Oils and Paints," a Philadelphia paper, by an author well known for his depth of research in these subjects. Like the editor of the paper from which the clipping is taken, whose notes are interlarded, we do not agree with him in his statements regarding such pigments as oxide of iron, carbon blacks and graphite. Then, again, he has another thing to learn, and that is that there is an oil to be had for this purpose that excels linseed, without a drop of linseed in it.

Chas. E. Copp.

The Protection of Iron from Rusting.

Revision and Expansion.

By L. Matern.

Having noted the several grades of hydrocarbons constituting linseed oil, it now becomes necessary to explain the process for separating the last-named two neutral constituents from the three acid compounents which are essential to durability in painting.

This operation requires that the unheated linseed oil be placed in air-tight drums, to prevent the watery solution of albumen contained from becoming rancid (decaying). After being stored in this manner for two years the palemtin and glycerine together with the water will have settled out, leaving the acid hydrocarbons, albumen, elain and linolin, as a clear transparent liquid, floating on top.

Raw fresh unheated linseed oil when exposed to the air hardens in about three months' time, but aged linseed oil will harden in about ten days, without the aid of a drier During this time the acid elain will have partly evaporated like turpentine while the rest of the oil has oxidized. But with the help of a little drier this aged oil will harden in twenty-four hours, the oil with all its constituent albumen, elain and linolin remaining in the film; a condition which is required to secure in paint the highest effective resistance against wind and weather. This result cannot be obtained with boiled or prepared linseed oil. But when the aged linseed oil is used with a basic pigment, like red lead or litharge, it dries hard in twenty-four hours and becomes water-proof and effectively resistant against wind and weather, the basic pigment taking the place of a drier.

A further advantage arises from the fact that this aged oil, being much more fluid than raw, boiled or prepared oil, it takes up more pigment than these, and is therefore more easy to apply with the brush, covers more surface, makes a more opaque paint and consequently yields a smoother surface with less paint. Paint made with it is also more durable and more economical than any paint that can be made without it.

This consideration of linseed oil fats brings us to the question:

What will best protect iron from rusting?

Many methods have been employed to prevent the destructive action of rust on iron exposed to moisture, but have failed. (Iron cannot rust except in the presence of water.) In all these efforts painting has generally been the means used, and apparently it is our last resort. But when the laws of nature are taken into consideration we shall see that the metal iron, in contact with moisture, cannot be prevented from rusting in the following circumstances:

First.—By materials, whether paint or other that are not strictly water-proof or do not adhere to the surface until actually worn away.

Secondly.—By paints which impart or transfer oxygen to iron.

Third.—By paints which develop an electrical current in contact with iron. Such currents are produced by chemical action between two metals in water containing acid (water always holds some carbonic acid), causing the consumption (oxidation) of the easily oxidizable metal, like iron or zinc.

From these three conditions we have to determine what kinds of ingredients are needed in paint to serve for the protection of iron exposed to moisture; and from the first condition we see at once that the protective coating must be at least water-proof.

As it has already been shown that aged raw linseed oil provides the most satisfactory binding material for paints, we have only to determine what kinds of pigments in combination with such oil are best qualified to meet the conditions set forth. In this connection the following named pigments, generally used for painting on iron, offer themselves for our consideration:

Red Lead: The most strongly basic pigment known. It readily combines by saponification with a definite proportion of raw linseed oil and hardens in twenty-four hours to a water-resistant metallic soap. This, provided that it is mixed with just as much linseed oil as is needed for spreading, and no more, is run through at paint mill immediately and used at once before saponification has proceeded. After complete saponification this paint requires for spreading more oil than the pigment can assimilate, and the uncombined oil must harden by oxidation and the resultant paint film will not be waterproof. A properly proportioned red-lead paint after hardening, being water-proof, does not convey or impart oxygen to an underlying iron sruface ,and the pigment, being chemically satisfied, does not set up an electro-galvanic action to destroy iron in contact with water and carbonic acid; but the paint lasts until worn off by the wear and tear of usage.

On request I am prepared to furnish a limited number of samples of such red lead and aged raw linseed oil as well as samples of iron painted with it that have withstood forty years exposure on roofs, not only resisting the weather, but the action of fumes from two adjoining blacksmith shops.

Litharge: A strongly basic pigment. With raw linseed oil it serves nearly as well as red lead, for the protection of iron. The difficulty consists in obtaining the paint in its state of highest effciency, as already noted with regard to red lead.

White Lead: The basic carbonate of lead is only partly basic and therefore when combined with raw linseed oil, needs an addition of drier for proper hardening. It is composed of about sixty-five per cent of lead carbonate—a pure white neutral salt, and thirty-five per cent of lead hydrate—a silver gray basic compound. Now since iron has a greater affinity than the components of white lead for carbonic acid in water, the latter soon sets iron to rusting in a moist situation. There are several other varieties of really "strictly pure" white leads on the market; but they are all neutral salts—carbonate, sulphate and sulphite white leads, for example. Used as paint they last no better than barytes, and when mixed with linseed oil require much drier to harden them. When hardened they become brittle and peel, acting in the familiar manner of yellow ochre when used as a painting coat. There is still another commercial white lead on the market, produced from lead acetate. It contains so much free lead acetate—a base soluble in water—that the hardened paint film, when exposed to the weather, soon disintegrates and washes away, an effect technically known as "chalking." Acetate or "sugar" of lead is often used in Japan driers, to the detriment of paints.

Iron Ore Paint: Commonly known as "mineral paint," though high in percentage of iron oxide, is a weaker base than white lead. It has extended use for the painting of wood, and if carefully selected, mixed with raw linseed oil and just enough drier to secure proper hardening within the correct time limit, it answers very well for the protection of wood, because the iron oxide of the paint will combine to some extent with the fibre and sap of the wood; but the paint in time becomes very brittle, and if too many coats are applied, will peel off. On iron it is a decided rust producer in the presence of water; first, because, not being water-proof, it conveys moistrue to the iron beneath, and secondly, because the iron oxide, like ordinary iron rust, has the property of imparting some of its oxygen to metallic iron, thus promoting rust. (Note.—The editor is not responsible for this hypothesis, which has been very widely discussed. Its truth or fallacy depends entirely upon the state of the oxide entering into the composition of the pigment.—Ed.) Thus we see that iron ore paint has dual destructive powers when applied to iron exposed to moisture, permitting percolation on the one hand, and imparting oxygen on the other. Furthermore, it stands to reason that, in such conditions, when iron has begun to rust the process will continue; hence the surface must be free from rust and adherent dirt before the paint is applied.

Black Pigments: Such pigments, as bone black, carbon black, drop black, lamp black, mineral black, asphalt, tar, graphite, or all paints containing carbon, are as destructive as iron ore paints to iron. In contact with iron in the presence of water, they set up an electric current that rapidly eats rust cavities into the iron; the latter acting as the negative and the carbon as the positive pole of the circuit. It is a familiar fact that, widely utilized, a chemico-electric current is produced with carbon and metallic zinc as the two poles of a battery with acidulated water as the excitant; the zinc being consumed. (Note.—However, graphite paint protected the editor's roof well for fifteen years, without renewal; blue lead is protecting it admirably now, and his galvanized (iron coated with metallic zinc) conduits show no trace of rust.—Ed.) The same atcion will result if iron be substituted for zinc and where iron is coated with carbon paint in the presence of water and the carbonic acid always found therein. This action is readily observed on black japanned sewing machines discarded and exposed to the weather.

Notes and Comments.

Christmas Greeting.

As this is the last issue of the Railway Master Mechanic previous to the holidays, we embrace the opportunity to extend Christmas greetings to all of our members of the association and their families, and also to all friends of the association. We wish them one and all a happy Christmas and New Year, and trust that a kind Providence will permit them to enjoy many returns of those happy days.

Our Query Department contains a few queries in this issue that are of general interest, and we hope that the members will freely reply to them, either briefly or at length.

Again we earnestly request that our friends of the association keep us informed of any changes or notes of interest to the association, such as resignations, transfers, sickness or deaths on the part of either our members or their families, change in style or standard of painting, improvements, etc. This is important in order that we may keep in close touch with each other as a fraternity by announcing such matters through our official organ.

A letter from our president, Mr. H. M. Butts, of the New York Central, with headquarters at Albany, N. Y., states that he is in the midst of his busy season. He expects soon to turn out seven or eight cars per day. This is probably the largest output of any shop in this country. The shop is conducted on the piece work system. Mr. Butts promises us an article soon which will tell us something of his great shop and his method of conducting it.

A letter from Mr. B. E. Miller, of the Delaware, Lackawana and Western, at Scranton, Pa., states that their new shop now building at Kingsland, N. J., will not be completed until about the middle of next year. At present they are putting out sixty cars per month, forty at the Dover shop and twenty at Scranton. They have a passenger equipment of seven hundred and seventy-eight cars. They work continuously and experience no slack spells as do some of the roads of the east.

New Use for Sheep Oil.

Paris, Nov. 6.—A new use has been found for the oil which so strongly permeates sheep's wool—it imparts waterproof quality to all materials upon which it is used.

A French traveler in Arabia having noticed that the native woven stuffs had peculiar properties which protected them from moisture, thoroughly investigated the manner in which the materials are manufactured and came to the conclusion that their imperviousness to moisture was due to the fact that the Arabian women do not wash out the wool before spinning it.

In another part of this issue we present an article on engine cleaning by one of our western members, Mr. E. L. Younger, of Baring Cross, Ark., Missouri Pacific railway. His article contemplates engine cleaning by mechanical means. It is said that coming events cast their shadows before; the idea is a good one, and it is to be hoped that some genius will show us how to make a practical application of it. We would be glad to hear from other members as to their method of engine cleaning.

The handsome scroll presented in this issue is from the hand of Mr. Warner Bailey. His excellent handiwork is well known to the association. He is a Roman scroller of the old school. Roman scrolling was once regarded as the highest test of workmanship. It was once largely used in the ornamentation of cars and engines, but since its abolishment it is probable that it is beoming a lost art to some of the young men just entering the master car painters' arena. The Roman scroll in this issue is executed in varying shades of gray, with high lights of white, with outline double shade of asphaltum. One needs must see the original in order to appreciate its beauty.

To our friends of the association we call attention to the following verse, which, although slightly paraphrased, will recall something that they have heard before:

TRY THIS ON YOUR NERVES.

Everybody works but father,
He's the one they work;
Sue and Belle and mother
Work him "like a Turk;"
Work him for new dresses,
Hats and all they can,
Everybody up at our house,
Works my—old—man.

—*Kansas City Times.*

From an item in the Detroit Free Press we learn that one of the railroad systems have placed an order for 1,500 pressed steel passenger coaches. "It marks the first step," the article continues, "by the railroads of the country toward abolishing wooden passenger cars." What road it is that has taken the initiative in making this long expected innovation, which guarantees greater safety to the traveling public, we have not learned. While this innovation will doubtless be welcomed by the traveling public, it also has some significance for the master painter for the reason that once begun it is prabable that the innovation will become general; if so, the master painter will ere long find himself painting iron coaches instead of wood. This will call for some change in shop methods, not the least of which will be the preparation of the metal before painting, and a different way of burning off.

Query Department.

How do you clean the interior of your cars preparatory to revarnishing? What material do you use for same?

How do you clean the exterior of your cars preparatory to cutting in or revarnishing? What material do you use for same?

How do you make your headlight numbers?

How often do you revarnish the interior of your cars?