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"Ellen M. Richards"

Cenec NewsChats

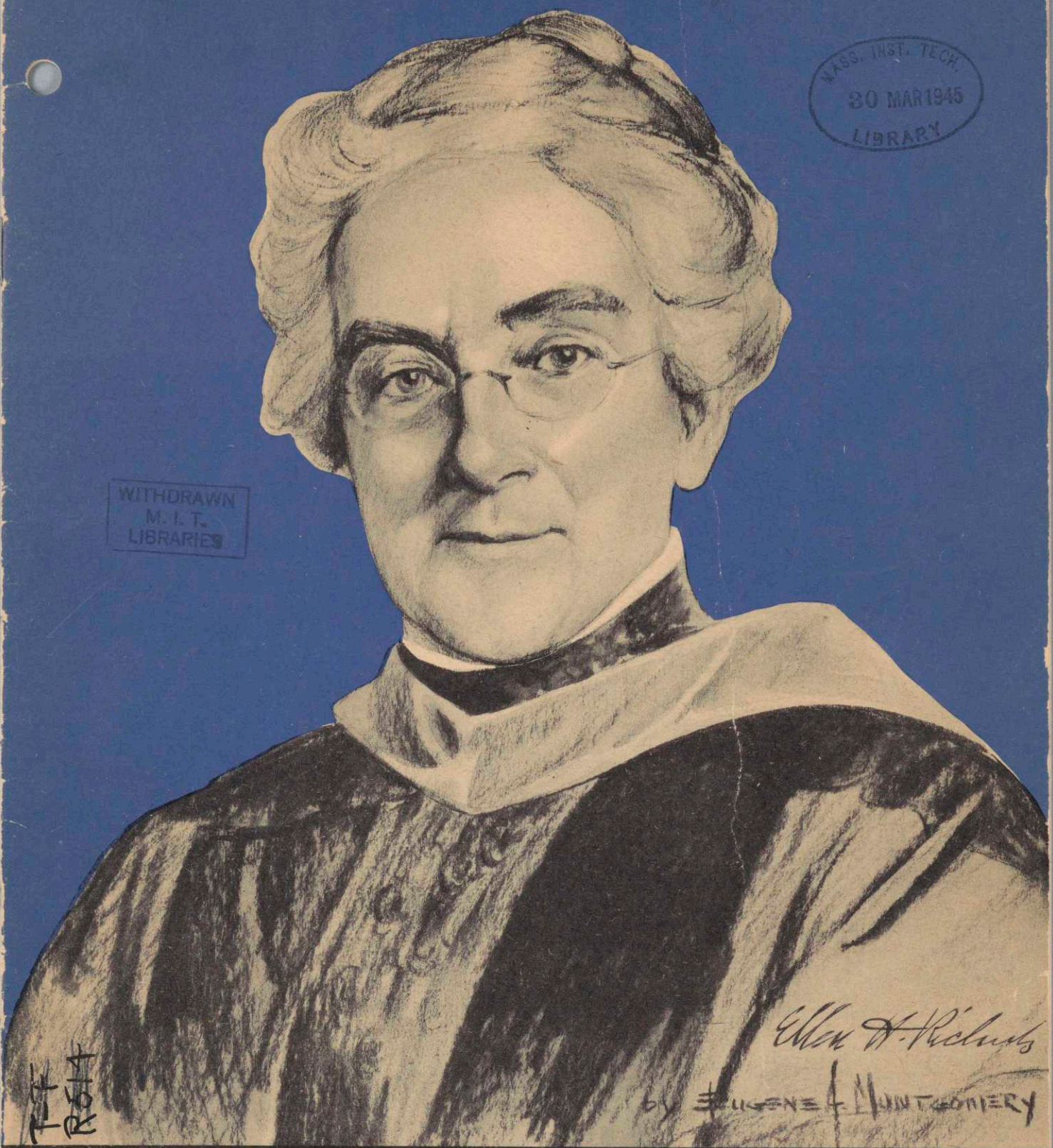
1945

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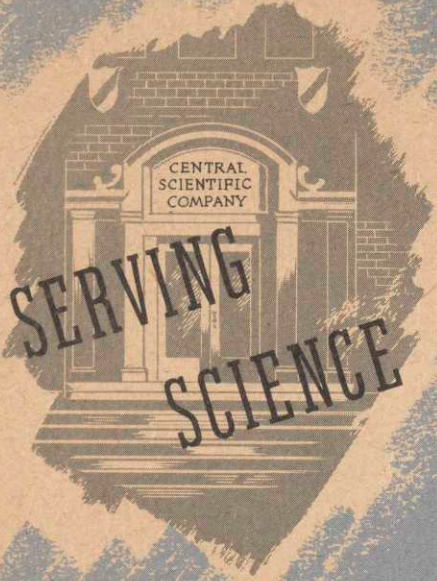
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Ellen W. Richards  
by EUGENE F. MONTGOMERY

# Cenco News Chats

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# Cenco News Chats



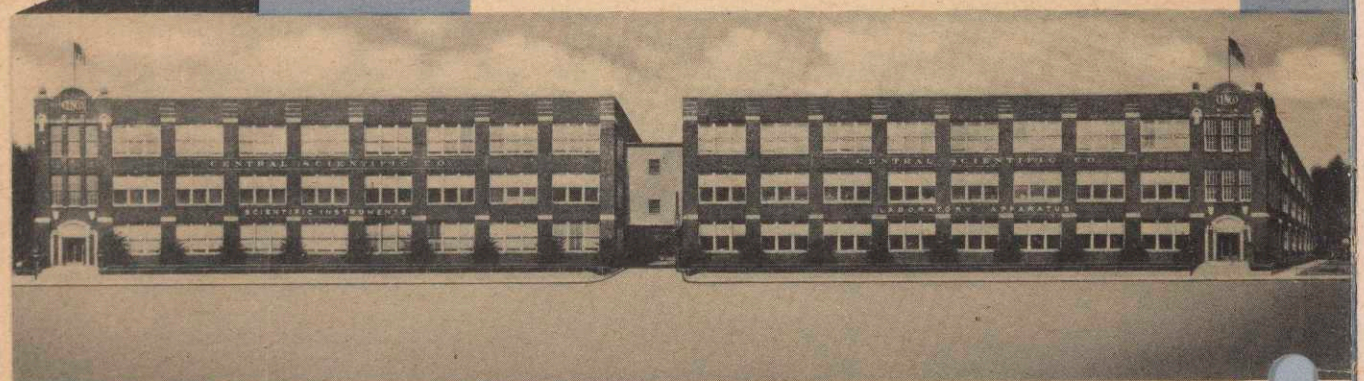
NUMBER 48 • MARCH, 1945

Cenco News Chats is published to acquaint those of you actively engaged in laboratories of education, industry and medicine, with the latest developments of apparatus and new applications. Included are catalog descriptions, prices, priorities and other details of information. We take pleasure in sending this copy your way in the hope it may convey little thoughts of inspiration and interest and help cement a long-lasting friendship. Comments and suggestions for improvement are always welcome.

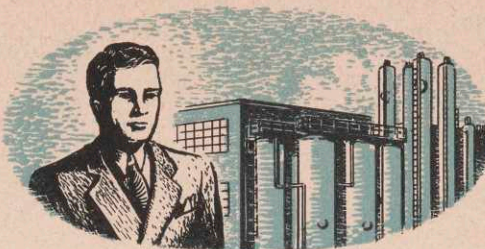
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# TECHNICAL



# PERSONNEL

FROM TIME TO TIME we have spoken about technical and scientific manpower in CENCO NEWS CHATS. The manpower shortage in technical fields continues to be one of grave concern, not only for the immediate but for the postwar future. The mounting importance of the subject spurs us to present again some facts which may be of interest to you. In the SCIENTIFIC MONTHLY\* for January, 1945, appears a report of an address by Dr. M. H. Trytten, "The Impending Scarcity of Scientific Personnel." It is timely and among other interesting things includes a study of yearly trends in the number of doctoral degrees granted in physics, mathematics, geology, chemistry and engineering since 1913. Attention is called to the great accomplishment of "American technological power" in producing in so short a time almost unbelievable quantities of war supplies. When the physicists, chemists and biologists of our nation were given a job to do—on a scale without precedent—they produced in a manner for which every American has just reason to be proud and grateful. It is alarming and seemingly illogical, therefore, that the training program which would assure an adequate supply of technically trained people has been permitted to lapse into its present stage as indicated by this report.

We repeat the remarks of Assistant Secretary of War Patterson: "That was our experience in World War I; it is also our experience today. Industries and universities have turned their laboratories and their test tubes inside out to give their country what it needed, whether they were summoned or not. . . . Our troops have been equipped with weapons, equaling or surpassing those of the enemy; final victory has been brought immeasurably closer, as a result of the efforts of our scientists and technicians."

Although a large number of the scientific achievements of this war are unknown, the veil of secrecy has been lifted sufficiently to indicate the tremendous effect science has had on the successful prosecution of the war and the saving of human life. When all the facts are known, an accurate appraisal will still be impossible, but these may very well show that the road to victory was paved with scientific accomplishment. Granted the triumphs of science, should not the future supply of scientific personnel be safeguarded? Technical training in our colleges has been reduced to almost a standstill because of the wholesale drafting of men.

Selective Service boards on the whole have done an excellent job. It has been a prodigious one and has required the cooperative effort of many people. Most of the boards have done the best that could be done in dealing with highly technical personnel. They should not be expected to have the technical

background necessary for the expert consideration of men with scientific training. The underlying weakness has been the lack of a basic policy—and the apparent failure in not assigning competent men to formulate a sound policy.

Quoting Dr. Trytten, "Conspicuously absent has been a clear-cut statement by highest authority that a highly technological type of warfare requires highly skilled specialists in civilian roles, that specialists of this type should be disposable for war purposes by a much more discriminating procedure than that of Selective Service.

"As long as public opinion rates the man in uniform as performing a greater service than the civilian, and as long as the individual must take part by tacit consent in a request to defer his military service, the individual is not in a sound position. American feeling does not take kindly a man's implication that he is too valuable to fight, and no man should be asked to acquiesce to a request for his deferment as the only way the nation may retain his important services."

Unless present methods are drastically changed comparatively little graduate training will be given in schools. Even after the war and after demobilization, several years will elapse before significant numbers of students can possibly return to technical graduate schools. If technology is to be expanded, a steady flow of trained personnel should be provided at all levels. Educational and industrial institutions should cooperate closely so that an adequate supply of trained personnel will soon start flowing again. Regardless of the present status of the war, scientific people should still insist on saving any technical personnel that can be recovered even at this late date by working through their respective organizations.

Every advantage should be taken of War Mobilization and Reconversion Director James F. Byrnes' Directive of January 15th, 1945, in which measures were taken to control the induction into the armed services of men in the 26 to 29 age group so as to minimize as much as possible the effect on essential activities. Emphasis is placed on Justice Byrnes' request that special consideration be given to all technical and scientific personnel whether their particular activity is listed or not, if such personnel can no longer be replaced.

"Technical, scientific and research personnel" and "the production of scientific instruments" are now classified in the CRITICAL activities group. CRITICAL items receive priority in the list of essential activities. While workers in the critical lists of industries are being granted occupational deferments, the trend is becoming more critical and is apt to change again in the near future.

\*Publication of the AAAS.

## OUR FRONT COVER

# Ellen H. Richards

1842 - 1911



THIS ISSUE OF CENCO NEWS CHATS honors a woman of genius and pays tribute to the women scientists of America, who today are engaged so actively in the progress of science. In particular, it recognizes a woman, a real pioneer, who was not only outstanding in science, but glorious in humanity and great in simplicity. Although women today are acknowledged co-workers with men in the scientific laboratory, not many years ago they had little opportunity for technical advancement. Women did not gain entrance to a strictly scientific school until 1870, when Ellen Henrietta Swallow, better known as Mrs. Ellen H. Richards, was admitted to the Massachusetts Institute of Technology as a special student in chemistry. About six years later that institution formally opened its doors to women as well as men, and a new epoch in the history of education for women had begun!

Ellen Swallow, daughter of Peter Swallow and Fanny Gould Taylor, was born in December, 1842, at Dunstable, Massachusetts. Both parents were academy trained. Her father was a teacher and a farmer, and her childhood days were spent on his farm. When Ellen was 16, her father purposely moved to Westford so that her education might be continued. The parents' deep interest in their daughter's education stimulated her intellectual ambitions and desire for a life of maximum usefulness. Ellen knew what it meant to be poor and to earn her own living. She devoted herself to a life of study, hard work, careful planning and helpfulness. She loved birds, animals, flowers, plants and the outdoors.

Ellen studied at Westford Academy, and in 1868, a few years after it opened, entered Vassar College where she applied herself intensively, graduating in 1870 with the degree of A.B. In 1873 she received the B.S. degree in chemistry, being the first woman to graduate from the Massachusetts Institute of Technology and the first woman member of the teaching staff. She retained the position of instructor in sanitary chemistry for 27 years until her death in 1911.

In 1875 she married Professor Robert H. Richards who for 46 years was a member of the Insti-

tute's Faculty and for 41 years was the head of the department of mining and metallurgy. Professor Richards became one of the country's most outstanding metallurgists, and incidentally, celebrated his 100th birthday August 26, 1944.

Mrs. Richards was a pioneer in the fields of sanitary and food chemistry, public health and home economics. In sanitary chemistry, she became an expert in air, sewage and water analysis, and in these subjects consultant to numerous schools and industrial plants and to many more on the subject of foods. Working from the Institute laboratories, Mrs. Richards made numerous pioneer analyses. She recognized the importance of public health, sanitation, industrial home and community processes and procedures and the need for educating the public on these matters. She made a survey of the waters of Massachusetts for the State Department of Public Health, analyzing more than 100,000 samples in the space of a year—the complete survey lasting nearly two years. From these analyses, "isochlors" or points of normal chlorine content were plotted on a map of the state yielding the first Normal Chlorine Map ever made.

She became a recognized authority on sanitation and for a typical example we quote her biographer, Caroline L. Hunt: "In June, 1894, Mrs. Richards was chosen alumna trustee of Vassar College. At the time when she came upon the board the question of sewage disposal was pressing. The custom had been to throw all the sewage, with little previous treatment, into Casperkill Creek at a point about six miles from the Hudson River. But as time went on the authorities of Poughkeepsie objected to this method of disposal, and the project of building a sewer to the Hudson River was considered, at a cost which was variously estimated at from \$37,000 to \$50,000. While the matter was under consideration in the trustees' meeting, Mrs. Richards, being a new member, sat silent. Finally, when her opinion was asked, she said that it had always seemed to her that educational institutions should lead and not follow in the matter of sanitation, and that for Vassar College to dispose of its sewage by allowing it to flow into the Hudson would be mediaeval. When asked to suggest an alternative she outlined fully and from intimate knowledge of the newest and most reliable methods a plan for a sewage disposal plant. This plant was later installed at a cost of \$7,500."

Perhaps the work for which she is known best was

her leadership in the home economics movement which progressed from achievements in food chemistry to what she called "euthenics" or the study of controlled environment for right living.

She became an active member of the American Institute of Mining Engineers in 1879, and in 1910 she received the degree of Doctor of Science from Smith College. She helped found and became the first president of the American Home Economics Association.

Space does not permit even touching further upon the other numerous projects and procedures to which this philanthropic woman always applied science and into which she plunged with the same enthusiastic zeal, tireless energy and determination. She was the spark in emanating numerous organiza-

tions and associations, always making the most practical use of her knowledge of the chemical science.

The published works of Ellen H. Richards were many and include: *The Cost of Living* (1899); *The Cost of Food* (1901); *The Cost of Shelter* (1905); *Sanitation in Daily Life* (1907); *The Cost of Cleanliness* (1908); *Laboratory Notes on Industrial Water Analysis* (1908); *Euthenics* (1910); *The Art of Living*; and *Conservation by Sanitation* (1911).

#### References

- "The Life of Ellen H. Richards,"* by Caroline L. Hunt.  
*"American Women of Science,"* by Edna Yost.  
*"Values for Which Mrs. Richards Stood,"* by Alice G. Bryant.  
*"Women in Science,"* by J. A. Zahm.

## Notes, Comments, Correspondence

### FROM CALIFORNIA:

"In the December number of CENCO NEWS CHATS there appeared an article "Technical Training Needs Industry's Help" with which I am in hearty agreement. However, this article states that the drop in enrollment in technical schools has been 12 to 15 percent. The situation is actually much more serious than this figure would indicate. Although the overall enrollment may have decreased by only that amount, the number of technically trained graduates has dropped almost to zero. To state that the drop has been only 15 per cent is likely to lead to the erroneous impression that the situation isn't really so bad after all.

"You are to be commended on your suggestion that industry should attempt to help in this situation. The current agitation in Congress with respect to increasing the demands of the draft is a case in point. For the last two years we have managed to continue our undergraduate laboratory instruction with the aid of graduate student assistants made up chiefly of men with 4-F or 2aL classification, together with a few women. If such an occupation is no longer to be classified as essential, and if qualified individuals are no longer to be allowed to transfer into such a position, it will be a death blow to laboratory instruction in the sciences.

"Sincerely yours,  
ROBERT D. VOLD  
Associate Professor of Chemistry  
University of Southern California"

\* \* \*

### FROM MISSISSIPPI:

"Your CENCO NEWS CHATS reaches me from time to time. I am glad to say I find each copy very much worthwhile.

"Please send me Bulletin 104A and List Bimet."

### FLUORESCENT ANALYSIS

Those interested in fluorescent analysis in chemistry or petroleum science may write to us for reprints of articles covering these subjects. Journal reprint No. 12 contains interesting information on Fluorochemistry, reprint No. 13, Fluorochemistry in Petroleum science and reprint No. 14, Ultra-Violet Rays Detect Filth in Foods.

Please specify reprints by number.

\* \* \*

### FROM UTAH:

"I appreciate CENCO NEWS CHATS, and usually find something of value and special interest in each issue.

"Articles such as the one in the December issue relative to A. A. Michelson are of general interest. The one page arrangement permits posting on the department bulletin board of the picture and the write-up. This has attracted considerable student interest."

\* \* \*

### FROM ST. THOMAS, V. I.:

"With great pleasure I read your article on Dr. T. W. Richards in your October issue #46. I would appreciate you sending me your CENCO NEWS CHATS regularly."

\* \* \*

### FROM WASHINGTON, D. C.:

"It would be appreciated if the mailing list for CENCO NEWS CHATS be changed as indicated on the enclosed address stencil.

"I have found CENCO NEWS CHATS to be educational and extremely informative as to suggestions for laboratory equipment and as a supplement to your regular catalog. The diversity of the apparatus included in the issues covers all fields and the choosing of material for the "Contents" is unusually well done."

# Technical Events and Abstracts

THE ANNUAL MEETINGS of the American Physical Society and the American Association of Physics Teachers were held at Columbia University, New York City on January 19 and 20, 1945. The meetings were well attended considering travel restrictions and the fact that many were prevented from coming because of their engagement in war activities.

In addition to an excellent group of contributed and invited papers, some of these being presented in joint sessions, both societies gave consideration to post war problems. The chief concern centered around the probable shortage of physicists both for industry and for college and university positions following the cessation of hostilities. Committees were appointed to study these problems.

Dr. Harvey Fletcher of the Bell Telephone Laboratories was elected President of the American Physical Society for the coming year, and Professor R. C. Gibbs of Cornell University, President of the American Association of Physics Teachers.



ACCORDING TO THE SCIENTIFIC MONTHLY, a publication of American Association for the Advancement of Science, Charles A. Browne, Ph.D., Sc.D., formerly of the U. S. Bureau of Agricultural Chemistry and Engineering is now in the process of writing a history of the American Chemical Society.



DR. CHARLES F. KETTERING of General Motors Corp. was recently elected president and Dr. Henry Eyring, Vice president of the American Association for the Advancement of Science. Dr. Anton J. Carlson of the University of Chicago is the retiring president.



A WARING BLENDOR JAR in which a hole had been drilled and fitted with a serum stopper provided means for the injection of the contents for a study of typhus rickettsiae growth. A report on the method can be found in THE JOURNAL OF EXPERIMENTAL MEDICINE for December, 1944, published by The Rockefeller Institute for Medical Research. It is entitled, "Effect of Enzyme Inhibitors and Activators on The Multiplication of Typhus Rickettsiae" and the authors are Donald Greiff, Henry Pinkerton, and Vicente Moragues from St. Louis University, and St. Louis University School of Medicine.



DATA AND INFORMATION of interest concerning the effects of processing on the vitamin content of

\*Published by The Garrard Press, Champaign, Illinois.

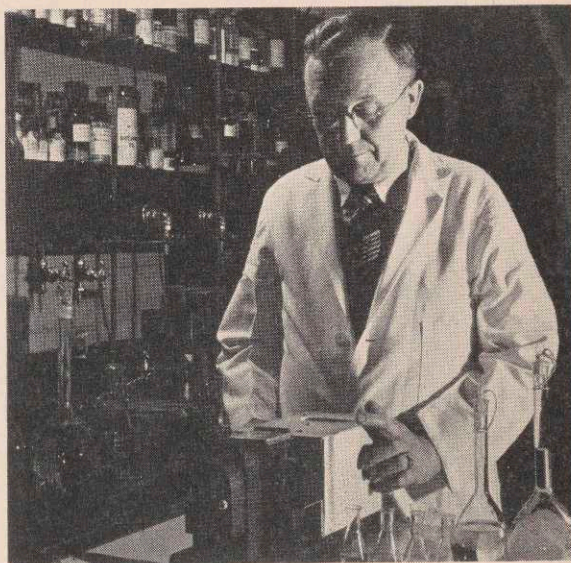
"greens" (Swiss Chard and Beet Greens) are given in two papers in Volume 9, No. 6, November-December 1944 issue FOOD RESEARCH\*. The effects of marketing, home cooking and drying on the riboflavin, carotene and chlorophyll content of the leaves of certain varieties are significant. The titles and authors of these papers are as follows:

"Carotene And Chlorophyll Content of Fresh And Processed Swiss Chard And Beet Greens" by Thelma Porter, Marion A. Wharton, and Rosalie M. Beltz, section of Home Economics, Michigan Agricultural Experiment Station, East Lansing, Michigan.

and

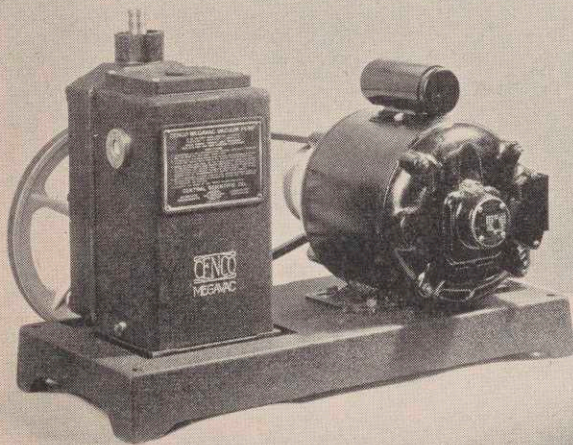
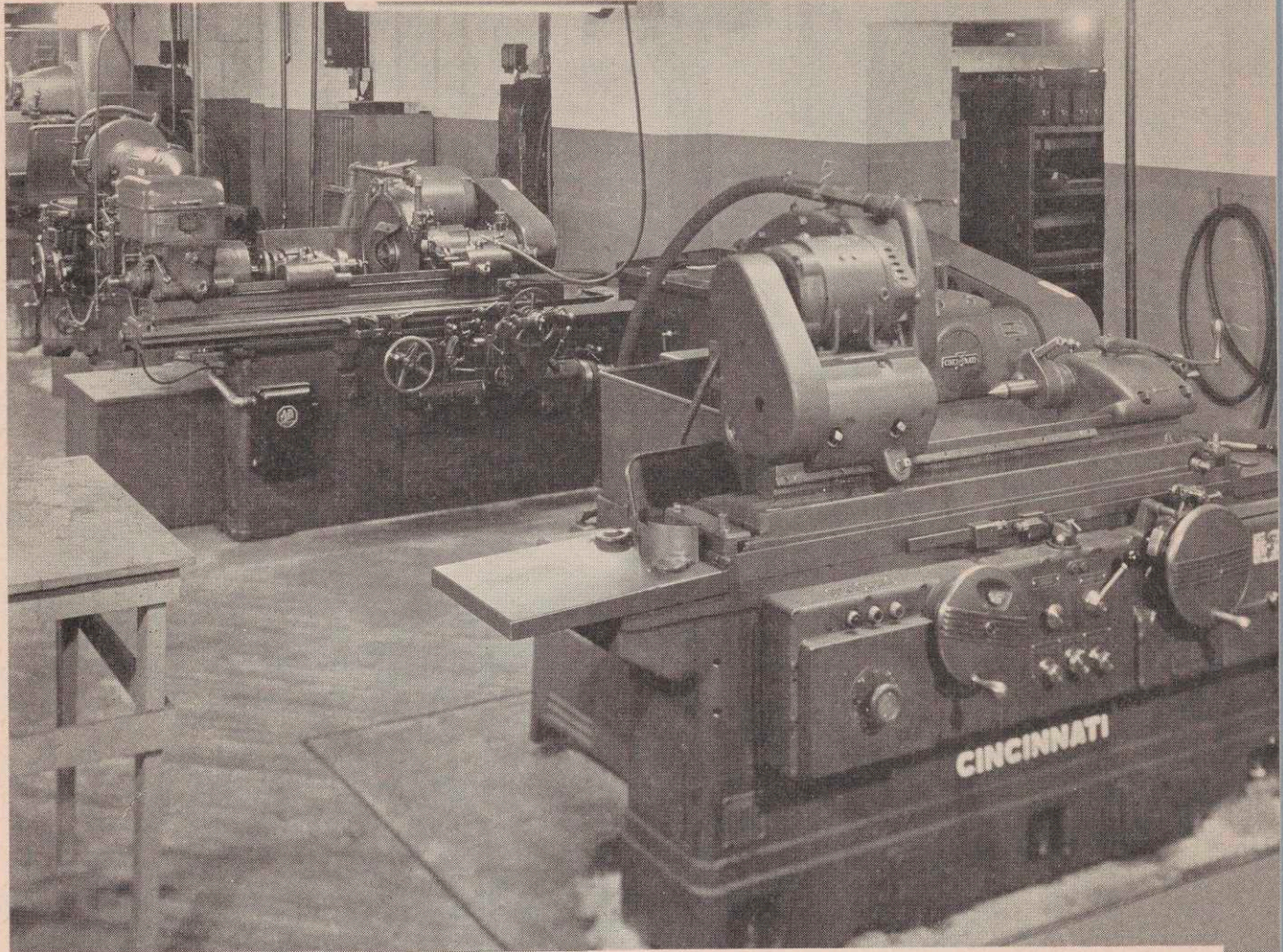
"Riboflavin Content Of Fresh And Processed Swiss Chard" by Thelma Porter and Eunice Kelly, section of Home Economics, Michigan Agricultural Experiment Station.

In determining chlorophyll and carotene, the Petering, Wolman, and Hibbard procedure (1940) was followed. The Waring Blendor provided fine dispersion of the plant material in absolute alcohol. It is interesting to note that the chlorophyll readings on fresh plant extracts, using the method of Petering et al. and the standard curve prepared and compared with readings on a spectrophotometer by Dr. C. L. Comar of Michigan State College, were found to agree completely.



One of the research laboratories of Parke, Davis & Company, where investigations are conducted on the long list of possible chemical analogues of sulfanilamide; compounds of greater effectiveness and less toxicity are sought and inquiries are made inquiring into the interference of various substances with the action of sulfonamide drugs. A Cenco "Photometer" implements these studies.

## ● PRECISION PRODUCTION AT CENCO



● The high vacuum pumps manufactured by Cenco are precision instruments with internal mechanisms which require more than ordinary machining. These parts are precision ground to tolerances within  $2/10,000$  of an inch.

The above view was taken in the Cenco grinding room where equipment was recently installed for the precision grinding of external surfaces, cylinders and tools for the production in quantity of vacuum pump parts.

Also included but not shown in the picture is a new boring machine which does a precision job of grinding internal surfaces in small holes and bores.



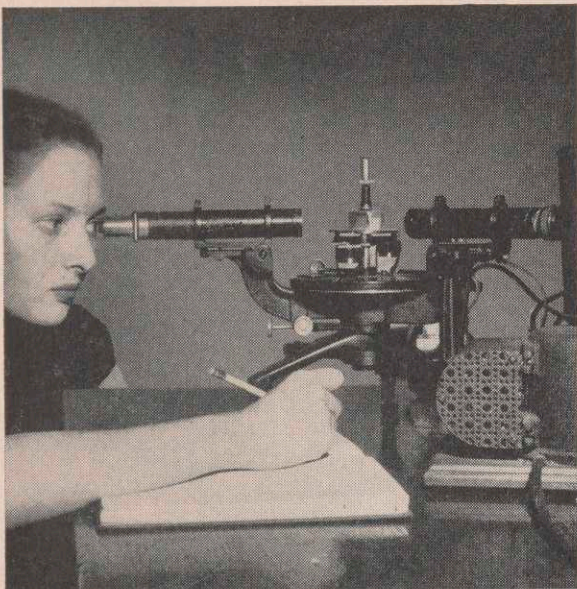


Photo by courtesy of the College of the City of New York where more than 4000 students have been trained in various war industry courses during the past two and one-half years.

## The three R's become E. S. M. W. T.\*

Universities and schools are training thousands of young men and women under the E.S.M.W.T.\* program of the United States Office of Education.

Typical is the young woman shown above who is measuring the refractive index of a prism with a Spencer Spectrometer—part of a training course which will qualify her as an inspector or production worker in an optical instrument plant.

Thus our modern educational institutions are equipping the youth of the nation for scientific work in war production—a far cry from the little red schoolhouse of early America!



\*E. S. M. W. T.—Engineering, Science, Management, War Training.

**Spencer** LENS COMPANY  
BUFFALO, NEW YORK  
SCIENTIFIC INSTRUMENT DIVISION OF  
AMERICAN OPTICAL COMPANY



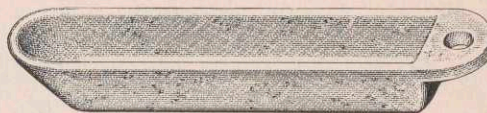
## LECO CERAMIC COMBUSTION BOATS

MADE FROM AN IMPROVED ceramic mixture, Leco Combustion Boats are the best boats it is possible to make. The ceramic used is very dense in composition, highly refractory and will stand temperatures up to 2700 degrees F. Boats made from it are smooth finished and well formed.



No. 26278A and D

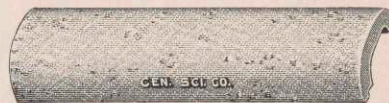
No. 26278D Combustion Boat, Leco No. 6, is unexcelled for volumetric or gravimetric determinations. It is made deep to permit the use of a greater number of samples and thin to assure quicker heating. It may be used repeatedly until full and without bulging, either with or without alundum. This boat will take a 2 gram sample at one heating. The dimensions are: length,  $3\frac{7}{8}$  inches; width at top,  $\frac{1}{2}$  inch; depth inside,  $\frac{3}{8}$  inch. Price per 1000—\$35.00 (\$4.50 per 100)



No. 26278C

No. 26278C Combustion Boat, Leco No. 5, is an excellent substitute for the nickel "barge." It is made of the same ceramic mixture as 26278D but is larger for those who prefer the use of larger samples. The dimensions are: length,  $3\frac{7}{8}$  inches; width at top,  $\frac{3}{4}$  inch; depth inside,  $\frac{5}{16}$  of an inch. Price per 100—\$10.00 (or 15c each).

For those who prefer a shallow boat for one time service, we recommend No. 26278A Combustion Boat, Leco No. 2. Its length is  $3\frac{5}{8}$  inches; width,  $\frac{1}{2}$  inch; and inside depth,  $\frac{3}{16}$  of an inch. The price per 1000 is \$35.00 (or \$4.50 per 100).



No. 26279

No. 26279 Combustion Boat Covers, Ceramic. Leco, made to fit the boats listed under No. 26278.

No.	A	C
For use with No. 26278 Boat, size.....	A&D	C
Each .....	—	.15
Per box of 100.....	3.50	10.00
Per 10 boxes.....	27.00	

# HIGH INTENSITY SODIUM LAMP

NUMBER 87300 SODIUM LAB-ARC made by the General Electric Company is a complete, self-contained portable device in which an intense source of sodium radiation of about 85 candlepower is provided. It is useful in the laboratory for polarimetry, interferometry, refractometry, spectrometry, and other optical work. Where chemical constituents or concentrations are measured as a function of the absorption of monochromatic light, it is an obvious convenience. It is also ideal for the detection of fine cracks and the inspection of surfaces by the interference patterns formed with test plates or for use in the calibration of spectrometers, spectroscopes and spectrographs.

The radiation source is of ample area, giving constant intensity and high brilliance. The lamp may be operated for long periods with unvarying output. No adjustment or maintenance is required and there are, of course, no fumes and very little heat. The value of such a reliable, trouble-free lamp will be appreciated by all who had to work with sodium flames or flares. The power required is only 65 watts.

The Sodium Lab-Arc consists of two units, a lamp housing and a base containing the auxiliary consisting of a transformer and a resistor. A rod extending out of the base provides support for the lamp. The lamp housing encloses a vacuum flask mantle which fits over the lamp to retain the heat necessary for proper operating temperature. This feature also assures stability in operation. The lamp housing has a  $1\frac{1}{2} \times 2$  inch rectangular opening fitted with holder for screens or shields to reduce the window size. Glass filters are separately mounted when used. The glass lamp bulb is equipped with a four prong radio type base for easy replacement. It is 5" long overall, including base pins, and  $1\frac{1}{2}$ " in diameter. A four conductor cable from the lamp receptacle in the bottom of the housing connects it to the auxiliary. Connection to a 115 volt A.C. convenience outlet for power supply is made by a six foot cord equipped with a run through switch.

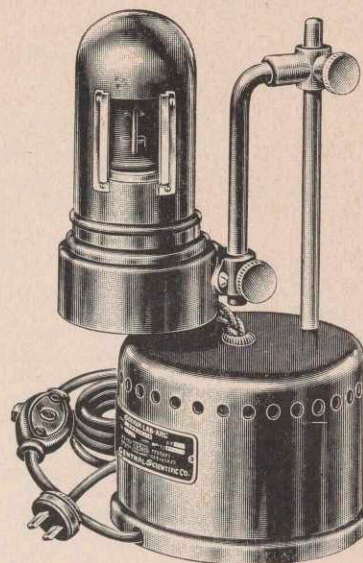
## Radiation

When operated on 115 volts, 60 cycles A.C. and with the lamp fully warmed up (20 to 40 minutes), the Sodium Lab-Arc produces about 500 lumens. This is largely concentrated in the 5889-5895 lines.

The brightness of a center square in the window area, about 3 x 3 cm, averages 7.5 candles per sq. cm. This includes the electrodes. If the electrodes are shielded to utilize the area 2 x 3 cm between them, the brightness is 8.5 candles per sq. cm. This is about thirty times the brightness of an average sodium flame.

## Filtration

The use of a filter is recommended to eliminate the 2 per cent of radiation in unwanted lines. A



No. 87300 High Intensity Sodium Lamp

bichromate filter, if used, may be adjusted to as high an absorption as the conditions require. Wratten filters Nos. 87310F and G may be used in combination. No provision is made on the lamp for holding filters. Gelatin filters should be mounted about 6 inches away from the lamp to avoid overheating.

The high brightness permits the operation of many polarimeters with the half shadow angle reduced, giving increased sensitivity and greater accuracy.

Reference to the following texts is suggested for information on filtering and other details of the use of monochromators:

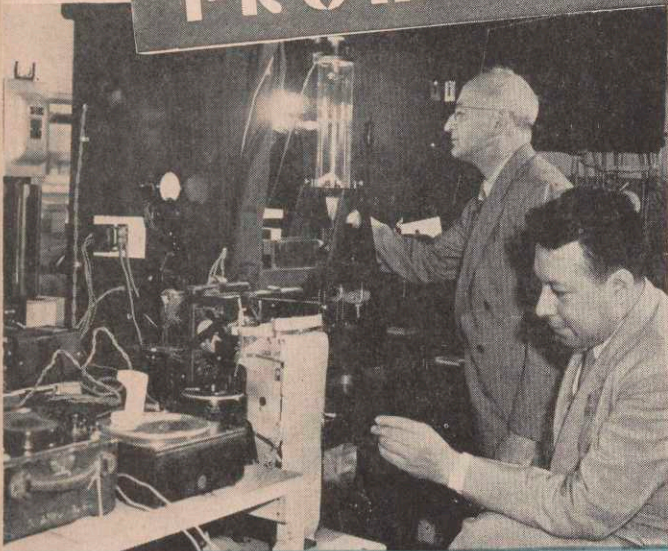
"Principles of Optics"—Hardy and Perrin  
"Measurement of Radiant Energy"—Forsythe  
"Procedures in Experimental Physics"—Strong

At this writing, No. 87300 Sodium Lab-Arc can be shipped from stock. Its price is \$62.50.

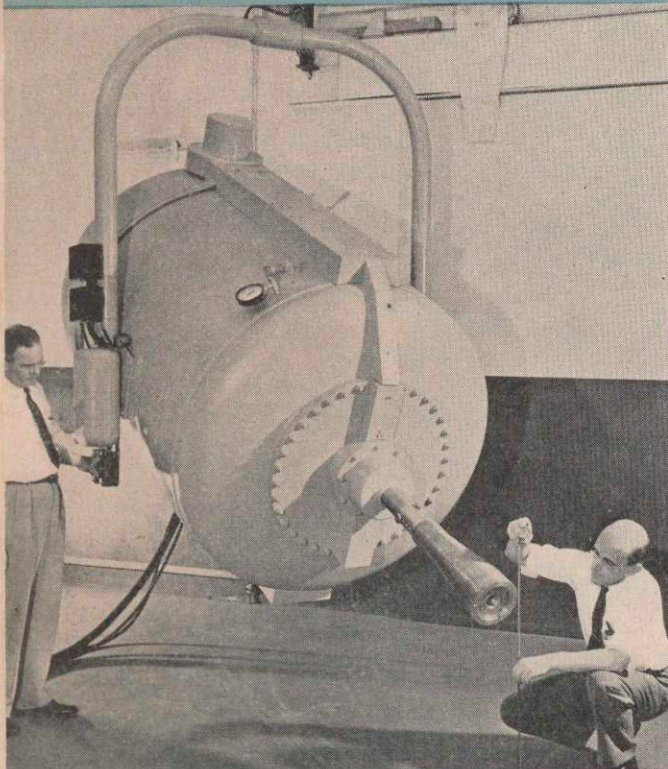
## Please Tell Us About Personnel Changes

Your cooperation in keeping the circulation department of CENCO NEWS CHATS posted on the recent personnel changes in your laboratories will not only assure a copy wherever desired but will eliminate unnecessary duplications. Thank you.

# INTERESTING SHOTS CENCOGRAPHS FROM MANY ANGLES



Measurements of the "creep" or flow of metals are being made here by Dr. Saul Dushman, assistant director of the Research Laboratory.



Above, Dr. Ernest E. Charlton (left) and William F. Westendorp inspect the new two million-volt X-ray outfit.

The General Electric Company operates 19 separate laboratories for the many phases in the development of electric products. At Schenectady, the activities of the major Research Laboratory and the General Engineering and Consulting Laboratories are conducted in the two buildings shown at the right. Here many scientists work for greater security in time of danger and greater comfort in time of peace.

GENERAL  ELECTRIC

A few of the countless activities of the General Electric Laboratories are illustrated here. For example, by the new method shown at the left (top), the "creep," or flow, of metals is measured. An electric current is passed through a thin wire of the metal, heating it to perhaps 2000° F. The wire is enclosed in a glass cylinder. A light shines through a glass grid, ruled with horizontal black lines. Attached to the bottom of the test wire is another such grid, nearly in contact with the first. A lens forms an enlarged image of these grids on the surface of a photocell, which converts light into electricity. A very sensitive meter

Katherine B. Blodgett at General Electric has built up 44 invisible layers of barium stearate on glass — to make it so non-reflecting that you can't see it!



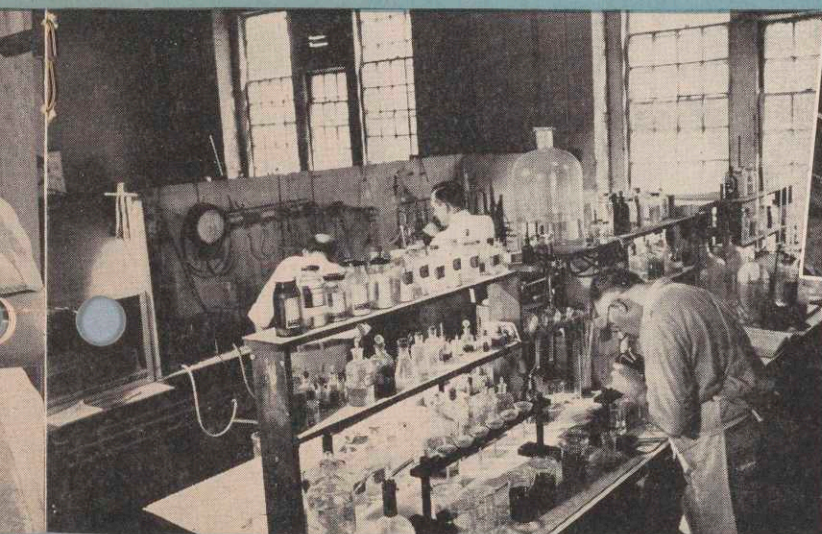
CTRIC



records on a moving strip of paper the changes in current from the photocell, thus measuring accurately an extension of the wire as small as  $1/10,000$ th of an inch.

In another of the G-E Laboratories (see picture at left, bottom) X-ray pictures can be taken through pieces of steel a foot thick, using a new 2,000,000-volt mobile X-ray unit developed in the G-E Research Laboratory. In radiographing an 8-inch steel casting, this outfit is 78 times as fast as the largest previous X-ray unit. Other illustrations on this page show more accomplishments of G-E engineers and scientists.

Here G-E engineers are shown at work in the Schenectady Works Laboratory. There is a laboratory for each of the major General Electric Works.



Vincent Schaeffer, member of the G-E Laboratory, is shown here experimenting with thin films on water.

# THE ZAHN VISCOSIMETER BY G-E

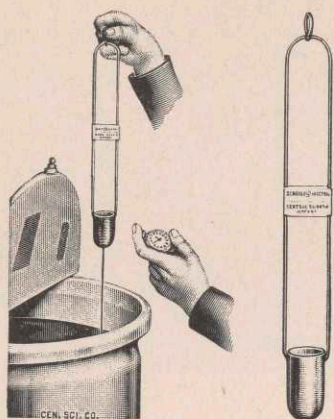
ACCURATE CONTROL of the viscosity of finishing materials, such as paint, varnish, lacquers, or japan, is the principal use for which No. 27134 G-E Zahn Viscosimeter is designed.

Paint manufacturers find it convenient in controlling processes and in standardizing finished products. Users too, can control the viscosity of finishing materials in order to obtain uniform results and minimize rejects due to imperfect finish. Oil companies have found it desirable for numerous applications. It is easy to manipulate, durable and inexpensive and permits control of viscosity right on the production line.

No. 27134 G-E Zahn Viscosimeter consists of a bullet-shaped cup, made of steel, with a capacity of approximately 44 cubic centimeters. It is suspended by a twelve-inch looped handle in the liquid to be measured. A small ring at the top end of the looped handle allows the operator to hold the cup in an exact vertical position when the cup is withdrawn from the liquid for a reading.

The cup is drawn from a single piece of steel, over a die of hardened tool steel. It is annealed several times during the drawing process to remove any spring or strain that might later cause inaccuracy. The orifice is drilled slightly undersize and later reamed to the precise size. The size of the orifice is then tested by measuring the viscosity of oils specially prepared for the purpose. The cup is plated with copper, nickel, and chro-

## For Quick and Accurate Viscosities of Oils & Paints



No. 27134 Viscosimeter

mium to make it resistant to corrosion.

The usual method of using the viscosimeter is to leave it in the material between readings so that it assumes the temperature of the material that is being measured. When a reading is taken, the cup is simply lifted out of the liquid and a timer is started as it leaves the surface. The liquid flows through a calibrated orifice in the bottom of the cup, and the timer is stopped when the stream flowing through the orifice suddenly breaks. The time of flow gives an accurate indication of viscosity. Correctly used, this viscosimeter will give consistent readings at any temperature.

These viscosimeters are made in five orifice sizes to measure the viscosity of a wide variety of liquids. Each is designated by a suffix letter and is priced \$9.50.

No. 27134A is designed for solvents, thin oil or thin mixtures; 27134B, for ordinary oil, mixed paints and lacquers; 27134C, for heavy oil and heavy mixed paints;

27134D, for extra heavy mixtures; and 27134E, for the heaviest mixtures.

The orifice size designation is:

A (Seconds—29.0)	1.1=centipoises
B (Seconds—14.0)	3.5=centipoises
C (Seconds— 7.5)	11.7=centipoises
D (Seconds— 5.0)	14.8=centipoises
E (Seconds— 0.0)	23. =centipoises

## NEON WANDS AS POTENTIAL INDICATORS

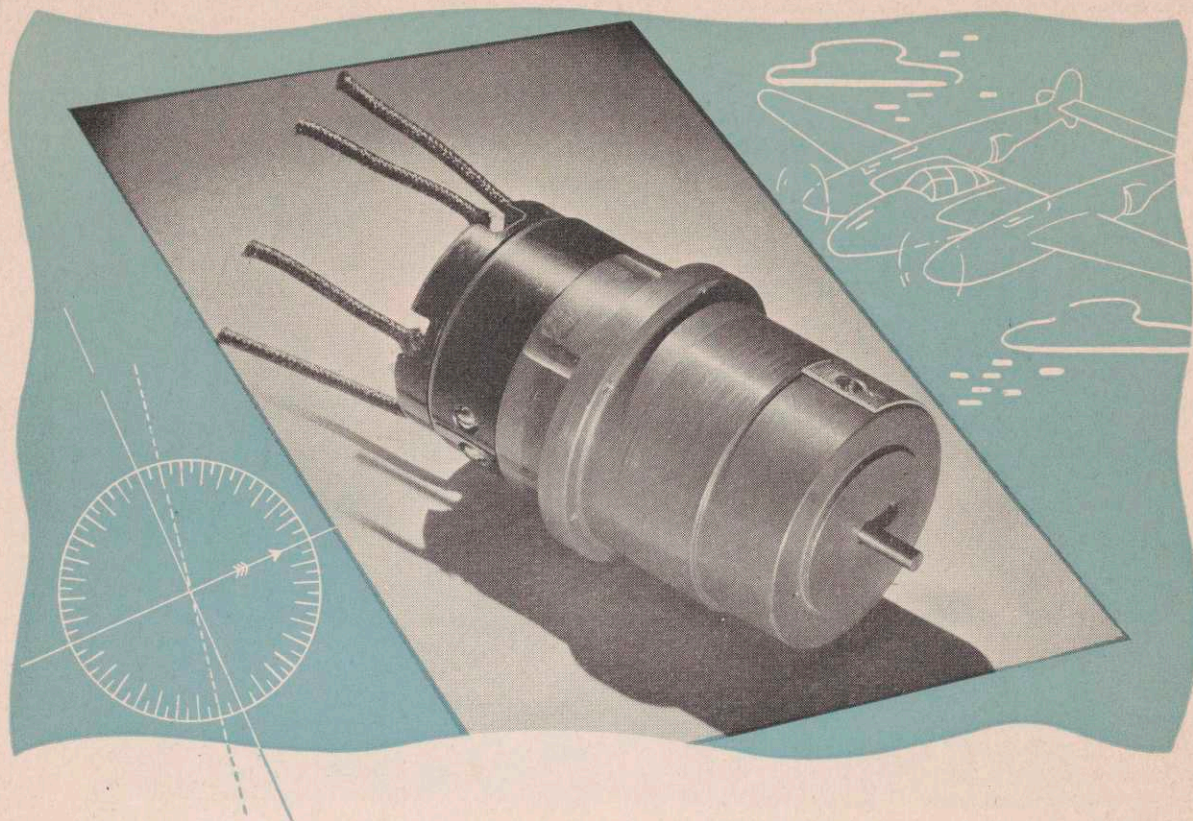


No. 80457 Cenco Neon Wand

No. 80457 CENCO NEON WANDS have become available again for use as potential indicators in high frequency fields of Tesla coils or for indicating the voltage nodes and antinodes along a No. 80454 Standing Wave Tube used in conjunction with No. 80435 Short Wave Demonstration Apparatus.

These glass discharge tubes are filled with neon

gas and are provided with external metal electrodes. When one is held in the hand and introduced into a high frequency field, it bursts into the intense red glow, characteristic of neon gas at reduced pressure and under the stimulus of a high potential. The approximate measurements are 10 x 1/2 inches and the price is \$1.00.



## THESE SELSYN MOTORS

EVERY NOW AND THEN an unusual chain of circumstances turns up with an item of extreme usefulness and wide application. Now it is our privilege to announce another of these items, a small synchronous motor (Selsyn) which fortunately is in stock. The importance of this little unit to our war effort is nothing short of miraculous. Without it we could have no automatic positioning of devices such as the draw bridge, the automatic pilot, the aircraft alarm, the automatic landing gear, the wind direction indicator, the communication of gas volumes in tanks many miles distant or the numerous other applications perhaps of even greater importance.

Not only are Selsyns valuable in technical applications but also in the classroom; instructors in applied physics will find a Selsyn motor a helpful adjunct to teaching practical electricity, aircraft mechanics and to demonstrating the rotating magnetic field, the three-phase generator variable inductor and other fundamentals of alternating current.

When one of these motors is used as a master other identical units will act as slaves. A combination of one master unit and one or more slave units can be utilized for remote control or indication of any motion which may be translated into an angular displacement. Angular displacements in the shaft of the master are reproduced in the shafts of the slaves. In use, the fields of the motors are

connected in parallel and the rotors in either series or parallel, excited from the same source of alternating current.

In No. 670 Selsyn Motors there are two rotor pole pieces and three-phase stators. Although originally designed for use on 115 volts, 400 cycles A.C., (67 watts—53.6 inch ounces torque) these Selsyns will operate on 15 to 25 volts, 60 cycles A.C., (approximately 10 watts at 17 volts) and on other frequencies. The approximate measurements are 2 inches in diameter by 3½ inches in length.

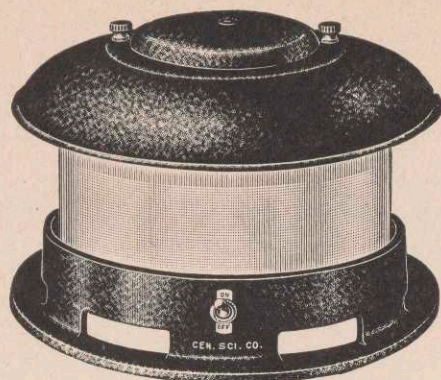
Best of all, the price is much less than production cost! Take early advantage of this opportunity to purchase No. 670 Selsyn Motors at \$7.50 each. There is a saving in quantities as follows: \$6.75 each in lots of 4; \$6.37 each in lots of 8; and \$6.00 each in lots of 12. Please order by catalog number.

When angular displacements of the shaft of a Selsyn motor are plotted on paper, a whole-circle protractor becomes very useful. We offer for the purpose No. 72987 Compass Protractor made of laminated Vinylite. It is 3½ inches in diameter and is graduated in 1°, numbered at every 15°. The price is 30 cents each.

We have prepared a mimeographed set of directions with schematic diagrams showing the uses of Selsyn motors. A copy will be gladly forwarded upon request. Ask for list "Selsyn."

## FOR DIFFUSE ILLUMINATION

THE DIFFUSE ILLUMINATION produced by the Cenco-Bidwell microscope lamp is highly desirable for microscopic and colorimetric work. The "Celestialite" glass cylinder which filters and diffuses the light from the frosted tungsten-filament bulb is composed of three layers of glass selected of different thicknesses and kinds best for the purpose. Much of the yellow light which causes eye fatigue is filtered out by this glass. Its cylindrical shape provides a nearly equal intensity of illumination in every direction. When greater working distance or in-



No. 66150A Cenco-Bidwell  
Microscope Lamp

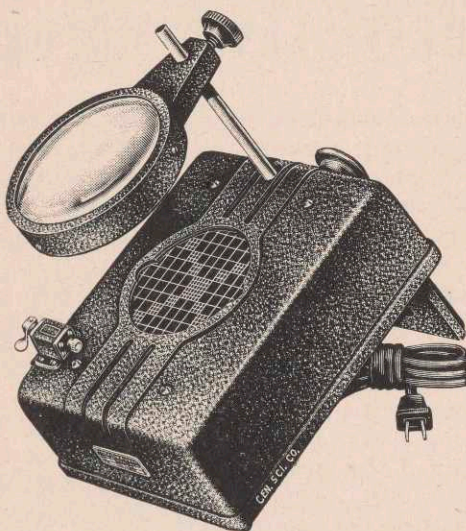
tensity is desired, a 250 watt lamp bulb, Catalog No. 66154, may be purchased at \$1.15 in addition to, or instead of, the 100 watt bulb supplied.

The Cenco-Bidwell microscope lamp is listed as catalog No. 66150A. It is convenient, compact, and easily installed. The lamp housing is cooled by ventilating slots at the top and bottom. The bottom casting is drilled for fastening to the table. The all diameter of the lamp is  $10\frac{1}{4}$  inches and height,  $6\frac{3}{4}$  inches. It operates on 115 volts A.C. and D.C. The price is \$20.00.

## COLONY COUNTER OF CONVENIENCE

THE COMPACT DESIGN of No. 44311 Cenco Colony Counter is the result of a study of routine laboratory procedure to permit rapid counting of bacteria colonies under uniform lighting conditions and to promote consistently accurate counts with minimum eye fatigue. The adjustable  $4\frac{1}{2}$  inch lens brings the entire dish into view at a magnification of  $1\frac{1}{2}$  diameters, as specified in APHA *Standard Methods for the Examination of Dairy Product*. Light from two 25-watt tubular lamps provides oblique and non-glare illumination for dark field or colored media counts.

The working angle of the counter may be adjusted from



No. 44311 shown with No. 44312 Tally

horizontal to 24 degrees from the horizontal. An opening in the center, in which is contained an etched-glass Wolffhuegel counting plate receives standard 100 mm Petri dishes. A spring clip at the top edge of the opening engages the Petri dish and holds it securely during the counting operation. Threaded holes in the left corner of the case permit attachment of a No. 44312 Tally for automatically recording the colonies with the left hand, while marking them with the right hand.

No. 44311 comes complete with lens, counting plate and two lamps for 115 volts A.C. or D.C. for the price, \$30.00.

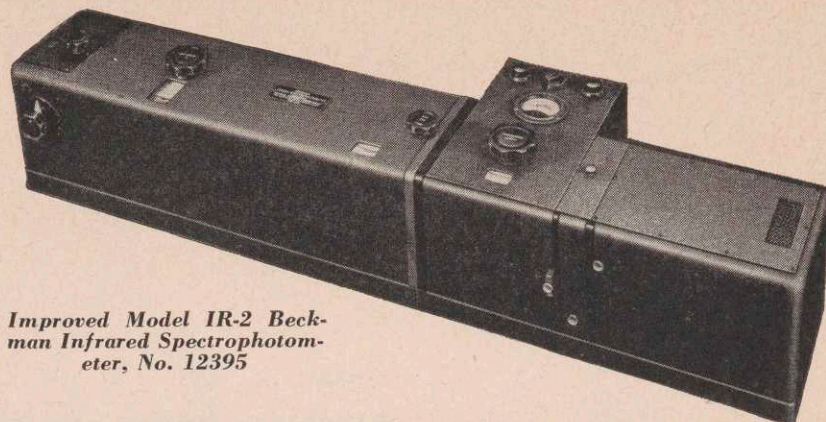


IN THE MANUFACTURE of SelaS crucibles the pore size of the porcelain disc is accurately controlled, a feature which assures improved filtering characteristics. With a maximum pore diameter of 11 microns, No. 13135 SelaS Filter Crucibles have been found suitable for direct ash

determinations in the standard test for alpha cellulose. These crucibles are fast and can be heated many times to incandescence and cooled without harmful effects.

Suffixes A, B, and C, indicate capacities of 20, 30 and 40 ml and prices of 70, 70 and 80 cents each respectively. These are now in stock.

## SELAS FILTER CRUCIBLES



*Improved Model IR-2 Beckman Infrared Spectrophotometer, No. 12395*

## THE BECKMAN INFRARED SPECTROPHOTOMETER

ONE OF THE MOST USEFUL analytical tools contributing to the tremendous production of war materials is the infrared spectrophotometer now being used for hydrocarbon analysis in aviation gasoline and butadiene plants. Before the war the usefulness of infrared spectroscopic methods was apparent only to a few research laboratories; since then this new tool has become essential in plant control.

The earlier instruments were designed specifically for routine analysis of hydrocarbon gases but rapidly increasing recognition of the value of infrared methods for general organic analysis has emphasized the need for a more versatile laboratory instrument. Such an instrument is now available in the new Model IR-2 (No. 12395). Experience gained in designing and producing a large number of infrared spectrophotometers, performance data from field operation under severe conditions, and the helpful suggestions received from professional spectroscopists, have led to the improvements incorporated in Model IR-2.

New features include the elimination of the troublesome zero drift associated with thermocouple-galvanometer systems, the incorporation for routine analysis of simple mechanism for quickly and accurately setting the instrument at a large number of predetermined wavelengths, provision for radiation measurements to be given directly in per cent transmission or density to avoid unnecessary calculations, provision for automatic scanning and recording, calibration of the monochromator directly in wavelength units to avoid the necessity for reference to a conversion chart.

A Littrow optical system with rotating plane mirror and fixed rock salt prism is housed in a rigid, normalized cast iron box. The prism, mounted on an individual self-aligning base, may be removed and replaced without change in the wavelength calibration, or a prism of lithium fluoride or other material may be readily substituted.

For convenience and general utility the spectrophotometer is equipped with two constant-temperature cell compartments, one for gas samples only and the other for gases, liquids of solids. Each compartment is provided with indicating desiccant.

The standard gas cell has an absorption path of 10 cm. and volume of only 25 cc.

The second cell compartment permits the use of liquid cells, solid specimens, special filters or removable gas cells. The standard compartment is 25 mm. long and is readily removable and replaceable by compartments of greater length to meet users requirements. Since light passing through this compartment is parallel, the absorption path may be extended to a total of 20 cm. without optical vignetting or aberration. Path lengths of a meter or more may be used with only a slight reduction in illumination.

Pressure-tight liquid cells with absorption paths 0.05 to 2.0 mm. are standard accessories.

A unique and important feature of Model IR-2 Spectrophotometer is the means employed for measuring radiation. A special bolometer and electronic amplifier provide stability heretofore unobtainable with the infrared spectrophotometer. Light from the Nernst glower is interrupted by a mechanical shutter ten times per second and the output of the bolometer is amplified by a special electronic circuit tuned to this frequency.

Light transmission values are obtained directly in percent transmission or optical density from the dial of a precision slide wire potentiometer.

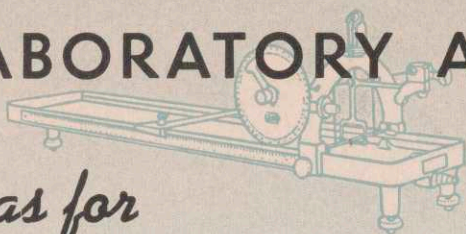
The amplifier output may be connected directly to the input of a conventional chart recorder. In combination with the wavelength motor drive, a permanent record of the spectrum may be obtained automatically.

The price of No. 12395 Beckman Infrared Spectrophotometer, Model IR-2, is \$3600.00.



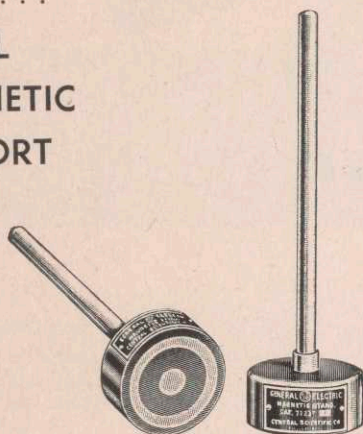
# THE LABORATORY ASSISTANT

*New Ideas for Better Work*



PHYSICS . . .

## NOVEL MAGNETIC SUPPORT



A NEW G-E MAGNETIC STAND consisting of a non-magnetic rod and a steel base in which is embedded an alnico magnet is not only space saving and convenient to use but has wide application. The permanency of the alnico magnet assures almost indefinite holding power even when placed in stray magnetic fields. The stand will "stick" surprisingly well on any table, wall or ceiling having an iron or steel surface.

The base is so designed that the magnetic flux in the air gap between the steel shell and the alnico ring "knits" the base to a cast-iron or steel surface. If less pull is desired, layers of cardboard can be cemented or glued to the bottom of the stand.

The stand is easily adjusted or moved in locations inaccessible to the customary optical bench. The stand provides a practical means of supporting lenses, mirrors, indicators or similar devices. Many applications will soon be suggested to the reader.

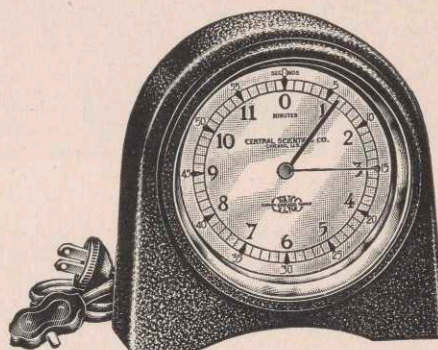
The base of No. 72227 G-E Magnetic Stand is  $2\frac{1}{2}$  inches in diameter by  $1\frac{1}{4}$  inches high, and nonmagnetic rod with  $\frac{1}{4}$ -20 screw thread, 8 inches long and  $\frac{3}{8}$  inch diameter.

The average pull through zero air gap required to slide the stand along a horizontal or vertical steel surface is 30 pounds and to remove the stand, 10 pounds.

Please order by catalog number, 72227. The price for one is \$9.75.

GENERAL . . .

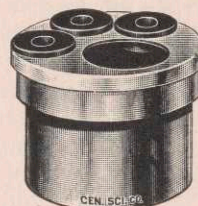
## INTERVAL TIMER IN STOCK



No. 73414A CENCO ELECTRIC STOPCLOCK is designed to time the interval of any operation between an estimated .2 of a second and 12 minutes. Its dial is graduated 0 to 60 seconds in 1 second divisions with numbers at every 5 seconds and from 0 to 12 minutes in divisions of .2 of a minute with numbers at every minute. The synchronous-clock movement operates from 115 volt, 60 cycle, A.C. This stopclock is available from stock at \$22.50.

CHEMISTRY . . .

## SEMI-MICRO WATER BATHS

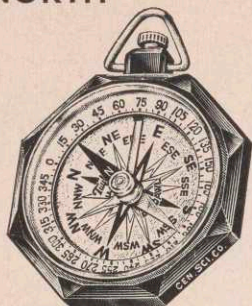


AN IMPROVED form of water bath for semi-micro chemistry is available for prompt shipment. Spun of copper larger at the top than bottom permits it to fit into an ordinary 4 inch iron ring for support. The top is perforated with four holes, three of which are provided with loose fitting rubber plugs to hold 10 m/m test tubes and the fourth for heating a small evaporating dish. The complete bath is listed as No. 22986 at \$1.00 each or 80 cents each in lots of 12. The cover only listed as No. 22987 at 40 cents may be used on top of a "Pyrex" Brand beaker of 500 ml capacity such as No. 14245. The rubber plugs only, No. 22988, are \$1.65 per hundred.

# THE LABORATORY ASSISTANT

GENERAL . . .

## POINTS NORTH



FOR THE MOMENT at least, and we are not trying to be facetious because today the demand for any item is extremely difficult to foretell, we have in stock a normal supply of attractive Taylor Compasses. These instruments are constructed from molded plastics and have raised metal dials, 2 inches in diameter, graduated in  $5^\circ$  divisions with numbers at each  $15^\circ$ . Fitted with suspension ring and screw adjustment stop for the jeweled-bearing needle, one of these pocket compasses is desirable for either field or laboratory use.

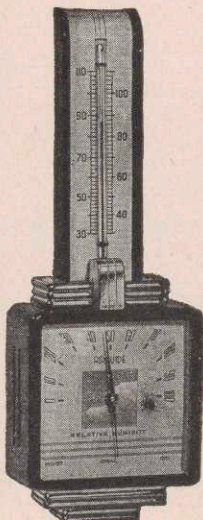
You may obtain it by specifying No. 78442Y. The price is \$1.15 each or 92 cents each in lots of 12.

GENERAL . . .

## AIRGUIDES

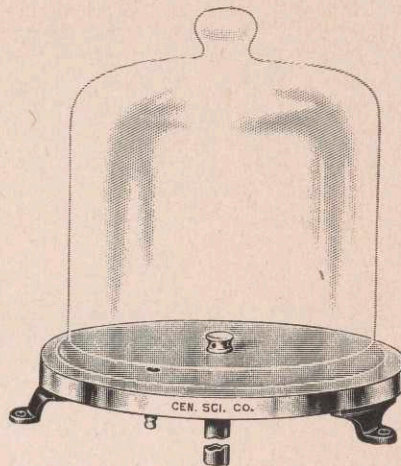
THIS ITEM HAS BEEN temporarily discontinued for the duration, but recently we were fortunate in receiving a limited quantity which is available to you while it lasts at a price of \$3.50 each. The item is No. 76960 Airguide Hygrometer designed for the direct indication in per cent of relative humidity and the temperature of the surrounding air.

The moisture-sensitive element is mounted in a square Bakelite case of artistic design, which also houses the indicating humidity dial and thermometer. The square silvered-metal dial is graduated from 0 to 100 per cent relative humidity in 10 per cent divisions.



PHYSICS . . .

## LARGE VACUUM PUMP PLATE

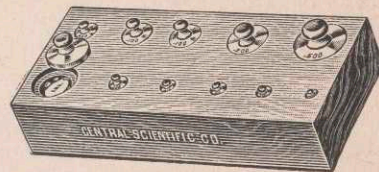


ESPECIALLY DESIGNED to be used as a vacuum pump plate on large bell jars such as this substantial cast iron base, 17 inches in diameter, is adequately reinforced and provides a perfectly flat surface ground plane on a precision grinder. The vacuum pump outlet is a connector pipe with  $1\frac{1}{4}$ "-18 machine thread and 12 inches in length. It is attached to the center of the plate from the bottom. A serrated hose connection also on the under side near the outer edge permits connection to a vacuum gage.

94211 Cenco Vacuum Pump Plate is the number and \$30.00 is the price. Delivery is scheduled for the near future.

INDUSTRY . . .

## DECIMAL POUND WEIGHTS



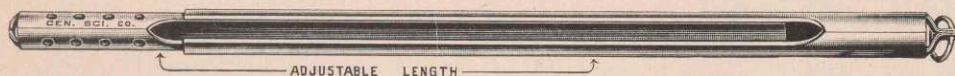
IN CERTAIN TYPES of industrial production where test batches need to be prepared quickly, decimal pound weights are a helpful convenience. The proper quantities required in the process can be easily calculated from the weights obtained in the test by moving the decimal points. Each set consists of 13 weights of values from 0.001 lb. to 0.5 lb., which total 1 lb. The 10 larger weights are of brass with knob tops, and the 3 weights of 0.001 lb. are of aluminum. No. 9000 Decimal Pound Weights are adjusted to the tolerances of technical class II and sell for \$9.00 per set.

# THE LABORATORY ASSISTANT

METALLURGY . . .

## HELPFUL AID TO RAPID COMBUSTION

No. 26185 LECO COMBUSTION ACCELERATOR is a helpful aid to the rapid combustion analysis of carbon and sulphur in steel. Packed in bottles of 3,000 strips each approximately the same in size and weight, its use accelerates oxidations, tends to prevent spattering and reduces iron oxide dust formation. In use a strip is placed on top of the sample in the boat. In high temperature sulphur determinations, it accelerates the reduction of sulphur trioxide to sulphur dioxide. Order a bottle by specifying No. 26185 at \$3.00.



## CHEMISTRY . . . ADJUSTABLE ARMOR FOR THERMOMETERS

THE INHERENT DIFFICULTY of most thermometer armors lies in the fact that these will hold only one size of thermometer. Now we offer No. 19298 Thermometer Armor which can be easily adjusted to fit a variety of sizes of glass chemical thermometers. It consists of a brass case and sleeve which telescope for convenient adjustment of length. It will hold thermometers with stems to 5/16 inch in diameter

and from approximately 10 to 16 $\frac{3}{4}$  inches in length. The lower end of the case is perforated to permit circulation. A ring at the upper end permits suspension.

No. 19298 Cenco Adjustable Thermometer Armors (Patented) are priced at \$2.00 each with discounts in quantity. These are now in production and stock is anticipated for the very near future.



*Cenco Booth at Third National Chemical Exposition*

*The Cenco booth at the Chicago Coliseum where the Chicago Section of the American Chemical Society staged the Third National Chemical Exposition on November 15-19, 1944. The total registration of Chemists, Engineers, Executives and others in attendance at the Exposition was more than 21,000.*

CENCO

# "PHOTELOMETER"



TYPE  
C-5

WITH  
CALIBRATIONS

**T**HE clinical type C-5 "Photelometer" now is available with calibration tables and procedures for the determination of hemoglobin, blood sugar, non-protein nitrogen, urea nitrogen, creatinine and uric acid.

No. 41017A, for 115 volts 60 cycles A. C. .... \$135.00

Specially prepared and tested solutions for use with calibrated "Photelometer" are indicated below. Included in each set of reagents is a standard sample for verifying each calibration.

(P2) Set of Reagents for Preparation of 60 Folin-Wu filtrates.....	\$2.00
(P3) *Set of Reagents for 150 Glucose Determinations.....	1.20
(P4) *Set of Reagents for 15 to 50 Creatinine Determinations.....	1.45
(P5) Set of Reagents for 75 N. P. N. Determinations.....	3.40
(P6) Set of Reagents for 50 to 100 Urea Nitrogen Determinations.....	4.35
(P7) *Set of Reagents for 25 to 100 Uric Acid Determinations.....	2.70

\*For use with Set P2

Write for information.

## CENTRAL SCIENTIFIC COMPANY

SCIENTIFIC INSTRUMENTS  LABORATORY APPARATUS

NEW YORK TORONTO CHICAGO BOSTON SAN FRANCISCO




Leading brands of laboratory supplies bearing familiar trade marks of the country's outstanding manufacturers are brought to you through Cenco, together with apparatus of Cenco's own manufacture. The requirements of scientific development, control, and research are served best by brands of highest quality. For dependable products from reliable sources, specify these brands:

Corning's "Pyrex" & "Vycor" Ware  
 "Baker's Analyzed"  
 Kimble's "Exax" and "Normax"  
 Spencer Optical Instruments  
 Coors Porcelain  
 Cenco Scientific Apparatus

*Your needs are our responsibility!*

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