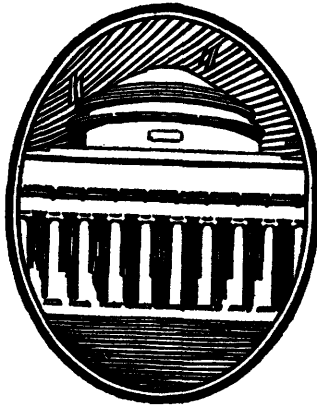


BULLETIN, MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

PRESIDENT'S REPORT  
ISSUE

VOLUME 65

NUMBER 3



OCTOBER, 1929

Published by  
Massachusetts Institute of Technology  
Cambridge, Massachusetts

Published by the Massachusetts Institute of Technology, Cambridge Station,  
Boston, Massachusetts, in October, November, February, March, April and May.

Entered December 3, 1904, at the Post Office, Boston, Mass., as second-class  
matter, under Act of Congress of July 16, 1894.

MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

President's Report

FOR THE YEAR 1928-1929



THE TECHNOLOGY PRESS  
CAMBRIDGE, MASSACHUSETTS  
1929



## TABLE OF CONTENTS

THE CORPORATION	PAGE
Members of the Corporation . . . . .	5
Committees of the Corporation . . . . .	6
REPORT OF THE PRESIDENT . . . . .	9
THE DEAN OF UNDERGRADUATE STUDENTS . . . . .	68
THE DEAN OF GRADUATE STUDENTS . . . . .	72
THE LIBRARIAN . . . . .	76
THE REGISTRAR . . . . .	82
THE TREASURER . . . . .	89



# MEMBERS OF THE CORPORATION

1929-1930

## President

SAMUEL WESLEY STRATTON

## Secretary<sup>1</sup>

WALTER HUMPHREYS

## Treasurer

EVERETT MORSS

## Assistant Treasurer

HENRY ADAMS MORSS

## Life Members

HOWARD ADAMS CARSON  
FRANCIS HENRY WILLIAMS  
SAMUEL MORSE FELTON  
GEORGE WIGGLESWORTH  
JOHN RIPLEY FREEMAN  
ABBOTT LAWRENCE LOWELL  
ELIHU THOMSON  
FREDERICK PERRY FISH  
CHARLES AUGUSTUS STONE  
FRANCIS RUSSELL HART  
COLEMAN DU PONT  
EVERETT MORSS  
WILLIAM ENDICOTT  
WILLIAM CAMERON FORBES  
ALBERT FARWELL BEMIS  
EDWIN SIBLEY WEBSTER  
PIERRE SAMUEL DU PONT

FRANK ARTHUR VANDERLIP  
OTTO HERMANN KAHN  
CHARLES HAYDEN  
CHARLES THOMAS MAIN  
GEORGE EASTMAN  
HARRY JOHAN CARLSON  
GERARD SWOPE  
ARTHUR DEHON LITTLE  
FRANKLIN WARREN HOBBS  
WILLIAM HOWARD BOVEY  
WILLIAM ROBERT KALES  
JOSEPH WRIGHT POWELL  
HENRY ADAMS MORSS  
FRANCIS WRIGHT FABYAN  
JOHN EDWARD ALDRED  
FRANK WILLIAM LOVEJOY  
WALTER HUMPHREYS

VICTOR MACOMBER CUTTER

## Term Members

*Term expires June, 1930*

JOHN LAWRENCE MAURAN  
ANDREW GRANVILLE PIERCE  
SALMON WILLOUGHBY WILDER

*Term expires June, 1931*

PAUL WEEKS LITCHFIELD  
JOHN RUSSELL MACOMBER  
ALFRED PRITCHARD SLOAN, JR.

*Term expires June, 1932*

ROGER WARD BABSON  
ELISHA LEE  
WILLIAM ZEBINA RIPLEY

*Term expires June, 1933*

LAMMOT DU PONT  
FRANK BALDWIN JEWETT  
WILLIAM EMERY NICKERSON

*Term expires June, 1934*

ALEXANDER MACOMBER  
CALVIN WINDSOR RICE  
MAURICE ROOSE SCHARFF

## Representatives of the Commonwealth

HIS EXCELLENCY, FRANK GILMAN ALLEN, *Governor*  
HON. ARTHUR PRENTICE RUGG, *Chief Justice of the Supreme Court*  
DR. PAYSON SMITH, *Commissioner of Education*

<sup>1</sup>Address correspondence to Massachusetts Institute of Technology.

## COMMITTEES OF THE CORPORATION FOR 1929-1930

### *Executive Committee*

PRESIDENT }  
TREASURER } EX OFFICIIS

EDWIN S. WEBSTER  
GERARD SWOPE

FRANCIS R. HART  
ELIHU THOMSON  
CHARLES T. MAIN

### *Committee on Finance*

FRANCIS R. HART  
GEORGE WIGGLESWORTH  
WILLIAM ENDICOTT

EDWIN S. WEBSTER  
FRANCIS W. FABYAN  
THE TREASURER, EX OFFICIO

### *Auditing Committee*

JOHN R. MACOMBER

FRANKLIN W. HOBBS  
JOSEPH W. POWELL

### *Committee on Membership*

SALMON W. WILDER  
GEORGE WIGGLESWORTH

FREDERICK P. FISH  
CHARLES A. STONE  
FRANCIS W. FABYAN

### *Committee on Nautical Museum*

FRANCIS R. HART

JOSEPH W. POWELL  
HENRY A. MORSS

## VISITING COMMITTEES

### *Department of Civil and Sanitary Engineering*

JOHN R. FREEMAN  
HOWARD A. CARSON

SAMUEL M. FELTON  
ELISHA LEE  
LAMMOT DUPONT

### *Department of Mechanical Engineering*

ALFRED P. SLOAN, JR.  
WILLIAM R. KALES

ANDREW G. PIERCE  
CALVIN W. RICE

### *Departments of Mining and Metallurgy and Geology*

CHARLES HAYDEN  
CHARLES A. STONE

COLEMAN DUPONT  
ALEXANDER MACOMBER



## VISITING COMMITTEES

7

### *Department of Architecture*

JOHN L. MAURAN	OTTO H. KAHN
A. LAWRENCE LOWELL	HARRY J. CARLSON

### *Department of Physics*

FRANK B. JEWETT	FRANK A. VANDERLIP
PIERRE S. DUPONT	MAURICE R. SCHARFF

### *Department of Electrical Engineering*

JOHN E. ALDRED	MAURICE R. SCHARFF
WILLIAM H. BOVEY	ALEXANDER MACOMBER

### *Department of Hygiene*

HARRY J. CARLSON	WALTER HUMPHREYS
	WILLIAM E. NICKERSON

### *Department of Economics and Statistics* (Including the course in Engineering Administration)

FRANCIS W. FABYAN	WILLIAM Z. RIPLEY
JOHN R. MACOMBER	ROGER W. BABSON
	MAURICE R. SCHARFF

### *Departments of German, Romance Languages and English*

W. CAMERON FORBES	OTTO H. KAHN
	FRANCIS W. FABYAN

### *Department of Mathematics*

WILLIAM R. KALES	WILLIAM Z. RIPLEY
	ROGER W. BABSON

### *Departments of Chemistry and Chemical Engineering*

LAMMOT DUPONT	FRANK W. LOVEJOY
ARTHUR D. LITTLE	SALMON W. WILDER

### *Department of Biology and Public Health*

WILLIAM H. BOVEY	W. CAMERON FORBES
FRANCIS H. WILLIAMS	PAYSON SMITH

### *Department of Naval Architecture and Marine Engineering*

JOSEPH W. POWELL	A. FARWELL BEMIS
CHARLES A. STONE	HENRY A. MORSS

### *Department of Military Science and Tactics*

SAMUEL M. FELTON	JOSEPH W. POWELL
	WALTER HUMPHREYS

*Aeronautical Engineering*

PAUL W. LITCHFIELD

HENRY A. MORSS

FRANK W. LOVEJOY

*Division of Industrial Coöperation and Research*

A. FARWELL BEMIS

SALMON W. WILDER

PAUL W. LITCHFIELD

*Textiles*

ANDREW G. PIERCE

FRANKLIN W. HOBBS

ARTHUR D. LITTLE

WALTER HUMPHREYS

*Humanics*

WILLIAM E. NICKERSON

ARTHUR D. LITTLE

PAYSON SMITH

## REPORT OF THE PRESIDENT

TO THE MEMBERS OF THE CORPORATION:

In accordance with the by-laws of the Corporation I have the honor to submit to you a report for the past year, covering changes in personnel, the more important points of progress in the work of the various departments, and reports of other administrative officers with reference to the work of their offices.

Instructors in the fields of technical education generally recognize the importance of sound training in the branches of mathematics and science fundamental to all technical courses. That they have too often failed in bringing about a satisfactory adjustment between the basic and applied subjects both as to quality and quantity must be admitted.

Instructors in these basic subjects are of course responsible for the quality of instruction given, but the quantity or extent to which they are required in technical courses should be decided by educators and successful men in technical fields, with reference to the individual's future and not solely by his immediate interests.

Naturally, the graduate is anxious to step as quickly as possible into his profession and those who make use of his services too often expect immediate results. The rapid growth of industry and its increasing dependence upon men trained in the fields of technology and science have not improved this condition, but accentuated it, except in the case of some of the larger corporations which have taken a broader view and a direct interest in technical education.

The Institute is not unmindful as to these conditions, and progress has been made toward increasing the amount and improving the quality of the mathematics and science considered as fundamental to technical subjects. There is a much greater appreciation of the importance of these fundamental subjects on the part of our leaders in technical instruction than formerly as shown by their increasing willingness to concede adequate time in the curricula for them.

The coöperative courses which are being very successfully carried on in Electrical Engineering, Communications, Chemical Engineering, Fuel and Gas Engineering, and Railroad Operation afford an opportunity for contact with actual practice without the sacrifice of the time necessary for the basic subjects in mathematics and science. For men of the professional type the addition of a fifth year to the curricula affords an opportunity for both theoretical and practical technical subjects not at the expense of the fundamentals as shown by the increasing number of candidates each year for the Master's degree.

In view of the rapid advances being made in scientific knowledge, the promptness with which new discoveries are utilized, and the unquestionable value of the study of science in the development of the faculties of observation and clear thinking, it is perfectly evident that the time devoted to mathematics and science in the technical curricula must be most efficiently utilized, that is, the quality of the instruction should be of the very best.

Again, there are certain subjects in applied mathematics and science such as theoretical mechanics, thermodynamics and others common to most of the technical courses, which must be considered as fundamental and be as rigorously dealt with as mathematics or science. It is true that the Institute may have suffered by too strict an adherence to its established practice, or the willingness of one department to adjust its courses to meet the requirements of another, or perhaps more often from a desire to satisfy the immediate needs of those utilizing its graduates. The Institute is probably no more delinquent in these matters than any other school, but its goal should always be to lead in science and technical education. To this end the Instructing Staff is coöperating in the study of such questions, including methods of instruction.

Two years ago the Faculty authorized the tentative adoption of an honor system by the Electrical Engineering Department, in which exceptional students may be excused from attendance in certain professional courses, but are required to pass the examinations. In each case, some member of the staff is assigned for consultation with the student as to additional or more advanced work. In this manner, the exceptional student is limited only by his ability. The experiment is considered a

success by the Department. A somewhat modified plan is being tried in Civil Engineering and all departments are watching the results with interest. The system will be discussed fully by the Faculty the coming year with a view to adopting it in all courses.

An effort is being made in all departments to inspire in students the spirit of creative work. The thesis when seriously undertaken affords a splendid opportunity to do original work and much of the advanced technical instruction can be made far more effective by the encouragement of original thinking in the solution of problems. The exceptional man can often be developed into a most valuable investigator — a much sought for individual in every field of science or technology. However, the thesis is too often a mere task undertaken because required; in such cases its omission would probably be desirable.

The Aldred Lectures afford an opportunity for students to meet and hear successful men — a great inspiration to those preparing to follow in the same professions. During the year the Institute has been favored by a series of lectures by eminently successful men.

The Course in Humanics provided for by Mr. Nickerson and so ably conducted by Colonel Gow will be taken as a prototype for courses in technical curricula here and elsewhere, for the purpose of preparing men to better understand the human relations met with in industry and in the practice of an engineering profession.

The Institute has an excellent department and staff of instructors in English, who are keenly interested in providing instruction in the branches considered essential in the preparation for professional careers. Those who prescribe the composition of technical courses recognize more than ever the necessity of English as an important factor; technical students rarely ever question the value of training in this branch.

The subjects given as General Studies are being carefully considered especially as to their cultural value, a factor which is also recognized more than ever by the students as well as instructors.

The Institute is taking an active interest in students who transfer from other institutions, and in aiding younger men who contemplate a technical career, to better understand the nature

of such courses. The individual's natural fitness for technical or scientific work should be the deciding factor in making a choice.

Students who transfer from other institutions are encouraged to take up the question with the Institute sufficiently far in advance to enable them to include in their studies subjects prerequisite for technical courses. In many cases, students who transfer to the Institute have elected to take up some general college work before entering upon a professional course. Others develop a desire for this field of work while in college.

The Institute through the newly organized Admissions Office is establishing very cordial relations with colleges which do not offer technical courses and especially those not providing graduate work. Often institutions giving technical courses do not include some of those found at the Institute, as for example, Naval Architecture, Automotive Engineering or Engineering Administration. It is for these reasons that the Institute offers its assistance to other institutions. That it is appreciated by them there can be no doubt whatever.

The problem of acquainting young men contemplating college as to the nature of the engineering and scientific professions, is approached through preparatory schools by providing them with lectures and literature on the subject when requested.

The annual Open House with its attendance of over twelve thousand, while intended to acquaint the people generally with the work of the Institute, is an inspiration to great numbers of young men and boys of the vicinity, some of whom will become the famous scientists and engineers of the future.

The series of Society of Arts lectures is another of the Institute's activities for the same purpose. Each lecturer is selected for his ability in demonstrating and explaining the fundamental phenomena of some important subject in science. So great is the interest in these lectures that it has been necessary to give each three times, Friday, Saturday and Sunday afternoons. Students of the high and preparatory schools are first provided for, and the Sunday lecture is given largely for parents and the public.

The Summer Session has become something more than a provision for students to make up deficiencies. Only 16 per cent of the subjects taken were repetitions. The work taken

was largely to secure advanced standing in subjects required for a degree, thereby freeing time in the regular semesters for additional subjects, often in other departments than their own.

The Summer Session affords an opportunity for teachers to keep abreast with work in their own fields — for graduate work by instructors in other colleges during vacation, and is a center for scientists and engineers in the discussion of important theories or problems. An example of the latter may be cited in the Colloquium sponsored by the Electrical Engineering Department during the past summer, on power circuit analysis and transmission line stability, at which 58 men were in attendance representing operating companies, manufacturers, and educational institutions, including two Canadian educational institutions, three Canadian Power Development Companies, and the Hydro-electric Power Commission of Ontario. The total attendance at the Summer Session was 1,687, exceeding that of the previous year by 273.

The Summer Camps provide for important instruction in connection with the departments operating them. The Surveying Camp at East Machias, Maine, had an attendance of 73 as compared with 65 last year. The class in Mining Surveying at the Mining Camp at Dover, N. J., had nearly twice the number of students as in the previous year.

The placement work of the Division of Industrial Coöperation and Research has been very successfully carried on by Colonel Locke, in coöperation with the various departments. Employers of technical graduates are making their selections of men with great care, giving attention not only to scholastic records but to character and extra-curricula activities. It is interesting to note that the members of the Class of 1929 had an average of nearly three opportunities for employment per man, also that quite a large number of graduates of previous years were placed in more advantageous positions.

The demand for men who have had some engineering or business experience and those who have shown an ability for scientific research has been unusually great. A large number of the latter were called for in the field of modern metallurgy alone. The demand is even greater for physicists and chemists. These results show conclusively that the Institute is moving in the right direction by the development of a graduate school for the

exceptional student who by nature and ability is fitted for creative work.

Graduate courses are given in all the scientific and technical departments and during the year 412 graduate students were registered. Both graduate students and many members of the Instructing Staff are engaged in original investigation. Men are taught the methods of research by doing it under the direction of experienced leaders, for it is difficult for men to inspire students or to direct creative work who are not experienced in its methods. It is for the best interests of the individual, the Institute, and his profession, for an instructor to participate in the production of the data or methods upon which advances in his profession depend. Even the improvement of the methods of teaching afford ample opportunity for creative work.

As a few examples of the many important researches in progress at the Institute, the following are noted, which are described in more detail by the departments concerned.

In the Department of Civil Engineering an investigation is in progress to determine the fundamental data necessary in the construction of retaining walls and dams, another to learn the characteristics of soil necessary in designing the foundation of structures.

In the Department of Mechanical Engineering, a research is in progress to determine the properties of the various kinds of gearing in order that they may be improved in design and be better adapted to the many purposes for which they are now used, also investigations in connection with internal combustion engines, refrigeration, and structural materials.

An important investigation taken up by the Electrical Engineering Department at the request of the National Electric Light Association, consists of the determination of the thermal conductivity of electrical insulation materials and the effect of heat on their properties, another example of the kind of research that is worth while from the point of view of the best interests of the man, the Institute and the profession.

The Department of Engineering Administration has conducted three researches during the summer.

The first was a study of the applicability of minimum cost formulae in the automotive industry, in which the General Motors Corporation and other automobile manufacturers have



coöperated. The results will be presented in papers before the American Society of Mechanical Engineers, and the Society of Automotive Engineers. The second was an extensive field test of the feasibility of summer study by undergraduates, of management procedure in industrial plants. Sixteen junior students in Engineering Administration were given supervised employment in ten New England concerns. Significant conclusions have been reached. The third was an investigation of the administrative policies and methods of a group of ten progressive building contractors in Boston and New York. The investigation has secured much valuable information for use in the subject of contracting management given to junior students in Building Construction.

In the Departments of Physics, Chemistry and Biology, many important researches are in progress, but what is more significant is the fact that these departments are realizing more and more that when selecting problems for solution, they should be of the type the object of which is to secure fundamental facts in the fields of science, or fundamental scientific data which will promote the interests of a specific industry as a whole.

It is interesting to note that quite a number of these researches of the pure science type were taken up at the request of and in coöperation with engineering and technical societies, as for example: The determination, by the Chemistry Department, of the constants needed in extending the steam tables to include the very high pressures and temperature used in designing modern steam plants. This is an investigation of the highest scientific type undertaken at the request of the American Society of Mechanical Engineers.

During the year, the Institute has been favored with lectures of great educational value by a number of prominent men, both foreign and American, which have been inspiring indeed to both instructors and students.

A few of the more promising young men on the Instructing Staff have been sent abroad for advanced study under prominent specialists in their own fields. Several of the most brilliant graduates each year have been given scholarships for study abroad, all for the purpose of strengthening and broadening the Instructing Staff. The results have been very successful.

The difficulty of maintaining a technical and scientific staff in these times of great industrial expansion is, perhaps, the most serious problem with which the Institute has to contend. Adequate salaries for competent men and proper facilities for creative work help in holding good men, but it is very difficult indeed to compete with the very great demand for scientific men and the high salaries that industry can pay. Much might be said as to the necessity for industrial interests to guard very carefully the sources of supply of scientific men.

The Institute's Pension Association Plan went into operation on October 1, 1926. At that time there were two hundred and fifty participating members. On October 1, 1929, there are approximately three hundred members. Thus far the plan is operating successfully. The establishment of this Pension and Insurance Fund is an important step toward making a position on our Instructing Staff more attractive.

The Richard M. Homberg Memorial Infirmary has proven of the greatest importance as to student welfare. It is well managed and very much appreciated by both students and faculty. The record of its activities during the year gives some very interesting information. Other steps that should be taken in the direction of student welfare are the completion of the Alumni Dormitory quadrangle and the construction of a gymnasium. We have been obliged to refuse dormitory accommodation to as many as have been accommodated, which is four hundred twenty-five. The gymnasium facilities are entirely inadequate, especially since the time for outdoor exercise is limited in this latitude. A suitable auditorium is urgently needed for many purposes, especially student convocations.

Attention has been called before to the urgent need for building up the staff and facilities for advanced work in science, a laboratory for graduate work in physics and chemistry, and another for biology. The plan of the present buildings did not provide space for graduate work. As a result, both physics and chemistry have encroached upon the space needed for chemical engineering, metallurgy and electrical engineering.

An endowment fund for graduate work in science will also be necessary as tuition does not provide sufficient funds to cover maintenance and equipment. More laboratory space is needed to provide for work involving heavy equipment, high

pressures and other dangerous conditions, also to displace the unsightly and unsuitable temporary buildings which have served a very useful purpose, but which are now entirely inadequate.

Designs for the model Towing Tank and the River Flow Laboratory are in progress. The necessity for the first in connection with the building up of our Merchant Marine, the second in power development, flood control and the improvement of waterways is apparent. A few problems of the latter type are being taken up in temporary quarters. The construction of these laboratories has been urgent for the past five years or more.

The improvement of the Great Court, the subsequent addition of grassed areas at the east and west of the Main Building, the construction of paths and roads have added much to the dignity and usefulness of the Institute's plant. Buildings are more accessible, automobiles are more neatly parked, the dust, which has been a great nuisance in laboratory work, has been abated to a large extent. The great improvement in appearance is evident.

The offices of the Dean of Graduate Students, the Dean of Undergraduate Students, Bursar, Registrar, Admissions Officer and the Superintendent of Buildings and Power, have functioned admirably during the year. The work of these offices has been well coördinated and it would be difficult to find a more efficient or enthusiastic group than the men in charge of them.

The Institute Committee has coöperated with the Faculty in a way that places student government at the Institute in a class by itself and is an indication of the fine relation that exists between students, faculty and administration officers.

The Corporation suffered a great loss in the death on February 2, 1929, of James Phinney Munroe, a Life Member and for twenty years the Secretary of the Corporation.

The Corporation elected Mr. Walter Humphreys and Mr. Victor M. Cutter as Life Members.

The term for which Messrs. George L. Gilmore, Morris Knowles and Redfield Proctor were elected expired in June, and the Corporation elected Messrs. Alexander Macomber, Calvin W. Rice and Maurice R. Scharff to serve as term members.

During the year the Faculty has lost through death the

following: Peter Schwamb, Retired Professor of Mechanical Engineering, who died on November 3, 1928; Thomas Eliot Pope, Retired Professor of Chemistry, died on October 29, 1928; Martin J. Shugrue, Professor of Political Economy, died on April 4, 1929; William A. Bassett, Professor of Municipal and Industrial Research, died on May 16, 1929.

Other losses in the Faculty have been occasioned by the retirement of Professors Dana P. Bartlett and William S. Franklin. The following members of the Faculty have resigned since the last report: Professors Charles Terzaghi and R. G. Tyler; Associate Professors Joseph W. Barker, C. H. Chatfield, W. E. Freeland, Edward Mueller and J. T. Ward; Assistant Professor A. S. Jenney. Professor E. P. Warner resigned as Professor of Aeronautical Engineering in charge of the course, but has accepted an appointment as non-resident Professor.

H. E. Lobdell has been appointed Dean of Undergraduate Students.

Additions to the Faculty have been made as follows: O. C. Koppen, Associate Professor of Aeronautical Engineering; Richard H. Smith, Associate Professor of Aeronautical Engineering; W. P. Fiske, Assistant Professor of Accounting; R. A. Wilkins, Assistant Professor of Chemical Engineering; Capt. George S. Eyster, Capt. V. W. Hall and Capt. C. M. Kellogg, Assistant Professors of Military Science and Tactics.

The following Associate Professors have been advanced to the grade of Professor: L. B. Chapman, Col. R. C. Eddy, F. L. Hitchcock, R. G. Hudson, W. V. Lyon, E. B. Millard, W. P. Ryan, E. H. Schell, H. L. Seaver, G. W. Swett, and C. F. Taylor.

The following Assistant Professors have been advanced to the grade of Associate Professor: J. A. Beattie, K. D. Fernstrom, H. O. Forrest, P. K. Frolich, V. O. Homerberg, M. P. Horwood, F. K. Morris, J. S. Newell, Shatswell Ober, Winward Prescott, George Rutledge, Norbert Wiener.

The following have been made Assistant Professors: M. J. Buerger, J. L. Entwistle, M. F. Gardner, Glennon Gilboy, E. A. Guillemin, Louis Harris, E. H. Huntress, F. H. Norton, K. C. Reynolds, L. H. Rice, D. C. Sayre, F. W. Sears, G. V. Slottman, L. B. Smith, E. S. Taylor, A. L. Townsend, H. W. Underwood, Jr., H. C. Willett and J. H. Zimmerman.

Professor W. K. Lewis has been relieved, at his request, of the headship of the Department of Chemical Engineering and Professor W. P. Ryan has been appointed to that position.

The following statement regarding the activities of the various departments during the year 1928-1929 deals with courses of instruction established or modified, lectures, investigations initiated or completed, and recommendations.

**Civil and Sanitary Engineering.** No changes of importance in the courses given and the methods of instruction have been made during the year. Research work has been actively continued and its scope in the field of soil mechanics extended by the addition of a retaining wall laboratory constructed under an agreement between the Institute and the New England Power Construction Company as described later.

As a result of a coöperative agreement between the New England Power Construction Company and the Institute to conduct experimental investigations of earth pressure on retaining walls, the Institute furnished the land and pile foundations and contributed towards the construction expenses of an experimental plant consisting of a fireproof building equipped with a steel retaining wall having a length of 14 feet and a width in a vertical plane of 7 feet, freely supported on knife edges and closing one side of a concrete bin 14 feet square and 10 feet high. Delicate measuring devices were provided to determine both the vertical and horizontal components of the pressure exerted upon the wall by earth in the bin in both a dry and a saturated condition. This retaining wall laboratory is the first, so far as the writer knows, ever built for determining earth pressure on a scale commensurate with conditions existing in practice, and it is believed that the results of these experiments will prove of great value to the engineering profession by furnishing fundamental data not hitherto available.

Coöperative research work in soil mechanics with the Bureau of Public Roads of the United States Department of Agriculture was continued for the third successive year. One of the most important pieces of work conducted during the year under this agreement was a research upon the influence of frost in causing heaving of soil. This investigation was carried out on

the Institute's land west of Massachusetts Avenue under the direction of Mr. Arthur Casagrande, Dipl. Ing., of the Bureau of Public Roads, who has been stationed here for the last two and one-half years at the Laboratory of Soil Mechanics to represent the Bureau. He was assisted in this work by Mr. George N. Mangurian, a candidate for the degree of Master of Science in Civil Engineering.

A coöperative agreement was made during the year between the Civil and Sanitary Engineering Department and the Sewer Department of the City of Worcester, Massachusetts, for the purpose of giving Institute students who wish to enter the field of sewage treatment and disposal an opportunity to acquire by actual experience, familiarity with the methods of sewage treatment in an important treatment plant. As a result of this agreement, a week's laboratory course was provided, for the first time, in April of this year at the laboratory of the City Sewage Treatment Plant in Worcester, where fourth-year and graduate students in Sanitary Engineering participated in the actual work of this laboratory and the operation of the plant, and also received instruction from Mr. Roy S. Lanphear, Supervising Chemist of the Plant, and from Professor R. G. Tyler, Professor of Sanitary Engineering at the Institute. This plan makes available for purposes of instruction in sanitary engineering at the Institute the resources of a laboratory, within reasonable distance of Cambridge, built and operated in a way no college laboratory can hope to emulate.

A series of nine lectures upon hydraulics with special reference to experimental investigations of stream flow was given at the Institute between March 18 and April 6 by Dr. Ing. Theodor Rehbock, Professor of Hydraulics at the Technische Hochschule at Karlsruhe, Germany, since 1899, and internationally known as an authority upon stream flow and the regulation of rivers and harbors. The new laboratory at Karlsruhe constructed in 1925, replacing the first laboratory established by Professor Rehbock in 1901, is probably the most extensively equipped laboratory for conducting water flow experiments of any laboratory connected with an educational institution.

On February 19 and 20, the third two-day conference for Master Plumbers was held at the Institute under the auspices of the Department. At this conference members of the Insti-

tute staff discussed problems pertaining to the engineering, scientific and educational aspects of the plumbing industry, together with problems associated with materials and construction. These conferences, which have been held annually since their inception, have been well received by the plumbing industry and favorably commented upon by the plumbing technical press all over the country because of the high standard and the generally beneficial character of the lectures and demonstrations. The total registration for these three conferences is 1,124, giving an average of 375 registrations per conference.

Resignations during the year include the following: Richard G. Tyler, Professor of Sanitary Engineering, who became Dean of Engineering at the University of Washington. Professor Tyler graduated from our course in Civil Engineering in 1910, after having previously received the degree of C.E. from the University of Texas. He returned to the Institute in 1923 to take the position from which he has just resigned, after having had fourteen years of combined professional and teaching experience. During the period Professor Tyler was associated with the Department, he initiated the series of Plumbers' Conferences held at the Institute during the last few years, and also an agreement between the Institute and the Massachusetts State Association of Master Plumbers for coöperative research in plumbing. It was also due to his initiative that the agreement between the Department and the Sewer Department of Worcester, Massachusetts, referred to elsewhere in this report, was established.

Dr. Charles Terzaghi leaves to accept the Chair of o. ö. Professor des Wasser- und Grundbaues an der Technischen Hochschule in Wien, his native city. During Dr. Terzaghi's residence at the Institute he initiated courses in Soil Mechanics not previously offered in educational institutions either in this country or abroad, and developed a Laboratory in Soil Mechanics, including much original apparatus for determining various properties of soils. The work established by him will be carried on by Dr. Glennon Gilboy, who has assisted Dr. Terzaghi since he came to the Institute, and by Dr. Leo Jürgenson whose thesis for a Doctor's Degree was conducted in the field of soil mechanics. It is expected that Mr. Arthur Casagrande, Dipl. Ing., a representative of the United States

Bureau of Public Roads in investigations conducted in the Soil Mechanics Laboratory, will continue in that capacity during the coming year.

Kenneth C. Reynolds returned to the Institute in March, after having spent two years in investigations and studies in hydraulic laboratories in Europe as the holder of a Freeman Fellowship of the Boston Society of Civil Engineers, and was appointed Assistant Professor of Hydraulics, and will develop experimental work in the field of modern hydraulics.

The attendance at the eighteenth session of the Surveying Camp at East Machias during the summer of 1929 was considerably larger than in the summer of 1928, the total attendance consisting of 73 students in 1929 as compared with 65 in 1928.

The class in Mining Surveying, held at the Mining Camp at Dover, N. J., was attended by 14 students. The instruction was under the general direction of Mr. W. C. Eberhard, Instructor in the Department of Drawing, assisted by Mr. F. Leroy Foster, Instructor in the Mining Department.

The Summer Camp Loan Fund, which was established in 1927 by Lammot duPont, was increased during the year by another gift from Mr. DuPont to an amount which it is hoped will be sufficient to make further increases unnecessary.

**Mechanical Engineering.** The demand for graduates in Mechanical Engineering has increased steadily. For a number of years all the seniors have been placed before the spring vacation; this year, however, candidates for the Master's and the Bachelor's degrees were placed by the first of March, and there was a demand for more than the Department could supply.

Many of the larger concerns ask the Department to select from the junior class men specially qualified for their work and to arrange for a preliminary interview with these men early in the fall. A large part of the class had accepted positions through offers made at such interviews before the end of the first term of the senior year.

During the past year there has been an unusual call for alumni four to five years out. It is rather interesting to note that the demand for expert machine designers and for superintendents of production were the most numerous. Men for



these positions paying excellent salaries were found through the help of the personnel office.

At the suggestion of the President, Professor Haven has been relieved of all undergraduate work that he may devote all of his time with the exception of that required for graduate work in Machine Design, to Textile Research, especially Textile Machinery.

Professor Schwarz, who in the past has assisted Professor Haven in Textiles, will also devote his time to instruction and research along Textile lines.

The undergraduate work in Machine Design is now in charge of Professor Swett, assisted by Professors Thomas Smith, Townsend and Dole. Under the guidance of these able designers the work in Machine Design will be maintained at the high level to which it was brought by Professor Haven.

The instruction in Heat Treatment of Metals and the Heat Treatment Laboratory developed by the Mechanical Engineering Department to meet the needs of engineering students has been transferred to the section of Physical Metallurgy of the Mining Department.

Space has been assigned to the Mechanical Engineering Department to be used as a Research Laboratory for the testing of materials. A 60,000-pound Riehle Universal Testing Machine with fairly complete equipment has been installed and is to be used during the coming year on research. A standard Izod Impact Testing Machine has also been installed in this space for the same purpose.

A 400,000-pound two-screw Riehle Testing Machine installed as new equipment when the Institute moved to its present site, has been unsatisfactory for a number of years due to torsion and vibration in the screws. This machine is being replaced by a three-screw machine of the same make and capacity which will be ready for use at the opening of the fall term.

Several new pieces of apparatus of the latest types have been added to the Concrete Laboratory for use in the testing of concrete for roads.

The Testing Materials Laboratory has added a number of precision instruments to meet the needs of graduate students engaged in work requiring accurate measurements on complicated pieces under stress. The laboratory now has an Amsler

box for testing the accuracy of testing machines and is about to secure another type of standardizing equipment especially adapted for the testing of the accuracy of smaller machines.

As it has been very difficult to work continuously in a room of the high temperature and high humidity which has been maintained constantly in the Textile Laboratory, an office and conference room has been provided.

Special advanced work which has been offered in textiles has attracted quite a large number of men, a special course offered in the Summer Session having an enrollment of fourteen students, several of whom were candidates for the Master's degree. A professor from Kyoto College in Japan took special work on physical testing of textiles, covering both the physical and microscopical study of Japanese silks. Several professors from textile schools in the North and South, a consulting textile engineer, and a number who are directly connected with the manufacturing side of the industry attended the course. Apparatus for optical and microscopical study of textiles, a line hitherto somewhat neglected in this country, has been installed, and a number of intensive investigations are now being carried on. A ball burst attachment for the fabric testing machine has been secured which will enable us to make strength tests upon knit goods.

During the past year Assistant Professor Schwarz has written a number of articles for the Textile journals which have attracted a great deal of interest and which no doubt have been largely responsible for the Summer Session enrollment mentioned above.

All of the automotive equipment with attached dynamometers loaned by the Ordnance Department of the Army, together with most of the equipment now located in the special Gas Laboratory adjacent to the Power House, are to be installed in the new building before the coming academic year.

The Aero Engine Laboratory of the Aeronautics Department, which has been housed in the east end of the Refrigeration Laboratory, has been transferred to the new Gas Laboratory, and the space released has been turned over to this Department for experimental work on dehumidification and air-conditioning. Up to the present time the Institute has had no apparatus or facilities for making studies along these lines. In the near

future it is probable that the better class residences will be equipped with apparatus for cooling and dehumidification, hence it is important that we have such equipment available for experimental use.

As has been customary each year, a few of the older type machines have been replaced with modern ones. In most cases the change has been made by the manufacturer without expense to the Institute. There are, however, remaining, thirty old machines — lathes, planers, and milling machines — some of which have been in use for more than forty years. These old tools should gradually be replaced at the rate of about ten per year. Each year a number of the present machine tools are motorized, so that ultimately it is planned to replace all of the belt-driven equipment. A swage machine capable of taking diameters up to three-quarters of an inch was added to the equipment during the year. This particular tool was purchased in order to carry out an investigation on the possibility of making cartridge cases of thirty calibre and fifty calibre size out of rustless iron and to place them on a production basis, the number of operations being reduced from thirty-five now required, to about seven, and at the same time to increase production tenfold.

In connection with the instruction in Machine Tool work the subject of welding is covered quite fully — the Machine Tool Laboratory having a fairly complete equipment of welding machines.

For some years Professor R. H. Smith has given a graduate course of forty-five hours on Production Methods and an undergraduate course of fifteen lectures on the same subject. The Department has been fortunate in securing as lecturers in this line experts whose names are given below:

Mr. R. W. Cook, of the Wallace Barnes Company, Bristol, Conn., on the Manufacture of Springs.

Mr. G. A. Pennock, of the Western Electric Company, Chicago, Ill. General Production.

Mr. Clifford L. Muzzey, of the General Electric Company, Lynn, Mass. General Production.

Mr. J. H. Skelton, of the Brown & Sharpe Mfg. Co., Providence, R. I. Automatic Machinery.

Mr. H. L. Van Keuren, of the Van Keuren Company, Watertown, Mass. Measuring with Light Waves.

For a number of years the courses in Thermodynamics given to the juniors has varied in length and subject matter, the schedule of one department being different from that of another. In the future these courses are to be placed on a uniform schedule as far as possible.

The Department has received gifts of apparatus and equipment with the following estimated values: to the Refrigeration Laboratory, \$2,000; to the Machine Tool Laboratory, \$5,000; and to the Automotive Laboratory, \$2,000.

The following investigations were carried on and are worthy of special mention:

Tests to Determine the Strains in Locomotive Parallel Rods.

Corrosion Fatigue in Steel of Different Kinds.

New Methods for Determining Hardness.

Stresses in Reinforced Concrete.

Methods of Testing Bricks.

Investigation of Physical Properties of Special Timber.

Efficiency of Welded Joints.

The Problem of Fuel Combustion in the Gasoline Internal Combustion Engine.

**Mining and Metallurgy.** Of chief concern to the members of the staff in the Department of Mining and Metallurgy has been the falling off in registration of students during the years 1921 to 1928. This year there seems to be indication of a change and confirmation of our earlier ideas that the decline in numbers was not alone coincident with the post-war depression in mineral products, but was the direct result thereof. The recent widespread revival in iron, steel and copper, together with the advance in stock-market prices of the shares of these industries has brought profits to many, has attracted general attention and most effectively advertised the opportunities for achievement and success in the fields of mining and metallurgy.

Freshmen at their first registration are asked to indicate the course of study they expect to take, but such election is not at all binding and the real decision is made by the student at the beginning of his second year. For the first time in recent years the registration of the second year classes in mining and metal-

lurgy runs ahead of their registration as freshmen a year ago as twenty is to ten. This means that twenty students in the class, which will graduate in 1932, have chosen mining and metallurgy where only ten had indicated their intention of taking that course at the beginning of the freshman year. Last year the relation of numbers were as nine to ten and the year before as six to eight. The increase affects the mining options and the metallurgy options in about the same degree, and marks a gratifying change of trend. Although there continues to be an unflinching demand for our graduates in all divisions, this demand is more insistent in the field of physical metallurgy to which, as yet, few students are coming, probably because of insufficient knowledge of this new branch of applied science.

The laboratory for heat treatment of metals and the instruction in that important branch of physical metallurgy has been transferred to the Department, and Mr. Zavarine, Instructor in heat treatment, has been added to the staff. The laboratories of physical metallurgy have been moved to the Mining and Metallurgy building where they occupy a suite of rooms on the fourth floor, which were designed especially for physical metallurgy when the building was erected.

Accessions of new equipment during the year for instruction and research in geophysics have been as follows: (1) "megger" ground resistance tester; (2) complete apparatus as designed by the Carnegie Institute for determining ground resistance; both of the foregoing being found effective for determining depth to ground-water level, bedrock or intervening strata; (3) instruments for electrical prospecting for mineral deposits by the "self-potential" method; and (4) complete set of "Radiore" equipment for electrical survey by high frequency inductive methods, the last being a loan by the Radiore Company of Canada, Ltd.

The laboratories of physical metallurgy have added three new microscopes, two pyrometer controls with panels, a Warner-Swasey polishing machine and an automatic high speed saw for the preparation of specimens. The laboratory of ore dressing is enriched by the addition of a Sutton, Steele & Steele dry concentrating table with extra decks.

Lectures by engineers and metallurgists engaged in industry were given during the year as usual, and the following, in

addition to some mentioned in previous reports, appeared before the students.

Charles S. Hurter, '98, Technical representative of the du Pont Company, spoke on the use of explosives in mining.

T. F. Coyle, '25, with United Chromium, Inc., dealt with the subject of chromium plating.

G. E. Oldright, Metallurgical Engineer of the United States Bureau of Mines, spoke on the work of the Bureau and the opportunities for young men in the organization. In addition, he held individual conferences with all students engaged on research problems.

Plant visits, conducted by members of the staff, were made by students in metallurgy to a number of industrial plants as follows: (1) Mystic Iron Works, Everett; a modern blast furnace plant, working mostly on imported ores and using excess coke produced at the neighboring plant of the New England Coal and Coke Company, and producing pig iron mostly of foundry grade; (2) Hunt Spiller Manufacturing Corporation, South Boston, makers of iron castings of special quality using air melting furnaces fired with pulverized coal; (3) General Electric Company, Everett, operating an iron foundry with cupola melting and a steel foundry with acid open-hearth melting; (4) American Steel and Wire Company, Worcester, exhibiting acid and basic open-hearth practice, blooming mill operation, merchant and rod-mill practice, drawing of wire and the production of both steel and copper cables; (5) Trimont Manufacturing Company, Roxbury; showing drop forging practice followed by the various steps in the manufacture of steel wrenches, including heat treatment of the steel parts.

These plant visits have become an essential part of the instruction in metallurgy.

Research activities of members of the staff and students are noted as follows:

Professor Waterhouse is engaged in research on alloy steel rails with particular attention to steels containing chromium and zirconium. The rails are being subjected to service tests in the track, and about one and one-half miles have been laid on a seven-degree curve, with eleven different kinds of rails placed both on the high and low side of the curve. These rails include both ordinary and heat treated examples of varying composi-

tions. Professor Waterhouse has recently become Chairman and Director of Research on the iron alloys committee of Engineering Foundation.

Professor Williams and associates have been engaged in research in the heat treatment of special bronzes; the properties of acid resisting bronzes; a new type of lead-base bearing metal; aluminum soldering as affected by steam corrosion and the investigation of a defective bridge bearing.

Professor C. R. Hayward has brought out a new textbook entitled "Outline of Metallurgy"; a departure from the ordinary run of metallurgy texts in method of presentation, which promises to win the approval of the beginner and afford a useful guide to the man in practice. Professor Hayward has just completed a research extending over a number of years which has resulted in the invention of a new process for the recovery of lead from battery plates, an operation hitherto most wastefully conducted.

Professor Homerberg and associates have made extended researches on various phases of nitriding, investigations of heat resisting steels and studies of austenitic heat resisting alloys.

Research investigations illustrative of the work of the Department done by students in coöperation with members of the staff are noted as follows:

The Case Hardening of Special Steels with Ammonia.

Case Hardening with Nitrogen through the Medium of a Solid Material.

The Wearing Properties of Nitrided Nitralloy Against Various Alloys.

Study of the Ballistic Properties of Light Armor Plate.

Microscopic Examination of Porcelain Enameled Iron and Steel Sheets.

Heat Treatment, Microstructure and Physical Properties of Special Bronzes.

The Mechanism of Graphitization of White Cast Iron.

The Relation between Temperature of Ageing and Resistance to Corrosion of Duralumin.

Determination of Sub-Surface Conditions by Earth Resistivity Measurements. (Applications of Geophysics in Mining.)

Activities of members of the staff in the technical societies are illustrated by the following items:

Professor Williams lectured before the New England Indus-

trial Electric Heating Conference and before the American Foundryman's Association.

Professor Homerberg lectured before the American Society for Steel Treating at Providence, Boston, Hartford, Milwaukee, Chicago, Schenectady and Rockford (Ill.). His paper on Nitriding presented at the Metals Convention at Cleveland in September, 1929 will be published serially in the *Journal of the American Society for Steel Treating*.

This year has been one of unusual activity in travel by members of the Departmental Staff.

Professor Locke, on leave of absence, has spent five weeks in visits to mines and ore dressing plants in the Northwest; following these he is attending the Regional Meeting of the American Institute of Mining and Metallurgical Engineers at San Francisco early in October, sailing thence to attend the World Engineering Congress at Tokio, Japan.

Professor Hayward made a long trip through the West, visiting metallurgical plants engaged in the production of non-ferrous metals and brought back important information concerning current practice.

Professor Mann spent the summer visiting oil fields in Oklahoma, Central Texas, Gulf Coastal Region of Texas and Louisiana, Northern Louisiana and Arkansas. By the way, he visited older fields in Pennsylvania, West Virginia and Ohio.

Mr. Foster spent the early summer in Canada with the Radiore Company of Canada, Ltd., in field work with the "Radiore" high frequency inductive method of prospecting for metalliferous deposits, thereby extending his experience to a new field of the applications of geophysics to ore finding.

Professor Hutchinson is a member of Engineering Division of the National Research Council representing the American Institute of Mining and Metallurgical Engineers; he is also a member of the Council of Mining and Metallurgical Society of America. With leave of absence from September, 1928 to January, 1929, Professor Hutchinson travelled in Chile and Peru, where he was engaged professionally in the study of deposits of iron, copper and vanadium. He had the fortunate opportunity of visiting the five chief American owned and operated mining enterprises in Chile: the Braden Copper mine; Andes Copper mine at Potrerillos; Chile Copper mine at Chuquicamata; Anglo-



Chilean Nitrate Corporation at Maria Elena, and Bethlehem-Chile Iron Mining Company at Tofo.

The usual sessions were held in 1929 at the Summer Mining Camp at Dover, New Jersey. There was a gratifying increase in registration with fourteen students attending in place of only eight the year before, seven two years ago and six three years ago. The instruction in Mining Practice was facilitated by the generous coöperation of the mining companies operating in the district, particularly the New Jersey Zinc Company, the Thomas Iron Company and the Warren Foundry and Pipe Corporation. In addition to the visits to iron mines and zinc mines, opportunity was found to visit the Picatinny Arsenal and the Ulster Iron Works (manufacturing genuine wrought iron).

**Aeronautical Engineering.** The end of the period covered by this report marks the completion of the first year in the Daniel Guggenheim Aeronautical Laboratory. The facilities of this building and the additional space provided have enabled considerable progress to be made in the laboratory work and in research.

The office and classroom space made available by the new building has made possible a marked improvement, both in the quality and quantity of instruction offered, but even with these additional facilities, the demand for undergraduate instruction in Aeronautical Engineering greatly exceeded the capacity of the instructing staff, and the program for limitation of students, put in force during the previous year, has been continued. On account of the small size of the aircraft industry, we feel that the limitation arrangement should be continued.

Twenty-five Bachelors' degrees and four degrees of Master of Science in Aeronautical Engineering were awarded.

The work of the aerodynamics group continued on a somewhat reduced scale. The laboratory staff consisted of two research associates, and one part-time assistant. In regard to equipment, the 4-foot tunnel continued in operation, used largely for instruction, theses and routine test work. The installation of the 7½-foot tunnel in the Guggenheim Laboratory was completed and its operation resumed. Certain mechanical difficulties arose on the propeller dynamometer, which was overhauled and is ready for test. A new 5-foot tunnel together with

its equipment was designed and built under supervision of the staff. At the close of the year this tunnel was completed except for balance equipment.

The staff devoted a large portion of their time to activities in connection with the installation of the  $7\frac{1}{2}$ -foot tunnel and construction of the 5-foot tunnel. In addition, it was necessary during the second term to take over all undergraduate aeronautical laboratory instruction. This consumed all of the time of the assistant and half that of one of the research associates. Naturally, therefore, the amount of experimental work and research is far less than usual.

Work was resumed on the general problem of the study of propeller and airplane interference, but the trouble with the dynamometer caused delay.

The following important tests were completed during the year: investigation of effect on variations of elasticity in torsion and bending on wing flutter, in cooperation with the Material Division of the Air Corps; further tests on cowlings for air-cooled engine cylinders; wing loading tests on a biplane cellule with different airfoils; design tests for wing selection on a high wing monoplane. In addition, routine tests were made on thirteen airfoils, five airplane models and two seaplane floats.

Interesting theses were written on the interference between engine nacelles and wings, on the effect of yaw and aspect ratio on autorotation (this with some previous work has been published by the N. A. C. A. as Technical Note 319), on a comparison of the friction drag of airship forms with that calculated by the Wieselsberger formula.

A series of lectures on aerodynamics was given during the spring term by Dr. M. D. Riabouchinsky, founder of the Aerodynamic Institute at Koutchino. General talks on practical airplane design were given by Theodore P. Wright, chief engineer of the Curtiss Aeroplane and Motor Company, and by Charles J. McCarthy, chief engineer of the Chance Vought Corporation. A lecture on the use of rigid airships of the Zeppelin type was given by Dr. J. C. Hunsaker, vice-president of the Goodyear-Zeppelin Corporation.

In the field of aeronautical power plants, the year was marked by the completion of a building to house the laboratory equipment for aeronautical power plants, donated through the

generosity of Messrs. H. M. Crane and A. P. Sloan, Jr. This is a one-story building approximately 60 feet by 150 feet, located to the east of the Guggenheim Laboratory. It is of modern concrete and steel construction, and is completely equipped for internal combustion engine work. Provision has been made for bolting down experimental equipment on any part of the floor space, and outlets for fuel, water, and electric current are provided at closely spaced intervals throughout the building. A system for disposing of the exhaust gases from the engines through a suitable chimney is also provided. Practically all of the equipment for research work on internal combustion engines, which heretofore has been scattered among a number of buildings, was moved into this building and installed for operation. This building forms a very welcome addition to the research equipment of the Institute.

In the field of power plant research considerable progress was made on the problem of the heat transfer from finned metal surfaces exposed to a stream of air at high velocity. This work is particularly applicable to the cooling of air-cooled cylinders. Valuable data was also obtained on the effect of variations of valve timing on a supercharged engine. The research on physical characteristics of detonation has been continued, the principal accomplishment being the completion of an electric oscillograph especially suitable for this work.

Theses of special interest in the field of aeronautical power plants were completed on the subjects of a theory of detonation and a comparison of water-cooled and air-cooled cylinder performance. Dr. S. A. Moss of the General Electric Company gave a series of lectures on centrifugal air compressors and on methods of measuring air flow.

In the field of airplane structures some interesting investigations were completed, the most important of which were published in the form of theses on a photoelastic analysis of the effect of cutout webs on a box girder subjected to torsion, and a photoelastic study of the stresses in a perforated monocoque airplane fuselage side panel. Next year the services of Professor J. S. Newell in the field of structures will be available to the Department, and it is anticipated that some valuable work in this field will be accomplished under his direction.

Some interesting work in the field of air transportation was

instituted under the direction of Professor Sayre, including a detailed survey of the effectiveness of the present United States air mail system. Work in this general field is to be expanded considerably during the next year or two.

**Meteorology.** The meteorological work was established in the summer of 1928 under a three-year grant from the Daniel Guggenheim Fund for the Promotion of Aeronautics and was incorporated in the Department of Aeronautical Engineering. Regular instruction began in the fall of 1928.

During the year the meteorological subjects were taken by six officers of the United States Navy, assigned to aerological duty, and by one civilian student.

The course is essentially a graduate one and would generally require two years' work. The government students, having had one year's preparatory work at the Post Graduate School of the Naval Academy at Annapolis, are permitted to take the complete course in one year.

In coöperation with the Physics Department, a complete plan of study has been prepared for students entering the Institute as freshmen and planning eventually to specialize in Meteorology. These students will register in the Physics Department for their undergraduate studies and upon graduation, transfer to the Department of Aeronautical Engineering for one or two years' graduate work in Meteorology.

The instruction in Meteorology has two objects in view; in the first place it aims to familiarize the student with the daily weather maps and the movements of the various air currents to be detected on these maps. This part of the course includes a study of the characteristics of the principal types of American air masses and practice in locating the boundary lines between them. It also includes empirical forecasting of the movements of these air currents. The second aim is to explain to the students, by means of established physical laws, those of the observed weather phenomena which are at present susceptible to theoretical treatment.

The research program includes primarily the application of the Polar Front theory to American weather maps. Daily weather maps are now prepared and analyzed at the Institute and a suitable method of reproduction is being developed, so

that the maps, the first of their kind on this continent, may be distributed to interested organizations. Another important point is the study of fog and problems relating to the moisture content in the atmosphere. A grant from Col. E. H. R. Green made possible the establishment, in the summer 1929, of a small meteorological research station at Round Hill, the Green Estate, for the study of problems of this nature. Work is now under way on the development of accurate methods for humidity measurements.

The work suffers from lack of proper observation material, only partially offset by the fact that available data may as a rule be copied in the United States Weather Bureau office in Washington, D. C.

The more important theses and other studies by students and staff members are published in a series of Professional Notes issued and distributed to interested meteorological institutions. Three numbers of this series have appeared and two more are scheduled to appear next spring. In addition to these papers, Dr. Willett, Assistant Professor of Meteorology, has prepared an outline on Dynamic Meteorology to be published by the National Research Council in a proposed memoir on Meteorology.

**Electrical Engineering.** The academic year 1928-29 had several items of unique interest. The new electric power network analyzer, originally proposed by the research division of the Department and constructed in coöperation between the Department and the General Electric Company, was put into operation. It is planned for use in our own investigations and also for service to the industry in solving problems which may arise in respect to electrical machinery, electric power transmission, and electric power distribution. It is now in use for the solution of certain problems regarding electrical machinery, and several power companies have already requested the privilege of using it in some of their problems. The Department hopes to arrange the use for the industries in such a fashion that the cost of such use will be borne by those who immediately profit by it. The June round table colloquium for power transmission engineers, directed to the problems of power circuit analysis with particular reference to the behavior of machinery and to trans-

mission line stability, was a success. There was an attendance of fifty-eight engineers from operating companies and manufacturing companies of this country and Canada, besides graduate students and members of the department staff. It was the general view of those in attendance that such round table discussions are desirable, and that the Institute would be of service to the industries if it annually promoted a similar meeting for analysis of specific electrical engineering problems.

The first group of students in the communications branch of the coöperative course (VI-A) secured their Master's degrees, and substantially all went into desirable communications employment. From now on the Master's degrees will be annually conferred on men following all of the branches of the electrical engineering coöperative course. In the neighborhood of two-fifths of all of our electrical engineering students are in the coöperative work and the continuation of the course alongside of and associated with the straight undergraduate course and straight graduate instruction is proved to be feasible and desirable.

Lectures for four weeks on the subject of "New Developments in Electric Power Problems," given by Dr. Reinhold Rudenberg, Chief Electrical Engineer of the Siemens-Schuckert Works in Berlin and Honorary Professor of Electrical Engineering at the Technische Hochschule in Charlottenburg, Germany, proved successful and stimulating.

The experimental investigations at the Round Hill Laboratory have gone on at an accelerated pace and this summer we have had the advantage of a Goodyear dirigible balloon 125 feet long, from which to carry on the measurements intended to secure accurate data regarding the distribution of field strength of very short-length radio waves around antennae, and also for investigating the different characteristics of reflection of such waves over the land and over the water. Scientific meteorological measurements have been added to the electromagnetic measurements which we have heretofore been carrying on at Round Hill, these meteorological measurements being under the immediate control of Professor Rossby of the aeronautics department, but within the administrative control of Professor Bowles of this department in order that the work at Round Hill may be maintained as a unit.

During the year, the work in the science of acoustics applied in communications was put on a firmer footing by Mr. R. D. Fay, Research Associate. This bids fair to become an important creative factor of the work of the department. The experimental aspects obviously will require the establishment of a suitable laboratory, equipped to make experimental re-examination of mathematical solutions by means of exact measurements.

Electrical engineering instruction and investigation is primarily dependent on experimental and mathematical physics, and our interrelations with the Departments of Physics and Mathematics are gratifyingly excellent. Since the word "engineering" also connotes economic applications of science we also should have strong interrelations on the economic side. This is a portion of our field which as yet is only partially developed but it is hoped that equally satisfactory mutual interests with the economics department may be gradually developed.

The investigations carried on by the staff and graduate students continue of a high order in the fields that the Department has set for itself during a period of several years, notably in respect to the characteristics of dielectrics and their disruption under electrostatic stress, the effects of higher frequency surges such as those that are imposed upon electric power transmission lines by lightning discharges, the photoelectric sensitivity of various surfaces, the mechanism of heat flow through non-homogenous dielectrics, the thermal conductivity of impregnated paper used for the insulation of high tension power cables, the further improvement of integragraphs for the mechanical solution of some of the unusual equations of electricity and magnetism. The new and more refined integragraph for solving differential equations of higher order is advancing and has come along far enough to give assurance that it will fulfill our best expectations of its usefulness as an instrument for solving some of the complex scientific problems associated with electrical engineering.

The Vail Librarian, who is research librarian for the Department, has completed the compilation of the titles of theses carried through by undergraduate and graduate students of the Department. This compilation will be published during the early part of the new academic year and will give evidence of

the scope of both the researches and the minor investigations which have been and are being carried on by the staff and students of the Department.

A great deal of interest has been exhibited regarding the sectionalizing of the larger classes in electrical engineering in accordance with the intellectual speed of the students, and regarding the privileges conferred on our Honors Groups, which was adopted for the purpose of encouraging students to utilize their own resourcefulness and originality in connection with their education. As the department laboratories are equipped for investigation, the aforesaid practices enable it to carry forward research as a part of education in a manner that is accomplishing desirable results. It will be able during the ensuing academic year to expand the work in the engineering applications of vacuum devices and devices utilizing the conduction of electricity through gases, for the development of which work Dr. T. J. Killian has been added to the staff.

The summer term was organized with a combination of the Department's own staff and important professors in electrical engineering from elsewhere. The men from other institutions included the chairman of the department of electrical engineering at the University of Missouri, a professor of the Harvard Graduate School of Business Administration, and an associate professor of physics of Williams College. The infusion of a reasonable number of distinguished men of other institutions into the teaching for the summer term is proving worthy and desirable by bringing to the staff as well as to students a wider horizon. It is hoped that the Department may find means for bringing certain men of notable capacity in the electrical engineering departments of other institutions into temporary employment during one or both of the winter terms, either by one-term exchanges or by filling temporary vacancies in the staff in this manner. Such a plan would prove doubly profitable through enabling men to secure wider contacts in this and in foreign countries in the field of electrical engineering and thereby add to the fruitfulness of each such teacher, and at the same time bringing into our midst the views developed in departments of electrical engineering of other colleges. This would be a desirable supplement to the advantages derived from several of the younger men spending a large part of their summer vaca-



tion period in the employ of important industries, as is now the practice.

The Department continued the undergraduate colloquia led by important men in the industries. The American Telephone and Telegraph Company, the Westinghouse Electric and Manufacturing Company, the General Electric Company, the Weston Electrical Instrument Company and the National Electric Light Association generously contributed the time of important men selected mutually by themselves and us to carry on these colloquia which are intended to show the manner in which scientific methods and scientific points of view are made serviceable in design, manufacture and operation in the industries. The subjects of the colloquia for the year were: "Scientific Aspects of Design Problems in Large Electrical Power Apparatus," "Commutation Problems," "Vibration and Noise Problems," "Switching Problems," "Scientific Problems Connected with Electrical Measuring Instruments," "Inductive Coördination," and "Manufacturing Problems Arising in the Production of Telephone Cables." A number of illustrated lectures were given by important men in various branches of electrical engineering to the freshmen and sophomores registered in the electrical engineering course, to enable the underclassmen to secure a clearer view of the lines of work which they wish to carry out. For these we are under obligation to Mr. C. L. Edgar of the Edison Electric Illuminating Company of Boston, Mr. N. H. Daniels of Stone & Webster, Inc., Mr. R. E. Doherty of the General Electric Company and Mr. O. W. Eshbach of the American Telephone and Telegraph Company. Some other lectures have been given by specialists to students majoring in specific scientific developments.

The Advisory Committee of the Department held an all-day meeting in February, with much fruitful discussion and counsel.

A number of gifts of service to the laboratories have come to the department, and also a number of interesting contributions of historical interest have been made. We are indebted for such to the Automatic Electric Company, Western Electric Company, New England Telephone and Telegraph Company, Stone & Webster, Inc., Mr. Edwin S. Webster, Mr. Hobart Ames, Edison Electric Illuminating Company of Brockton and the Radio Corporation of America.

Associate Professor J. W. Barker resigned to go to the distinguished post of head of the Department of Electrical Engineering at Lehigh University. One instructor resigned to take a desirable place in the electrical engineering department of the University of Nebraska and several others to go into desirable industrial employment. The Department's policy of maintaining competent understudies for the leading men of the Department has enabled it to meet these losses without lessening the strength in the staff. The resulting promotions will further contribute to the enthusiasm and loyalty of efficient younger men.

On account of the increasing exactions of the Round Hill Laboratory on the time and thought of Professor Bowles, Professor Guillemin will hereafter take a large part of responsibility in Communications instruction.

During the absence of Professor Jackson on a sabbatical leave for travel, and for observation of foreign engineering industries and engineering educational institutions, Professor Bush will act as Head of the Department and shift to Professor Dahl (under the supervision of Professor Bush) the duty of supervising the plans of study of the large group of graduate students. This group comprises between one-third and one-half of all the graduate students of electrical engineering in the United States.

With foresight respecting constant improvement of the creative work of the department staff, the notable needs of the Department are: research professorships which carry with them attractive salaries, opportunity for carrying on creative research in the electrical engineering sciences (surrounded by graduate students), and requiring contributions to our teaching to the extent only of graduate lectures in the specific field of the incumbent; additional graduate fellowships, preferably involving grants of not less than twice the cost of tuition; and a loan fund for junior and senior students to be dispensed in somewhat larger amounts than now possible, and available only for men of high scholastic rank.

**Naval Architecture and Marine Engineering.** As the shipping and shipbuilding industries of the country have shared in the increased prosperity, there have been applications

for more graduates, especially in the ship operation end, than we were able to provide.

During the summer vacation the head of the Department made inquiries in Europe regarding the latest developments in Experimental Tank work, especially in connection with propellers and steering.

Professor Hovgaard continued his researches on pipe bends and contributed a paper to the *Journal of Mathematics and Physics*, entitled "Tests on High Pressure Pipe Bends," and he will contribute a paper to the World Engineering Congress in Tokio in November of this year, entitled "Deflections and Stresses in Pipe Bends." In addition, he contributed a paper to the Institution of Naval Architects' summer meeting on "The Relation between Armament and Protection in the 10,000-Ton Cruisers and the Ersatz-Preussen." He has written several articles on the Reduction of Naval Armaments to the *London Engineering*, *New York Times*, *Boston Transcript* and the *Technology Review*. His work has been publicly recognized by his election to the National Academy of Sciences in the United States, and the degree of Honorary Doctor of Engineering from the Polytechnic Institute of Copenhagen.

Professor Owen devoted the summer to study of yachting and he sailed the winning schooner in the fisherman's race at Marblehead.

During the summer Professor Keith was employed by the Fore River Plant of the Bethlehem Shipbuilding Corporation at Quincy. In addition to the usual routine work in a naval architect's office, Professor Keith was actively engaged in the preparations made for the launching of the United States Cruiser *Northampton* at the Fore River Plant on September 5, 1929.

Professor Chapman spent the summer in close association with a number of important shipping firms, having been consulted by them on several of their problems which have an important bearing on the course in Ship Operation.

The Nautical Museum continues to attract visitors. A number of models and prints was lent to form an exhibit at Springfield, Mass., which aroused considerable interest in that city.

From February to June there was an exhibit of ancient weights and measures lent by Dr. Edward Clark Streeter. This

was a remarkable collection and contained some unique specimens.

The marine collection has been enlarged by the purchase from Rear Admiral Elliot Snow of catalogues and photographs of the Macphearson Collection of marine prints in England. This is the most extensive collection of its kind in the world, and the catalogues and photographs will enable the museum to locate records which otherwise are not obtainable.

Mr. Henry A. Morss has lent a beautiful model of a Japanese junk in glass case.

**Architecture.** The year has brought one important change in our curriculum by the addition of two General Studies. Previously, students in the Department of Architecture had not been required to take any General Studies because of the cultural nature of the courses offered in the Department; but it has seemed that they might profit as much by acquaintance with subjects outside of their chosen field as is true of students in other departments, and the change has consequently been made.

The Department has with great regret consented to the termination of the services of two of its valued teachers, Miss Ida D. Loring, for twenty-six years librarian and assistant in Architectural History, and Professor A. S. Jenney, who had given courses in Office Practice and Professional Relations for many years. Many architects will recall with gratitude the association with these two valued helpers.

The expansive capacity of the Rogers Building toward meeting the increasing numbers in our classes seemed to have been taxed to its limit, but a change in method in Freehand Drawing has enabled the Department to place this work in the basement, and use the fifth floor for an additional draughting room so that the freshmen shall no longer be separated from the upper classmen as heretofore in their work in Design.

For the second time in three years one of the students has won the Paris Prize, the most coveted honor available to architectural students in the country. Our students have again been successful in both the Rotch and Guy Lowell competitions.

Perhaps in consequence of these and previous similar successes the quality of our entering students in the upper grades

is of a high order, showing an increasingly high percentage of college graduates.

The Department wishes again to express its appreciation of the help that it continues to receive in so generous a measure from its alumni and from the departments in Cambridge, as well as from the members of its Visiting and Advisory Committees. In this connection it records with great regret the loss of two architects who have shown an interest in and devotion to the advancement of the Department that has been of the greatest value to us, namely Henry Forbes Bigelow and Milton B. Medary, Jr.

**Architectural Engineering.** Certain minor changes have been made in the curriculum tending toward improvement and better balance. One important change is the introduction of a new course in the study of materials of engineering much more comprehensive in its scope than has been offered hitherto. This was made possible through the helpful coöperation of the Department of Mechanical Engineering, and through the personal interest of Professor H. W. Hayward.

With the increasing interest in the welding of structural frames and the practical certainty of the process materially affecting, in the near future, methods of erection, some adequate provision must soon be made to prepare the students for this line of work. In connection with the undergraduate theses we have already made some study of certain phases of the subject.

The number of graduates which has made a gradual increase from year to year was this year the largest in the history of the course, and will probably be the maximum for some time to come. Next year there will be an appreciable falling off, due without doubt to the establishment of the course in Building Construction and the fact that, up to the time of its establishment, students preparing to enter the field of contracting elected the course in Architectural Engineering.

Last year, owing to the depression in building operation, it was with some difficulty that the graduates without practical experience were able to find suitable positions. This year with the larger classes there was a greater demand for our graduates than could be filled.

**Drawing.** In the Division of Drawing we have tried the experiment of departing from the old classical method of teaching Descriptive Geometry and of introducing the more modern method of solution by the use of auxiliary planes of projection. The newer method appears to offer certain advantages both from an educational viewpoint and in its more direct application to the problems of practice. In order to give some basis for comparative study, the freshman sections have been divided into two groups, one group receiving instruction by the old method and one by the new. It is the intention to continue this study during the coming year with the hope that in 1930-31 we shall be able to offer a course which will embody the essentials of both methods while laying the greater emphasis on the use of auxiliary planes. At the same time an attempt is being made to bring the course in Descriptive Geometry into closer relation with the courses in Drawing.

The Drawing courses have been carefully revised, greater stress being placed upon the ability of the student to read drawings and to make dimensioned freehand sketches.

It is planned to make the courses more flexible and to present more of the data for the problems in the form of written descriptions, from which the student must prepare the layout for his solutions.

In connection with the development of the new course in Descriptive Geometry Mr. Watts should be mentioned for his helpful interest and initiative, while to Professor Goodrich must go much of the credit for the improvement in the courses in Drawing.

**Economics and Engineering Administration.** A stimulating influence in the development of this course were meetings of two advisory committees held in Boston and New York during the past winter. At the New York meeting there was an attendance of seventeen, including three representatives of the Faculty, three graduates of the Course in Engineering Administration, and eleven other graduates of the Institute who were executives in industry or who had had long experience with the educational needs of the country in the fields of administration. Consideration was given to the proper balancing of studies in science and engineering with those in applied busi-

ness economics. This course is a comparatively new grouping of studies designed for students who are interested in the business aspects of industry as well as its technical problems. To undertake these responsibilities, however, it is necessary that they should have an acquaintance with the principles of science which control economic production and distribution. When the course was established, there was no precedent as to the proper allocation of subject matter, and there have been doubts as to whether the distribution of three-fourths of the student's curriculum to science and engineering and one-fourth to business subjects was the most advantageous ratio. While it is impossible to give a positive answer to this question, the opinion of the Advisory Committee appeared to sustain the present distribution.

Distinct progress has been made in methods of instruction in the course in Business Management. Mimeographed notes, now extending to more than 200,000 words, have been thoroughly revised. The same is true of material furnished to classes in Accounting and Cost Accounting.

During the past four years the students in Business Management have coöperated in research relating to the organization and administration of small businesses. Last year fourteen small metal working establishments were interviewed and a preliminary summation was presented to the class at the end of the term, and assembled field data were submitted to a senior as a basis for thesis. This year six radio manufacturers and six radio distributors were interviewed and the material afterwards classified.

During the year there were twenty-five coöperating lecturers in Business Management, an increase over previous years in order to present the newer developments in marketing. In Corporate Finance there were twelve coöperating lecturers and in Industrial Relations, nine.

Further experiment has been made in Business Management with the use of cases for class discussion. During the past year, however, there was a reduction, for experience has led us to believe that it is more advantageous to use fewer cases with opportunity for more exhaustive discussions.

For the first time a course in Contracting Management was given by our Department for the students in the Course of

Building Construction. The subject matter was divided into three sections: contracting office routine and management, contracting law and contracting accounting. For this purpose it was necessary to call in Mr. Haussermann who gave the lectures in law, and Mr. W. W. Dow, a Certified Public Accountant of many years' experience, who treated the subject of contracting accounting. Professor Schell has devoted this last summer to conferences with contracting firms in order to secure the results of current experience.

During the summer Professor Fernstrom devoted a considerable part of his time to organizing better methods of placing students in industrial plants during their summer vacation. It is hoped that through supervision, by visits and reports, the experience gained by students in their summer work may be of greater value in their subsequent academic studies. With this in view sixteen students were given supervised employment in ten New England concerns.

Professor Raymond's research in the field of economic production has been diligently carried on. A manuscript is nearly ready for publication, and some of his material has already been presented in papers before engineering societies. During the past summer he made a study of the application of minimum-cost formulas in the automotive industry.

Professor Raymond's research in the field of Management has disclosed the interesting fact that economic production is more closely related to the conservation of working capital than to production at minimum cost. A manuscript has been prepared supporting his conclusions which is nearly ready for publication and some of this material has already been presented in papers before engineering societies. During the past summer he has made a study of the application of economic production quantity formulae in the automotive industry.

The Department suffered a loss in the death of Professor Shugrue and in the resignation of Professor Freeland. Appointments have been made to fill the vacancies, and owing to the growing importance of marketing, the new appointment for this position has been placed upon a full-time basis.

Professor Doten, as consulting economist, has carried on a considerable amount of research work for the Tariff Committee of the National Retail Dry Goods Association, and prepared



three briefs which were submitted to Congressional Committees at various stages in the progress of the proposed tariff bill now before Congress.

Professor Porter made an investigation for an important industrial corporation relating to research appropriations in large manufacturing establishments, and the proper bases for such appropriations.

Professor Dewey served at the request of President Coolidge as a member of an Emergency Board in a wage dispute between the railroads and brotherhoods in the western district.

**Biology and Public Health.** The Department has shown a gratifying increase in enrollment, the registration markedly exceeding that of any previous period in its history.

The establishment of a new option in Public Health Engineering is the most important curricular change which has taken place. This has been offered because of a conviction that excellent opportunities exist in official and industrial life for men who have given special attention to the engineering aspects of public health problems and are also well trained in biology, bacteriology, physiology and personal hygiene, statistical analysis, and public health administration. This type of engineering course must deal not only with the problems of water supply and waste disposal, but with the fundamental engineering as well as the biological aspects of city milk supply, the great food manufacturing industries, and the manifold problems of conservation and utilization of products of plant and animal life. It is believed that it will also be of great value in preparing men for service in great industrial organizations where a knowledge of factory conditions and their relation to the health of the worker may help to solve important human or personnel problems.

It is the intention that students undertaking this option will have the benefit of engineering instruction and opportunities for field studies in sanitary chemistry and biology at the Summer Camp of Civil Engineering and attempts will be made to secure the coöperation of health departments where they may gain experience and practical knowledge as they become more advanced in their work.

A new graduate course in Enzyme Chemistry has been developed by Professor Bunker and Dr. Parker and was given

for the first time during the year. Dr. Slack has given increased training in pathological microscopy to graduate students in Public Health.

In connection with the course in Technology of Food Products, the senior and junior students, accompanied by Professor Prescott and Dr. Proctor, utilized the spring recess by a tour of food manufacturing establishments in Buffalo, Rochester, Syracuse and Canajoharie, New York. The Department is deeply grateful for the generous treatment and the opportunity to see processes in detail at the plants visited. It is hoped that such a tour may become an annual event, as it gives the students a vision of the organization and problems of the industries and also valuable personal contacts with the officials in charge of these enterprises.

The coöperation of the Department with the Army Medical Corps has been advantageously continued. Two officers have been in attendance during the past year. Dr. C. J. Gentzkow, Major, Medical Corps, U. S. A., who was detailed to the Institute for two years of advanced training for bacteriological research, received the Ph.D. degree in June.

For the third year in succession a Public Health Institute for health officers and other workers in this field has been held in the Department during the summer and was highly successful. The attendance was greater than at either of the previous Institutes. This conference was again made possible through a generous contribution by the Metropolitan Life Insurance Co. Acknowledgment is also made of the coöperation of the Massachusetts State Department of Health and the Massachusetts Association of Boards of Health. Health officials from eight states (five outside New England) were in attendance.

Professor Turner has devoted a part of his time to coöperative work with the Eastman Teaching Films, Inc., in the preparation of a series of health films. During the summer he went to Geneva to preside at the Health Section of the World Federation of Education Associations.

Research work in pure and applied science has been carried on by nearly all members of the staff during the year. Investigations completed or continued during the year are as follows:

- A Synopsis of the Crustacea Entomostraca of New England.
- An Investigation of a Tryptic Digest Medium.
- Rheumatic Fever.

Professor Bunker, with the coöperation of the Physics Department and the Children's Hospital, has begun important researches on certain bio-physical factors affecting rickets. Professor Prescott has directed research work on the relation of domestic refrigeration to viability of microörganisms. Professor Bigelow has studied the process of quick freezing from the histological standpoint. Several other important investigations have also been conducted in coöperation with industrial organizations.

The members of the staff have also given time and effort to public service in various ways in connection with national organizations, the Public Health Committee of the Boston Chamber of Commerce, the State Department of Health, the Massachusetts Fish and Game Association, and in advising numerous local health departments.

The increase in registration and in the enlargement of the scope of the work of the Department, both in instruction and in research, emphasizes the need for the new building which it is hoped may at no distant day stand as a memorial to the late Professor William T. Sedgwick.

**Physics.** During the year a substantial revision has been made in the required schedule for students taking the course in Physics, the general intent of which has been to bring the more fundamental subjects into the undergraduate years leaving the more highly specialized work for the graduate years.

Further modifications have also been made in the schedules for the teaching of general Physics with the particular purpose of having smaller sections.

More of the time of the staff has been devoted to research than heretofore, both along theoretical and experimental lines. Some of the problems now underway include:

The relation between relativity and quantum mechanics.

Color research including the establishment of a standard instrument for color analysis.

The study of an optical sound synthesizer.

The electrical conductance of strong ammonia solutions.

Vapor pressure of strontium oxide.

Electron orbits in the Barkhausen-Kurz effect.

The analysis of stress by reflection of polarized light.

The stresses in rotating disks. A comparison of Chree's solution with photo-elastic results.

Methods of determining the thermal conductivity of liquids.

Specific heat of magnesium and aluminum oxides to 1800°C.

Studies of the ultraviolet emissions of incandescent lamps.

Study of transmission of earth tremors.

Measurements of dielectric constant and power loss of viscous liquids with polar molecules.

Investigation of the Kerr effect of viscous liquids with polar molecules in high frequency fields.

X-ray study of the structure of the meta-silicates.

X-ray diffraction in liquid.

Photographic reproduction of tone values.

A study of gold, nickel and silica linings for combustion bombs.

Thermal conductivity of alloy steels.

The creep of steel at high temperatures.

Study of transmission of vibrations in structures.

Determination of the physical significance of sharpness.

X-ray study of the structure in welded joints.

Development of a method for determining the performance of sound projecting devices.

The production of rigid refractory bodies from kaolin.

During the year graduate work has been started in Ceramics and courses are offered with a view to training in Ceramics men who have had the required preliminary training in Physics and Chemistry. Two research laboratories have been set aside for ceramic research.

There has been a considerable increase in the number of students taking undergraduate and graduate work in Physics in the past year.

Professor Werner Heisenberg, director of the Institute of Theoretical Physics at the University of Leipzig, was in residence at the Institute for a considerable portion of the second term, giving a course of lectures on "Recent Developments in Quantum Mechanics." A short course of lectures on theoretical Physics was also given by Professor L. S. Ornstein, director of the Physical Laboratory at the University of Utrecht.

In spite of considerable shifting about of the quarters of the staff and the construction of overhead balconies, the Department finds itself under great pressure for room for giving graduate instruction and carrying on researches of graduate students and members of the staff. During the past decade Physics has grown enormously, both as to the importance of new fundamental data and its application to industry. Every effort should be made to provide the best of instruction and

adequate facilities for both undergraduate and graduate work. The present quarters of this Department were provided primarily for undergraduate instruction in elementary general Physics called for by all courses. They do not provide for advanced instruction or graduate work. Steps have been taken to remedy this at the earliest possible moment.

**Chemistry.** The Inorganic Division has given instruction to 613 freshmen students during the fall term and 568 in the second term. Attention was directed in last year's report to the fact that it will be unwise to postpone unduly provision for extra space for the increasing numbers of students taking the first year fundamental chemistry course. Already the amount of "doubling" in the use of chemical desks is a serious handicap in maintaining the best kind of laboratory instruction. On an average the inorganic division courses were attended by 672 students per term.

The recently established Research Laboratory of Inorganic Chemistry has thrived and an unusually large number of senior students appeared to enjoy their thesis effort in the new surroundings working under Professor Schumb's direction. Dr. A. C. Young has been appointed Research Associate in the new laboratory, thereby adding materially to the good prospects of promoting inorganic chemical investigations. Several papers will be forthcoming as a result of the year's work.

The instruction in organic chemistry by the Department as a whole continues to be woefully hampered as a consequence of the restoration of space in the mining and metallurgy building, temporarily occupied by chemistry, to the work of metallurgy. The reaction on students and staff of a situation as distressing as the present one, calls for emphatic statements. The organic undergraduate facilities are antiquated and the space provided unsuitable in kind and extent. The situation with respect to the graduate work in Organic Chemistry is even worse and unfavorable comments regarding the situation are beginning to reach the Department regarding working conditions for graduate students in organic chemistry at the Institute.

It must not be overlooked that chemistry is a subject which in its development as a science and as an applied art has in the United States grown from almost nothing to be, within com-

paratively a few years, of first importance in the life of the nation. Accordingly what seemed to the Institute as ample provision in space and facilities for the progress of chemistry in 1916 has become now entirely insufficient, and thoroughly antiquated. The situation is in reality desperate and requires sustained effort to secure the proper ameliorization. If this can be accomplished in the near future the Department may hope to attract the requisite number of graduate students, the demand for which is exceptional. It is worth noting that every institution of any pretensions has constructed new laboratories for chemical instruction and research during the past ten years, and it is becoming more and more difficult to secure and hold competent men on the staff with inadequate laboratory facilities.

During the year fortnightly conferences were inaugurated for the purpose of discussing and rearranging all the undergraduate courses in chemistry. The work has resulted in the elimination of duplicating courses and a general consolidation effected. Not all the consolidation has been accomplished that would seem desirable, but as much as seems practicable under present conditions where so many specialized courses are demanded by the engineering departments.

The Research Laboratory of Physical Chemistry has carried forward those investigations referred to in earlier reports similar to the present. Naturally some of these investigations are of long duration and equally naturally it is desirable to have substantial long-time research projects under investigation in the interest of the graduate student. The investigation of the properties of steam appears after five years to be in prospect of completion, possibly within the year. The body of data already completed has enabled provisional steam tables to be formulated which extend beyond the critical temperature. Plans for bringing about international agreement on the properties of steam have been formulated by the A. S. M. E. Research Committee and a meeting was held in London in July, 1929. The results accomplished appear favorable to securing world-wide recognition of the value of the Institute's contribution in determining the properties of steam at high temperatures and pressures.

The development of facilities and opportunities for gradu-

ate study in the field of photo-chemistry has been marked. The general field of the relation between radiation and chemical interaction is assuming an importance which will make it imperative to maintain the progress thus far achieved.

Reference was made in the previous report of the very great desirability of providing a building for carrying on in close association the graduate work in both physics and chemistry. This project cannot be too seriously considered in view of the thoroughly unsatisfactory situation with respect to space for both the undergraduate and graduate work of the Department. A building for graduate work and research in chemistry and physics of this kind would enable a rearrangement of space to be made in the interest of the undergraduate work of both departments and definitely provide for the graduate work. Provision for the latter, it must be recognized, was not made at the time the Institute buildings were designed. The space allotted to the Research Laboratory of Physical Chemistry, which at that time was independent of the Department, was a "residue" of badly situated "attic-like" rooms. The unattractive situation relative to space and general facilities in the Department is becoming known outside the Institute and having its effect in retarding the growth in the number of graduate students requesting admission.

The rearrangement possible by the addition of this new space would also provide some of the much needed relief as to space for Chemical Engineering.

It is a pleasure to acknowledge the receipt of a gift to the Department of a large portrait of Professor Henry P. Talbot, presented by Mrs. Talbot. The portrait has been placed on the walls of the conference room of the Talbot Laboratory for Inorganic Chemical Research. The Department has also been fortunate enough to receive a portrait of Professor Thomas M. Drown, one of the former members of the staff of the Department.

**Chemical Engineering.** For a number of years the Department has been developing a postgraduate course covering the practical applications of thermodynamics to the engineering phases of chemical industry. Because of the fact that our graduates go almost exclusively into chemical work, it seemed advisable to replace the undergraduate instruction in thermo-

dynamics, hitherto given along mechanical engineering lines, by a course similar to the graduate instruction, definitely chemical in point of view. The Faculty has approved this change and it is hoped that the new subject will prove an important advance in the technique of chemical engineering education.

Marked progress was realized on several of the research projects initiated in previous years. Results of value were reported in six papers on high pressure syntheses. The corrosion program being conducted in coöperation with the National Association of Cast Iron Pipe Manufacturers has been expanded, largely as a result of papers published during the year. The work on oxidation of organic compounds has focused upon an intensive study of the oxidation of linseed and other drying oils, the preliminary results of which are promising. The work of Professor McAdams on heat transmission has resulted in his choice by the sub-committee of the National Research Council to prepare and publish a comprehensive monograph on the broad field of heat transmission between fluids and solids. The study of rectification, of both binary mixtures and more complex liquids of the petroleum type, has yielded results which promise to be of value in placing this important operation on a footing scientifically far more sound than hitherto. Because of the widespread interest in this work, the Department has been requested to present the results before the American Petroleum Institute.

Two important research projects have been initiated during the year. The first of these, undertaken in coöperation with the work in Fuel and Gas Engineering as a part of a broad program on cracking, is an experimental and theoretical study of the rate and the mechanism of thermal decomposition of pure hydrocarbons, and the second an investigation of the flow of mechanical mixtures of gases and liquids through pipes. Both of these are of importance to the oil industry and in both programs preliminary results already obtained are promising.

It seems necessary to reiterate the extent to which the Department needs additional facilities for its research and instructional work. The attendance in the School of Chemical Engineering Practice was the largest since its establishment in 1916 and the enrollment of graduate students in the Department increased over thirty per cent beyond that of the preceding



year. This places an undue strain on facilities already over-taxed and makes it increasingly difficult for the Department to maintain proper standards in its work, particularly along research lines.

**Fuel and Gas Engineering.** During the year the Department was unfortunate in the loss of Professor Ward as head of the course. He has continued to be of service, however, in an advisory capacity.

Due to the comparative youth of the Fuel and Gas Engineering School, major changes continue to be made in the courses offered. In the past year's revision considerable weight was given student opinion as obtained from a questionnaire on material and methods of instruction. An advanced course in furnace design, intended primarily for research men, was inaugurated.

Progress has been made in encouraging students to continue for the Doctor's degree. During the coming year four men will be pursuing work on their Doctor's theses in the Department. Through departmental membership in the Heat Transfer Committee of the National Research Council one student has been enabled, by a generous fellowship, to start work on a Doctor's thesis in furnace design.

The school, due to its recent establishment, has been particularly interested in the success of the graduates from its course, as a measure both of its teaching methods and of the opportunities which the field offers to properly equipped men. Many more positions were available than there were graduates during the year, and reports from their employing companies have been extremely favorable. A large part of this success has been due to insistence on students learning the viewpoint of industrial plant operatives during their period in the Practice School. Plant executives at the practice stations have expressed appreciation of this viewpoint of the students and have materially assisted in accomplishing the result by giving lectures on appropriate subjects.

A new Practice School station was established at the Rochester Gas and Electric Company, at which is located one of the most modern city gas plants in the country. This has enabled students to make tests on equipment not before available to them.

Following Professor Ward's organization of research work on a project basis in order that the ultimate objects of various connected investigations may not be lost sight of, the Department has made progress on the following projects:

Application of Heat Transfer Generalizations to Practical Furnace Design. Work in the field of radiation between finite surfaces of various shapes led to convenient graphs permitting quick calculation of many furnace problems heretofore incapable of exact solution. A series of lectures on furnace design to an outside industrial group led to the correlation of much valuable material. Gas and flame radiation are to be studied with respect to their effect on furnace design by a candidate for the Doctor's degree as a thesis. Valuable plant data on furnaces were collected for correlation by thesis men during the coming year. A special double-screened optical pyrometer is being developed for determining the emissivity and true temperature of semi-opaque flames for use in furnace design.

Study of Pre-Ignition Phenomena in Combustible Gas Mixtures. Apparatus for adiabatic compression of the mixture to a predetermined temperature, with provision for following the pressure rise due to combustion, has been developed. The work is being continued.

The Synthesis of Hydrocarbons at Atmospheric Pressure. Thesis work has been done and may be continued.

Flame Propagation in Gases. Work on a special phase of this problem, the detonation phenomenon in combustion engines, was inaugurated and will be continued by a Doctor's thesis man.

Study of Cracking and Polymerization of Petroleum Hydrocarbons. This work, inaugurated during the year, has progressed to the stage of completing and testing a satisfactory apparatus, and will be continued.

The Manufacture and Properties of Lubricants. A careful study of existing methods and knowledge has been made and research work has been carried out on several phases of the problem. The relative solubilities of oil and wax in various organic solvents have been investigated with the object of developing a method of securing a low cold test lubricating oil by a process other than the expensive and wasteful one now used. Two papers covering this investigation have been accepted for publication. Additional investigations have been made at the Bayonne Field Station on the distillation and clay filtration of lubricating oils. Work on this project is being continued.

Means for Calibrating Large Gas Meters. Assistance was given one gas company on this important problem during the year, and the Department has recently been approached by another for a complete survey of the field.

Elimination of Noxious Gases and Smoke from Automotive Engine Exhausts. Work on this problem has led to the development of a satisfactory apparatus, and is being continued to make its use commercially feasible.

**Building Construction.** The course in Building Construction shows a steady growth, the enrollment for the present year being 87, an increase of 24 over the previous year. In June 8 men were graduated, these being the first men to complete the course. All but one of them were placed in employment with well known building firms at the time of graduation. This is the class that inaugurated the course in February, 1927, with 17 members. To accommodate the increased enrollment the Department now has secured the use of an additional large drawing room.

In April, the usual conference was held between the Department staff and representative men of the building industry, including Messrs. A. E. Barlow and T. W. Ryan, Jr., of the Thompson Starrett Company, Mr. F. P. Brown of the George A. Fuller Company, Mr. A. F. Bemis of the Corporation and others.

The work of the course was reviewed and the discussion brought out the suggestion that Quantities Surveying and Estimating should be incorporated as a subject in the course either as a part of the undergraduate training or as a graduate study. This suggestion emphasizes what has already been reflected in correspondence with builders in various parts of the country, as to the importance of the study of estimating as a preparation for the building business. A study is therefore being made of the feasibility of including this subject in the undergraduate course.

At graduation Mr. John W. Sibert, Jr., of Augusta, Georgia, was appointed to the Horowitz Scholarship in building construction.

**Division of Industrial Coöperation and Research.** The work of the Division has proceeded during the year along the same lines as heretofore. The work of the Personnel Office has been emphasized, and a much closer contact established with the Alumni, both in the matter of information as to positions which are open, and as to the location and fitness of the men who may be available for positions.

A larger percentage of the industrial problems upon which the staff is working have been brought under the jurisdiction of the Division of Industrial Coöperation and Research, and

the method of operation, whereby the industrial companies pay to the Institute suitable overhead charges, has been found to work out satisfactorily. It is believed that there has been a further increase in the number of serious investigations and research in the fields of science, and a further diminution in the number of routine tests which have been made. This change should enable us to be of materially greater service to industry, and it is a change which is beneficial to the staff. It is recommended that this work be given suitable quarters and a staff of experts, covering the main lines of work, thus avoiding the necessity of depending too much on the extra time of members of other departments for the solution of problems.

**Division of Municipal and Industrial Research.** The work of this Division has followed as far as possible the objectives determined upon at its inception — the undertaking of community industrial and economic surveys. When not occupied by studies of this nature, research projects calculated to promote the Division's effectiveness in its allotted field have been carried on. Contact has been maintained with organizations and with individuals engaged in activities allied to those of the Division and due attention has been given to such promotional and publicity features as have seemed warranted by circumstances. These various phases of the year's work are summarized in succeeding sections of this report.

The chief task of the Division in connection with community industrial and economic surveys has been the completion of the comprehensive report on Bangor and Brewer, Maine, and the territory which is served by these two cities. It has also been able to render advisory assistance in connection with both this survey and that of Metropolitan Providence, completed last year.

The Division's complete report on Bangor-Brewer was rendered to the local survey committee on December 19, 1928; a subsequent summary report, prepared at the special request of this committee for publicity purposes, was completed in August of this year.

While the Bangor survey was in progress the Division, by arrangement with Mr. Arthur C. Comey, City Planner, collaborated in the preparation of a zoning plan and ordinance which was accepted by the city authorities but rejected by the

voters at a referendum election. We are informed that this negative vote was due more to lack of understanding of the subject by the voters than to any specific objection to the plan, and that there are good prospects of its ultimate success.

With the organization of an industrial council in Providence and the addition of an experienced industrial director to the staff of the Providence Chamber of Commerce have come a number of opportunities to offer constructive advice and assist towards the development of projects outlined by last year's survey. It is of interest to note that not only in Providence, but in Pawtucket, R. I. and also in Norwood, Mass., our reports have served in a very practical way to stimulate and to strengthen important features of the industrial or civic life of these communities.

Survey projects of various descriptions have been discussed with representative groups or individuals in Milton, Mass., Warwick, R. I., Clarendon, Va., Trenton, N. J., Concord, N. H., Manchester, N. H., New Bedford, Mass., and St. Paul and Minneapolis, Minn. None of these discussions have so far resulted in the undertaking of new work. The Division is also in touch with a number of other groups who appear to be interested in an analysis of community conditions such as the Division is in a position to make.

Considerable time has been devoted to projects of a research character bearing upon various phases of its work. In some cases these have been initiated with reference to possible survey opportunities, in others they have borne no relation to any specific proposition. Among these projects may be listed:

An analysis of modern municipal assessment systems.

The proportionate cost of fuel and purchased power in American industry.

A survey of available sources of statistical information in New England — in coöperation with the New England Council and the Federal Reserve Bank of Boston.

Modern methods and costs of highway construction.

A study of the causes and extent of the smoke nuisance — in coöperation with civic organizations in Boston.

A comparative analysis of industrial survey reports.

Several less extensive coöperative studies by staff members deserve mention; these include the compilation of important data for the Wool Manufacturers Association and estimates of

highway financing costs for the Portland Cement Association.

Incidental to the carrying on of these research activities the library and office facilities of the Division have been completely rearranged and revised so as to minimize the assembling of data needed in future survey undertakings.

A general descriptive bulletin, published by the Institute for this Division in March of this year, has proved an invaluable aid in outlining the work of the Division to interested parties. A special article by Professor Bassett — "The Smoke Problem of Greater Boston," in *Our Boston*, April 1929 — drew much favorable attention.

Articles on the cost of residential building and on factors influencing the location of industrial plants — the latter unpublished as yet — were prepared by members of the staff. A discussion of general industrial trends, based on an analysis of United States Census data and appearing in the *Bulletin of the Taylor Society* in February of this year, was the work of a staff member now on leave of absence with the Federal Trade Commission in Washington.

Throughout the year there has been considerable correspondence which is properly classifiable under this title; a number of talks to civic organizations in several cities were also made both by Professor Bassett and staff members.

A review of the record of the past year would seem to indicate that the work of the Division is no longer in the experimental stage and that in those communities where it has been active, definite and favorable results are being obtained. A problem of salesmanship undeniably exists, and it is planned during the coming year to incorporate a certain amount of publicity in the activities of the Division and enlarge its personal and professional contacts. There seems to be no need, however, to modify in any important particular the original program or methods of procedure determined upon when the Division was established.

It is a most painful duty to record in this report the death early in May of the director of this Division, Professor William A. Bassett. To him is due such success as the Division has met with; his courage, optimism and integrity remain with his co-workers as an inspiration for future achievement. The Division will miss Professor Bassett both as a leader and as a man.

**Geology.** Professor Lindgren, who was on leave of absence during the previous year acting as chairman of the Division of Geology of the National Research Council in Washington, returned and has remained in charge of the Department during the year.

Professor J. L. Gillson has been granted leave of absence for the academic year 1929-1930, and his work will be taken over by other members of the Department. Dr. M. J. Buerger was appointed assistant professor in Mineralogy and Petrography, and will, in part, carry on the work of Professor Gillson.

A course in the Geology of Coal and Petroleum was given during the fall of 1928 by Dr. W. L. Whitehead. As in previous years, Dr. J. A. Cushman has been giving instruction in Micropaleontology to a few students at his laboratories in Sharon. A course in prospecting by seismic methods was given during the year by one of the advanced students, Mr. V. G. Gabriel, who had had special experience in this method.

Much scientific work and research investigations have been carried on during the year. Professor Lindgren devoted much of his spare time to the preparation of an Annotated Bibliography of the International Literature of Economic Geology. In this he was assisted by Professors Gillson and Newhouse. This work, carried on under the auspices of the National Research Council, resulted in the publication in July, 1929, of a volume of 380 pages, in which the literature for 1928 is enumerated and reviewed. This bibliography which has already evoked favorable comments from various sources will be continued during the next year.

Professor Lindgren devoted one month during the summer to the examination of certain ore deposits in Utah, near Bingham.

Professor Shimer completed a book entitled "Evolution and Man," 273 pages, which was published in February, 1929. He also contributed a chapter to the volume of the "World Mechanism" issued by Van Nostrand Company.

Professor Gillson pursued studies on various petrographic subjects, such as the geology of the origin of the alkaline rocks, and the contact metamorphism near Blue Hill, Maine, the latter in coöperation with R. M. Williams, a graduate student. Articles describing these researches were published in the

*Journal of Geology and Economic Geology*. During the summer Professor Gillson was occupied in examining sulphur and barite deposits in southern Texas, and elsewhere.

Professor Newhouse devoted such time as could be spared from the regular work to the investigation of paragenesis in ores, criteria of replacement and the study of lodestone magnetite, all of which researches were published in the *Journal of Economic Geology*, or elsewhere. During the summer he made geological maps of an area in Newfoundland, which includes valuable mineral deposits. He also examined a mine in the vicinity of Porcupine, Ontario, and visited a number of mining camps in Canada. Dr. Newhouse was absent on leave for three months, from December to March, during which he undertook explorations for gold deposits in Venezuela south of the Orinoco River, and was aided by Mr. Zuloaga, an advanced student in the Department.

Professor F. K. Morris, who several years ago carried out extensive work in Mongolia in coöperation with Professor Berkey of Columbia, under the Chapman expedition, completed the second volume of the geological results, and this volume is now in press, Professors Berkey and Morris being co-authors in both. During the summer Professor Morris gave a field course to students in Columbia University, and also devoted much time to the manuscript for a book on the structural geology of Asia. He also undertook various geological studies in New York and Pennsylvania.

Professor Buerger continued his studies on crystal structure referred to in last year's report and published a paper on a new method of light sources in such investigations. His Doctor's thesis, soon to be published, relates to translation gliding in crystals. During the summer Professor Buerger spent two months as assistant to Mr. Lundberg in electrical prospecting for ore bodies in Newfoundland.

Dr. W. L. Whitehead and Mr. W. F. Jones, former assistant professor in this Department, published the results of their investigations of certain geological features in Venezuela.

A number of investigations were undertaken by students for the Master's and Doctor's degrees. Among such investigations should be mentioned a research by Dr. W. V. Smitheringale on manganese minerals, which was published recently in



the *Journal of Economic Geology*; also an investigation of the Lardeau district, B. C., undertaken by Dr. H. C. Gunning, and to be published by the Canadian Geological Survey. Mr. A. C. Abbott carried on a research on the Oruru tin and silver deposits in Bolivia; Mr. Papenfus completed an examination of certain copper ores in New Brunswick and Nova Scotia, while Mr. R. K. Doten investigated the silver-lead ores of Durango, Mexico. Mr. G. F. Flaherty and Mr. J. E. A. Kania investigated certain phases connected with pyritic ore bodies. Mr. Kania also completed an investigation suggesting methods regarding the deposition of limestone in connection with submarine flows. All of these investigations will be published in the near future.

During the year the Department has had nine undergraduate students, and ten graduate students. There were also three special students. It should not be overlooked that although the students registered in the Department are comparatively few, the Department serves a large number of other Departments in the Institute and gives fourteen courses for students in them. The number of students thus served amounts to about two hundred twenty-five.

No radical changes are in view as to instruction or equipment. However, in connection with the increasing number of students it is felt that additional equipment will be needed in the way of microscopes and a two-circle goniometer, also new equipment for preparing polished sections of ores.

**Mathematics.** There has been no marked change in the general course in Mathematics extending through the first two years. The list of Special and Elective subjects has, however, been somewhat revised with the discontinuance of the course in Engineering Science for students in General Engineering, and the introduction of new courses in Analytic Geometry and Advanced Calculus for students in Physics. A committee, including representatives of other departments, under the chairmanship of Professor Phillips, has been appointed to have particular charge of the development of a systematic program in Mathematical Physics.

The management of the *Journal of Mathematics and Physics* has been somewhat modified by the formation of an editorial committee under the chairmanship of Professor C. L. E.

Moore, with regular rotation of membership, Professor Philip Franklin succeeding Professor Moore as managing editor. The *Journal* has become increasingly useful for the publication of research in this and allied departments.

The equipment of the Department has been increased by the purchase of a Marchant Calculating Machine and of a Coradi Harmonic Analyser, which are also available for use by other departments.

Mention should be made of the retirement of Professor Dana P. Bartlett, a valued member of the Department for forty-three years, and of the Faculty for thirty-seven. Professor Bartlett was particularly interested in the creation and maintenance of our department library in the Rogers Building. He conducted the course in Least Squares and Probability, developing a textbook for it.

Professor Woods acted as head of the Department during Professor Tyler's absence during the second term.

**English and History.** For the last nine years the fundamental subjects given by this Department to the first-year and the second-year students have had a substantial amount of time assigned to them by the Faculty; it has been possible, therefore, to provide for these courses a greater breadth of outlook than before in the fields of History and English Literature and to give the students a better command of written and spoken English.

Appreciation of the need of continuing the instruction has been shown by several of the professional departments, which have made a place in their third-year and fourth-year programs for courses in English. In the courses so required in the Departments of Chemical Engineering and Electrical Engineering, particular attention is given to training students in the oral presentation of reports. Beginning in the fall of 1929, a similar course running through both terms will be required of the third-year students in Architecture. Since the methods of the old-time instruction in formal public speaking were not adapted to conditions here, the courses are planned to give men practice that will prepare them for the type of speaking that they will be called upon to do in professional life. On the other hand, the course in Engineering Administration has found it necessary

to drop the third-year work in English which has been a part of its curriculum for the past fourteen years. Since the value of this course was generally recognized, this action was much to be regretted and it is hoped that a way to restore this course to its place of usefulness may be found. It is not thought that too much diversification in the subjects taught leads to economical use of time in instruction. The needs of the various engineering departments are not sufficiently different to warrant such diversification.

**Romance Languages.** A course in French for men in Aeronautical Engineering was given for the first time with gratifying results. In addition to a rapid review of grammar and practice in the pronunciation of aeronautical vocabulary, a wide program of reading was covered, dealing with the structure of aircraft, types of engines, problems of aviation, etc. The reading matter used was taken from current technical French reviews, and in a number of cases was specially recommended by the Department of Aeronautical Engineering.

In the courses for students in Architecture a great deal of new, finely illustrated reading matter imported from France was used for the first time with excellent results.

The Department profited greatly by the fine set of wall maps and charts, recently imported, showing the political divisions, history and civilization of France, its geological structure, distribution of population and industries, its railroads, canals, rivers, etc.

During the year the Faculty passed an important vote, allowing an elementary or intermediate foreign language to be taken as a general study in cases where all entrance language requirements have been met. This will not result in a large increase in numbers in the lower courses, but will be a great benefit to a limited number of serious students desiring to add to their language equipment.

**German.** During the year the progress has been very satisfactory. The attendance has increased by about 50 and the interest has been very good. About 15 students were examined in German for advanced degrees, and a number of increases in the attendance in electives has been noted. Instruction in

Scientific Literature is being sought after by quite a number of students, who display extraordinary interest in the advanced realms of science. The summer courses were all well attended. Professor Vogel again served as Chief Reader in German at the College Board Readings this year.

**Military Science.** The Department of Military Science and Tactics functioned satisfactorily during the past year and considerable progress over the previous year in many minor details was noticed. More and more attention is given by this Department to discipline. It has always been felt that this phase of the Department is of the greatest value to the Institute. Obedience to rules and regulations is a phase of discipline. The Infantry drills given on the parade grounds and in the armory are the best agents for securing this discipline.

In the Academic Department, quite a number of changes have been made in catalogue nomenclature which have been of great advantage not only to the student but to others in looking up various credits, etc. A few changes have been made in the credit system.

In the Coast Artillery Unit the theory and practice of anti-aircraft artillery has been given more prominence in the course, while during the coming year less study will be placed upon more or less obsolete types of seacoast armament.

The R. O. T. C. encampments this year were a marked improvement over any previous years. The strictest of discipline was enforced at Camp Devens with most gratifying results. The engineers unit here was fortunate in having a well informed and well trained faculty of regular army officers as their instructors.

**Hygiene.** The year has been one of most notable progress in the care of the students' health.

Upon the completion and opening of the Homberg Memorial Infirmary with its unexcelled facilities the Medical Department has had placed in its hands enviable resources for the care and treatment of the Faculty, student body and employees; in fact this addition has made it possible for Technology to assume a position of leadership in this field amongst the colleges throughout the country.

The scope of this work can be best illustrated by the following figures: 19,051 visits were made to the Department. Of this number 389 were members of the Faculty, 17,263 of the student body and 1,399 were employees.

It was necessary to send 308 cases to the Infirmary for treatment and 23 operations were performed there. Many men suffering from colds and severe sore throats were sent to the Infirmary and after forty-eight hours were able to resume their studies without further loss of time because of these precautionary measures. A paragraph taken from one of the many letters received proves beyond question how much the boys appreciate the care and attention received.

“The appreciation that every student who has been compelled by illness to go to the Infirmary has expressed of your care and attention is the finest tribute that any group of people could ask, and I am very glad to add my own word from personal contact with many of you to what students have so gladly volunteered.”

During the year 3,068 physical examinations were made: of this number 1,590 were complete and 1,568 were re-examinations. One hundred forty-four were re-examined for R. O. T. C. including vaccinations and typhoid inoculations. Of the total number of men examined 494 were found to have one or more defects. Of these defects 119 were corrected during the year.

Because the Bacteriological Laboratory with all its modern equipment was available, 461 examinations for cultures, urines, blood counts, blood sugar, blood Wassermann and others too numerous to mention were done without added expense to the student. If these men were sent outside to have this done the cost in some instances would amount to over one hundred dollars.

There were twenty-one contagious cases during the year. Of this number two were diphtheria contracted by boys living in one of the fraternity houses. These men were sent at once to the Homeopathic Hospital and the whole house was inoculated including cooks and kitchen help against diphtheria and there was not one single contact case.

By having the facilities available we feel that we were able to prevent a serious epidemic of influenza such as was prevalent in many parts of the country.

The Department has acknowledged with gratitude the

services rendered by Mr. H. S. Ford, Bursar, in the selection and furnishing of its new quarters and coöperation in the executive part of the Department of Hygiene.

**Summer Session.** The enrollment in the Summer Session for 1929 was the largest in the history of the Institute. The total attendance was 1,571, which is more than 100 larger than in any previous Summer Session.

The program of subjects offered for secondary school teachers was enlarged by adding subjects in the field of education. This did not increase the registration, which was about the same as last year, but a more balanced program was offered which may attract more teachers in the future.

Additional emphasis was placed on graduate work by offering a more extended program which attracted a large number of students, the enrollment being about 200.

The colloquium held by the Electrical Engineering Department on the subject of Power Circuit Analysis was a distinct success.

The Public Health Institute held in coöperation with the Metropolitan Life Insurance Company was well attended.

The special course for Army Officers of the Ordnance Department was again offered and aeronautical work was given to a group of naval officers.

The facilities of the Institute are being used to an increasing extent during the summer, there being half as many students enrolled as during the academic year.

**Dean of Undergraduate Students.** For the second successive year there has been a growth in the registration of first-year students, the class of 1932 outnumbering the freshman class of 1931 by 76, an increase of nearly 13 per cent. Of more significance is the fact that the scholastic records of an appreciably smaller percentage of this year's group of freshmen incurred serious criticism by the Faculty. Moreover, the members of the Instructing Staff teaching first year sections have formed the definite impression that the general level of professional promise shown by the class of 1932 is superior to that of the several preceding classes.

Undoubtedly the Institute is now attracting not only

greater numbers but more of the better type of student. For this condition the efforts begun several years ago to give dignified publicity to the opportunities afforded is responsible. Happily, the visiting of the high and preparatory schools and of colleges and universities by members of the Faculty and the Admissions Officer, the regional scholarships for freshmen, the activity of alumni clubs, and of other agencies are bringing traceable results.

Heretofore, too little attention has been paid as to whether an applicant possesses those inherent qualities other than mere scholarship — character, honesty of purpose, reasonably good health — which are fundamental if he is to measure up to the standards expected for future success after graduation. The misapprehension, still widespread in many quarters, that the Institute puts aside every consideration except scholastic ability ought to be, and is being, discouraged. Much is also being done to dissipate the false but nevertheless prevalent feeling that the Institute is to be attempted only by “geniuses.”

Concurrently with the efforts to attract students of exceptional promise, the Admissions Officer and the Dean's office have carried forward the studies of “student mortality” begun in 1927-28. Obviously, elimination prior to entrance, of those unfitted to carry our work successfully, would be best for all concerned. This ideal, however, is not always attainable. In such cases, elimination soon after entrance is imperative. Otherwise there occurs the too common tragedy of a boy doomed to the depression of failure when it is too late for him to seek another form of higher education for which he may possess particular aptitude.

The present entrance examination method of selection, with possible modifications now under consideration, admittedly is the best at present available. Studies show it is certain that students entering by examination without conditions have the best chance for future success at the Institute. A striking example of this is furnished by the records of the 33 students suspended for the remainder of 1927-28 at the midyears in February, 1928, on account of low scholarship. Only 5 of the 33 had clear entrance records. Last fall 20 re-entered the Institute and after a second trial half of these were dropped again. Two others accepted advice to withdraw and of the 8 remaining

only 4 have, on repetition of freshman studies, made satisfactory though not brilliant records.

The pressure of an increasing number of freshmen applicants is an encouraging omen. Cutting down the number selected through the adoption of more difficult entrance requirements is neither needed nor desirable. But this pressure of applicants is having, and will continue to have, the wholesome effect of provoking a more rigid scrutiny of the "raw material" to see that it meets the existing scholastic requirements without "conditions," and that it possesses those fundamental qualities other than scholarship referred to above.

Charged, as it is, with the responsibility of cooperating with the President in matters of general student welfare, the Dean's office has this year fully appreciated the significance of the Homberg Memorial Infirmary. No more timely gift ever came to the Institute, for during 1928-29 the Infirmary made it possible to cope successfully with the local effects of a national epidemic of grippe colds which many other institutions solved only by closing their doors. Nearly 150 cases were treated at the Infirmary and the regular classroom work of the Institute was carried on without interruption, due allowance being made to give sick students an opportunity to recover the work they missed.

The inauguration of a program whereby every male student is examined physically each year he is in residence took place during 1928-29. Hitherto only entering students and seniors have been examined. The expanded program possesses obvious merit in the endeavor to safeguard student health.

Further progress in the expansion of undergraduate athletics, especially in rowing, took place during the year. For the first time the Institute was represented by crews at the Poughkeepsie regatta. Including those interested in rowing, it may be conservatively stated that one out of every three undergraduates has, during 1928-29, participated in active competition for some varsity or intramural team. There are sixteen of the former and nearly one hundred of the latter.

Next to rowing, track and cross country continue to interest the greatest numbers, but the more specialized sports are not denied places. Soccer football and fencing provide forms of exercise appealing especially to foreign students. Outstand-



ing among the "specialized sports" during the past year have been the basket ball team which showed a very high percentage of victories in an active season, the gym team with the best record ever made by an Institute team in this sport, and the swimming team with five individuals and two relay teams breaking existing Institute records.

Student activities, other than athletics, did not experience a particularly flourishing year. However, the experiment of omitting Junior Week and spreading its component functions over the second term proved a desirable change. The Junior Prom was held in late February, the performance of the Tech Show in March, the Spring Concert and dance of the Combined Musical Clubs in April, and the appearance of *Technique* was on the afternoon of Open House Day in late April.

Performances of the Show were confined to Boston and the type of performance was that of a simplified revue rather than the elaborate musical comedy attempted in recent years. Abandonment of the road trip did not result in a lack of competition for parts by undergraduates, as some expected, but it did make this year's production a financial success in direct contrast to recent losses.

The situation on the undergraduate publications calls for consideration and is receiving the attention of the Alumni Advisory Council on Undergraduate Publications. Financially none did especially well during 1928-29, but since each has its trust fund formed from the profits of previous years it is relatively simple to cope with this phase of their difficulties. The real problem seems to be a lack of student willingness to compete for places on the boards with the consequence that incompetent and irresponsible editors and managers are sometimes chosen. A flagrant instance this past year was the publication of an especially offensive number of *Voodoo*. It resulted in prompt censure by the Institute Committee as the undergraduate governing body, and in definite action by the Advisory Council which called for (and received) the resignation of the responsible members of the *Voodoo* board.

During the academic year four students were dismissed by the Faculty and four were placed on probation by the Dean's office for academic misdemeanors. One student was required to withdraw by the President and three were placed on probation by the Dean's office on account of misconduct.

Because of poor scholarship, 147 were dismissed by the Faculty during 1928-29 and 100 were advised to withdraw. Those dismissed in 1927-28, 1926-27 and 1925-26 numbered 146, 145, and 137, respectively.

The administrative work of the Faculty Committee on Undergraduate Scholarships has been a responsibility of the Dean's office for the past three years. There is little realization of how marked has been the increase in the monies Technology has annually available for this worthy purpose. Ten years ago, in 1918-19, they amounted to \$22,683 while for 1928-29 awards totalled \$75,386. For 1929-30, due to several further generous bequests, \$82,810 is already available.

Last year nearly one out of every six undergraduates (364 men and 14 women) received assistance, the grants being of varying amounts based, in accordance with previous policy, on two factors: the applicant's scholastic record and evidences of general need and worthiness.

**Dean of Graduate Students.** The Committee on Graduate Courses and Scholarships has given much attention to the revision of the requirements for the Master's degree. Upon the recommendation of the Committee, the Faculty has adopted new regulations which will go into effect the coming year. These place the requirements for the degree of Master of Science with or without specification of field of study on essentially the same scholastic basis so far as the amount of required advanced study and research is concerned. The difference between the two forms of the degree lies primarily in the extent to which advanced work is concentrated in a specified field. Undergraduate prerequisites in fundamental subjects — Physics, Chemistry, Mathematics, Language, and Cultural studies — are essentially the same in all departments. Undergraduate requirements in professional subjects for students desiring the Master's degree in a specified department are determined by the Committee on Graduate Students of that department. In all cases at least 75 per cent of the program of studies must be chosen from courses intended primarily for graduate students, and not over 25 per cent may be chosen from courses which are regularly open to undergraduates, such courses being for the most part of senior or fourth year grade.

The above requirements for the Master's degree are somewhat higher than those under the former rules, but a study of the curricula upon which Master's degrees have been conferred in recent years indicates that the requirements do not exceed the present practice in most departments. The new regulations will make it possible for graduates of other institutions to qualify for the degree of Master of Science in a specified field of science or engineering without being obliged to complete the equivalent of all subjects required in the corresponding undergraduate curriculum of the Institute. Heretofore this was necessary, and many graduate students in departments whose curricula are radically different from those prescribed at other institutions, found it impossible to obtain a Master's degree in the field in which they concentrated without devoting too much time to the removal of deficiencies in subjects in which they were not interested or which had little bearing upon their professional work. It is expected that hereafter under the new rule nearly all Master's degrees will be conferred in a specified field, as graduate students are strongly advised to concentrate upon a few subjects together with their research in a definite field.

It was feared that the increase in tuition a year ago would tend to decrease the attendance of graduate students. This, however, was not the case as the attendance was the largest on record. On November 1 there were registered 392 graduate students as compared with 365 the preceding year. These were distributed as follows:

	<i>1927</i>	<i>1928</i>
Applicants for Doctor of Philosophy. . . .	34	52
Applicants for Doctor of Science. . . . .	55	48
Applicants for Doctor of Public Health. . .	1	1
Applicants for Master of Science. . . . .	267	280
Applicants for Doctor of Architecture. . .	8	11

The national and international character of this group of students is indicated from the fact that among them were representatives of 147 colleges, 27 of which were outside of the United States. Forty-two states were represented. As usual many of the younger members of the staff registered for graduate work while carrying on their teaching duties. Thus 46 were pursuing

courses leading towards the Master's degree and 48 towards the Doctorate. Every encouragement, both in time and laboratory facilities, is given these young men to carry on research and graduate work. In fact it is this inducement more than any other which makes it possible to attract able young men to the staff.

The number of higher degrees conferred during the school year, October 1928 to June 1929 was 217 distributed as follows:

Doctor of Philosophy.....	14
Doctor of Science.....	6
Master of Science.....	188
Master of Architecture.....	9

Scholarship awards to graduate students were increased in amount the past year to meet the new tuition rates. This was made possible by an appropriation of \$10,000 from general Institute funds. There were also available \$31,760 from graduate scholarship endowment funds, and \$10,950 from funds donated by individuals or industries for scholarships in specified fields. These last scholarships are especially appreciated as they have made it possible for a number of brilliant young men to continue graduate work who could not otherwise have done so. The Swope and Brown Scholarships in Electrical Engineering and Physics have been of great assistance; the Crane and Sloan Research Fellowships for research in automotive engineering have also been productive of excellent results. It would be a great advantage to other departments if friends interested in the development of research and graduate work would make it possible for one or more of the outstanding students in each graduating class to continue their studies for the Master's or Doctor's degree by establishing scholarships of \$1,000 each. With the tuition fee of \$400 this is not an excessive stipend as the remaining sum is inadequate to meet living expenses for the school year unless the student is able to live at home or can supplement it from other sources. The special Travelling Fellowships which have been inaugurated by the President in recent years and awarded, as a mark of distinction, to young men on the staff of outstanding ability, enabling them to travel and study abroad, are also proving of great value not only to the individuals themselves, but to the

Institute as well. The contacts thus made have been further strengthened by the visits of eminent professors from abroad to the Institute. The lecture courses given by them last winter proved particularly satisfactory.

Four numbers of the new publication inaugurated last year entitled "Abstracts of Scientific and Technical Publications from the Massachusetts Institute of Technology" have been issued to date. The number of abstracts together with abstracts of Doctor's theses reflects the research activity throughout the Institute. The publication is serving a very useful purpose in making it possible for the first time for one to form an idea of the extent to which research is being encouraged in the various departments.

**Society of Arts.** Under the auspices of the Society of Arts the annual series of Popular Science Lectures was offered during the winter months December to March inclusive, each lecture being given on Friday, Saturday and Sunday. The attendance at all the lectures was very large. Many applications for tickets to the Sunday afternoon lecture on Aeronautics had to be refused owing to the limited seating capacity of the lecture hall. The Sunday afternoon lectures have now become so well known to the public that applications for tickets are received even before the lectures are announced in the fall. These lectures are proving a most effective means of interesting the public and pupils of the secondary schools in the scientific and engineering work carried on at the Institute, and they are well worth the time and labor which the lecturers devote to their preparation and illustration.

The lectures given the past year were as follows: On December 14, 15 and 16, Professor H. Monmouth Smith of the Department of Chemistry, lectured on "Some Gases, Useful and Harmful." Of special interest were the experiments with the rare gases of the atmosphere, and experiments and a moving picture film illustrating the dangerous properties of carbon monoxide.

On January 11, 12 and 13, Professor Gordon B. Wilkes of the Department of Physics lectured on "Artificial Cold and Its Applications." This timely subject was illustrated by many experiments underlying modern processes of refrigeration.

Experiments with carbon dioxide snow and liquid air were also shown.

On February 8, 9 and 10, Prof. Charles H. Chatfield of the Department of Aeronautical Engineering lectured on "Why an Airplane Flies," illustrated by experiments on model airplanes suspended in a powerful current of air. Following the lecture the new Daniel Guggenheim Aeronautical Laboratory was open for inspection, and most of the audience availed themselves of the opportunity to visit the new building.

The last lecture was given on March 8, 9 and 10. Professor Arthur C. Hardy of the Department of Physics spoke on "Color, Its Nature and Measurement." This subject lent itself to illustration by many striking and beautiful experiments. Among the novel results shown were those obtained by Professor Hardy's recently perfected automatic spectrophotometer, based on the action of a photoelectric cell, on the analysis and recording of colors.

**The Librarian.** The increasing use being made of the Institute Library is to some extent reflected in the statistics of books borrowed for home use, which in the year 1928-29 totalled 49,992 items, as against 46,319 for 1927-28. An increase occurred not only in the Central Library but in all the branch libraries.

These figures, however, give only a partial view of the activities of the Library. No statistics are kept of the large number of readers who use the Library's books within the Library and its branches; nor of Faculty, students, and outside inquirers who are assisted in their research, either in the libraries or over the telephone; nor of bibliographies or reports prepared by the reference assistants; yet in the aggregate as many or more readers are served daily in these ways as borrow books.

There is one other branch of the work, however, in which records are kept, namely the inter-library loan service, the tremendous growth of which is well shown by the following table:

	1925-26	1926-27	1927-28	1928-29
Volumes borrowed.....	225	232	338	496
Volumes lent.....	320	447	581	768

To those who are unacquainted with the possibilities for service of the inter-library loan system the following figures may be of interest:

*Number and Types of Libraries Dealt With in Inter-Library Loan Service, 1928-29:*

<i>Borrowed from</i>		<i>Lent to</i>	
College libraries . . . . .	16	College libraries, United States . . . . .	15
Public libraries . . . . .	5	College libraries, foreign . . . . .	1
Society libraries . . . . .	12	Public libraries . . . . .	12
Industrial libraries . . . . .	7	Society libraries . . . . .	2
United States Government libraries . . . . .	10	Industrial libraries . . . . .	32
State Library . . . . .	1	United States Government libraries . . . . .	2
	—	Hospital libraries . . . . .	4
Total . . . . .	51	Total . . . . .	68

In common with other college libraries the Institute has considered means of reducing the strain put upon it by outside borrowing, but it is necessary to go slowly in formulating restrictions because the reciprocal privilege of borrowing from other libraries is extremely valuable. Thus the Institute has been frequently indebted to the following libraries, to mention only a few: Harvard (Baker and Widener), Yale, Brown, Massachusetts Agricultural College, Cornell, Boston Public Library, Providence Public Library, American Academy of Arts and Sciences, Boston Medical Library, John Crerar Library (Chicago), Stone & Webster library, Massachusetts State Library and in Washington the libraries of the Department of Agriculture, Bureau of Standards, Geological Survey and Surgeon General. Thus the Institute feels under obligation to assist other libraries.

Such assistance, however, is often rendered by providing a photostat copy of an article instead of lending a heavy or expensive volume. During the year photostatic material was supplied in response to 120 requests, many of which came from outside the Institute.

The net increase in the Library in 1928-29, after allowing for books discarded or lost, was as follows:

Volumes added to the Central Library . . . . .	4,785
Volumes added to the branch libraries . . . . .	<u>2,944</u>
Total . . . . .	7,729

Total volumes in the Institute Library and branches, June 30, 1929: 257,838.

The cost of the year's accessions is shown in the following table:

	Books	Periodicals	Binding	Total
From Library Appropriation.....	\$5,076.67	\$4,511.57	\$5,304.53	\$14,892.77
From Endowment Funds.....	3,252.02	.....	78.04	3,330.06
From Departmental Appropriations.	1,291.78	511.32	166.89	1,969.99
Total.....	\$9,620.47	\$5,022.89	\$5,549.46	\$20,192.82

The total contents of the Institute Library now includes, in addition to the Central Library, the following volumes in the branches:

Aeronautics.....	2,673
Architecture.....	5,598
Civil and Sanitary Engineering.....	3,286
Economics.....	4,644
Geology.....	3,253
Mathematics.....	3,405
Mining and Metallurgy.....	7,777
Modern Languages.....	1,490
Naval Architecture.....	3,525
Walker Memorial.....	7,776
Others.....	3,043
Total.....	46,470

Before the opening of the fall term one major undertaking was completed, namely the rearrangement of the bound periodical section on the main stack floor. This collection, probably the most used portion of the Library, was badly crowded, without room for growth. By removal of the books in the old Treasure Room to the sixth floor, much extra space was gained for periodicals and better provision was made for the Treasure Room. This task, which involved the shifting of about 30,000 books, was accomplished with student help. All three stacks are now in excellent condition, with room, according to present estimates, for from fifteen to twenty years' growth, unless unforeseen circumstances should bring an exceptional rise in



the annual rate of increase. Before that time again brings crowded shelves, however, let us hope some far-seeing alumnus or group of alumni will have provided the Institute with a new library building, worthy to rank alongside the modern, well-planned structures recently erected for Dartmouth, Holy Cross and Yale.

Another step towards improving service to readers working in the stacks was the providing of more practical working tables and chairs. For a standard table the type in use in the stalls at the Widener and Baker libraries (Harvard) was adopted, although modified so as to cost much less than those; and the Windsor chair was chosen as the most comfortable type for a man engaged in research work. Forty of each were supplied during the winter, and more will be added as needed.

In the Economics branch (1-290) the great growth in business literature made necessary the installation of a free-standing, double-faced stack which has helped greatly to relieve congestion there.

When the Guggenheim Aeronautical Laboratory was planned a room was set aside for a branch library. In the early fall all books on aeronautics except those belonging to the Vail Collection were transferred to the new branch, which was opened in October with a branch librarian appointed and paid by the Department of Aeronautical Engineering. This is one case where library decentralization may be said to be fully justified, because of the detached location of the Guggenheim Laboratory.

An instance of interdepartmental coöperation by which the Library benefited should be mentioned. For a long time our order and accounting system had been outgrown and inadequate. At the request of the Librarian, Professor Porter of the Department of Economics made a careful study of our needs, lasting over several weeks. He worked out a thoroughly modern order system, and made specific recommendations for a new method of bookkeeping. Both have been adopted and promise good results. The debt of the Library to Professor Porter for this valuable service is here acknowledged.

The Librarian attended the organization meeting of the new Faculty Committee on the Library on May 1, at which the method of apportionment of the Library appropriation

among the various departments was under discussion, and prepared numerous memoranda for this and a subsequent meeting.

The work of the Institute now covers such wide and diverse fields, not only in teaching but in research, that the demands upon the Library, from our own men, for the latest information in print, bear little direct relation to the size of the student body. These demands are with few exceptions reasonable, but many we are unable to meet out of our own resources, hence the extent of our borrowing from other libraries. Moreover the present high cost of the type of books we buy should be borne in mind. In short, it is the character of the work done here at the Institute, rather than the number of students, that makes imperative the maintenance of the Library's resources and service at a high level.

In this connection might be mentioned the problem, not yet satisfactorily solved, of the amount and nature of the service which the Library can render to firms and individuals not connected with the Institute, and upon what terms it can be rendered. More and more the Institute Library is coming to be recognized as the leading library of scientific and technical literature east of New York City, and one of the largest of its class in the country, with the result that calls upon us from outside the Institute are steadily increasing. The Library responds to these calls cheerfully so far as it can do so without handicapping our own men; but a definite plan for handling this growing service must soon be worked out.

The printed catalogue of Walker Memorial Library, which was suggested as one means towards making the resources of that library better known to more students, is now in preparation, work having been begun in March. It is planned to have this catalogue of such size as to slip easily into a student's pocket and of such typographical appearance as to invite inspection and lead to many subsequent trips to the Library.

Twice during the year, the Librarian gave a practical talk to the students in Chemistry and Physics in regard to the use of the Library, the Reference Librarian coöperating. The Vail Librarian as usual attended Electrical Engineering seminars regularly, and gave three talks to students on the use of the Library. She compiled, in collaboration with Professor

Murray F. Gardner, a "Classified List of Theses in Electrical Engineering, 1902-1929," and has continued to act as chairman of the Electrical Engineering Committee of the national Special Libraries Association. Several members of the staff have been frequent attendants at the meetings of the Special Libraries Association of Boston, and have taken part in its activities.

The largest gift of books in several years was presented this year by the Misses Isabel F. and Sarah A. Hyams of Dorchester, who allowed the Librarian to select desirable volumes from the library of their late brother, Godfrey M. Hyams. Miss Isabel Hyams was a member of the Class of 1888. This generous gift totalled 1,286 bound volumes and many pamphlets and unbound periodicals. It included a set of Buffon's *Histoire Naturelle* in 127 volumes (1800-1808) and the five volumes of Haüy's *Traité de Minéralogie* (1801).

Other donors of noteworthy gifts were:

Mr. Samuel M. Felton, '73, a member of the Corporation: 138 volumes, principally in civil engineering.

Mrs. Herbert Dabney: 163 volumes of general literature, particularly books of travel, a valuable addition in a field in which our resources have been limited.

Estate of Charles W. Eaton, '85: 107 volumes of general literature.

Estate of Professor Shugrue: 100 volumes, mainly in economic subjects.

Frank L. Smith, '79: 31 volumes from the library of his brother, Morrell A. Smith, '75.

Frank H. Briggs, '81: 58 volumes, mainly fiction, of which we have had but little.

Université de Liège: 40 volumes and brochures.

The Earl of Camperdown: the publications of the Institution of Civil Engineers, the Junior Institution of Engineers, the Institution of Naval Architects, and the Iron and Steel Institute.

Professor Theodore Rehbock, visiting lecturer: 26 papers on hydraulics.

The Boston Chapter of the American Society for Steel Treating: a subscription to the Transactions.

The Technology Review: 15 volumes.

The Hindustan Club: 13 volumes on India.

Guillermo Zuloaga: *Histoire naturelle illustrée* (Larousse). 6 volumes.

As in previous years, the Library is indebted to several members of the Faculty for the renewed gift of various periodicals and society publications; among such donors are Professors Bigelow, Gill, Waterhouse, Locke, Richards, Dewey, and former Professor Kennelly.

The following members of the Instructing Staff presented the Library with copies of their own works:

Prof. V. Bush: *Operational Circuit Analysis*.

Prof. C. H. Chatfield and C. F. Taylor: *The Airplane and Its Engine*.

Prof. O. G. C. Dahl: *Electric Circuits*, Volume 1.

Prof. M. P. Horwood: *Health Survey of Cambridge in Relation to Tuberculosis*.

Prof. W. S. Hutchinson and H. T. Mann: *Mining Economics*.

Prof. J. S. Newell and A. S. Niles: *Airplane Structures*.

Prof. H. W. Shimer: *Evolution and Man*.

Prof. F. S. Woods and F. H. Bailey: *Elementary Calculus*. 2 copies.

Other gifts were received also from members of the Instructing Staff and from alumni and undergraduates.

**The Registrar.** The total registration increased for the second successive year. The largest growth was in the first-year class, where the increase was 76 or 13 per cent. The number of graduate students passed the 400 mark for the first time.

The course having the largest registration was Electrical Engineering with 513, Chemical Engineering being second with 318. The Aeronautical course ranked sixth with an enrollment of 224. There were 93 freshmen, or one-seventh of the class, competing for the 35 places in the second-year class of this course.

Fifty-two, or about one-eighth of those who received the Bachelor's degree in June 1928, registered for graduate work the following year. Of the 706 degrees awarded last year, 216 or 31 per cent were advanced degrees.

The continued increase in the freshman class again forecasts a growth in the total registration.

Statistics for the year 1928-1929 follow:

THE CORPUS OF INSTRUCTORS  
(November 1)

	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28
Professors: Emeriti	1	3	3	3	4	4	4	5	5	5	6	5	8	8	7	7	6	6	4
Retired	1	3	3	3	4	5	7	7	6	6	6	7	6	5	5	7	5	4	3
Non-Resident	3	3	3	3	3	3	2	2	2	2	2	2	2	3	3	3	3	4	4
Research (Not counted elsewhere)	—	4	3	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	5	13	12	10	12	12	13	14	13	13	14	14	16	16	15	17	14	13	11

Professors	43	40	47	46	59	63	61	59	58	52	56	56	56	61	64	63	68	73	82
Associate Professors	18	17	16	23	23	23	30	32	29	33	34	35	40	43	42	49	55	58	61
Assistant Professors	30	33	35	33	36	31	36	38	33	39	49	54	48	46	51	53	51	58	64
Instructors (Members of Faculty)	—	—	—	—	—	—	—	—	—	—	—	25	30	25	17	14	11	10	8
Active Faculty	91	90	98	102	118	117	127	129	120	124	139	170	174	175	174	179	185	199	215
Instructors (Not members of Faculty)	66	64	67	74	70	79	90	70	67	99	109	84	80	92	98	112	116	115	119
Assistants	55	50	49	54	52	58	54	38	35	39	79	93	87	60	59	53	63	55	53
Faculty Instructors and Assistants	212	204	214	230	240	254	271	237	222	262	327	347	341	327	331	334	364	369	387
Research Associates	8	5	3	1	3	3	5	4	1	8	19	19	19	25	26	21	24	29	22
Research Assistants	5	6	7	8	15	11	14	7	5	10	15	13	16	17	21	29	38	39	49
Lecturers	21	25	16	19	23	28	31	29	13	13	14	15	15	6	16	21	23	30	29
Total Active Members	246	240	240	258	281	296	321	277	241	293	375	394	391	375	394	415	449	467	487

REGISTRATION SINCE THE FOUNDATION OF THE INSTITUTE  
(As of November 1)

Year	Number of Students	Year	Number of Students	Year	Number of Students
1865-66	72	1887-88	720	1909-10	1,479
1866-67	137	1888-89	827	1910-11	1,506
1867-68	167	1889-90	909	1911-12	1,559
1868-69	172	1890-91	937	1912-13	1,611
1869-70	206	1891-92	1,011	1913-14	1,685
1870-71	224	1892-93	1,060	1914-15	1,816
1871-72	261	1893-94	1,157	1915-16	1,900
1872-73	348	1894-95	1,183	1916-17	1,957
1873-74	276	1895-96	1,187	1917-18	1,698
1874-75	248	1896-97	1,198	1918-19	1,819
1875-76	255	1897-98	1,198	1919-20	3,078
1876-77	215	1898-99	1,171	1920-21	3,436
1877-78	194	1899-00	1,178	1921-22	3,505
1878-79	188	1900-01	1,277	1922-23	3,180
1879-80	203	1901-02	1,415	1923-24	2,949
1880-81	253	1902-03	1,608	1924-25	2,938
1881-82	302	1903-04	1,528	1925-26	2,813
1882-83	368	1904-05	1,561	1926-27	2,671
1883-84	443	1905-06	1,466	1927-28	2,712
1884-85	579	1906-07	1,397	1928-29	2,868
1885-86	609	1907-08	1,415		
1886-87	637	1908-09	1,461		

CLASSIFICATION OF STUDENTS BY COURSES AND YEARS (As of November 1)

Course Name and Number	1926-27						1927-28						1928-29					
	YEAR						YEAR						YEAR					
	1	2	3	4	G	Total	1	2	3	4	G	Total	1	2	3	4	G	Total
Aeronautical Engineering XVI . . . . .	28	21	7	14	72	15	60	45	38	12	15	170	93	36	37	31	27	224
Architectural Engineering IV-A . . . . .	22	42	29	17	110	35	17	18	35	20	90	22	15	16	16	3	3	284
Architecture IV . . . . .	36	38	33	5	150	32	42	56	50	30	9	189	54	45	61	47	11	216
Army Ordnance . . . . .	—	—	—	8	8	—	—	—	—	—	—	10	—	—	—	—	—	10
Biology and Public Health VII . . . . .	2	2	6	12	36	8	4	14	12	13	8	51	10	14	15	16	13	68
Building Construction XVII . . . . .	—	—	—	—	—	—	20	25	21	—	—	66	25	27	24	14	—	90
Chemical Engineering X . . . . .	53	53	61	42	239	30	61	63	54	49	31	258	60	60	59	43	39	261
Chemical Engineering Practice X-A, X-B . . . . .	—	—	—	5	42	47	—	—	—	—	—	42	—	—	—	—	—	42
Chemistry V . . . . .	22	19	21	15	45	122	13	20	19	16	40	108	26	23	16	17	41	123
Civil Engineering I . . . . .	56	51	65	84	17	273	63	38	45	63	24	233	67	54	49	48	25	243
Electrical Engineering VI . . . . .	97	71	92	106	68	434	75	48	70	77	81	351	70	44	49	73	63	299
Electrical Engineering VI-A . . . . .	21	49	49	33	36	188	51	41	39	44	28	203	45	59	35	32	43	214
Electrochemical Engineering XIV . . . . .	9	11	16	8	50	18	16	10	11	13	5	55	18	11	6	11	4	80
Engineering Administration XV . . . . .	63	73	100	97	334	83	61	86	76	83	1	307	68	80	76	72	7	803
Fuel and Gas Engineering . . . . .	—	—	—	—	8	—	—	—	—	—	14	14	—	—	—	—	—	13
General Engineering IX-B . . . . .	3	9	10	22	44	—	5	4	9	14	—	32	6	6	4	14	—	30
General Science IX-A . . . . .	2	1	1	2	6	—	2	2	2	2	—	10	3	1	2	5	—	11
Geology XII . . . . .	1	1	1	3	9	15	1	1	2	2	8	14	5	2	3	5	11	26
Mathematics IX-C . . . . .	2	2	3	4	17	3	—	6	3	6	3	18	4	4	1	5	5	19
Mechanical Engineering II . . . . .	55	70	76	94	34	316	66	58	64	77	32	297	47	87	57	60	32	283
Metallurgy III, 4 . . . . .	1	7	9	5	9	31	3	1	8	9	6	27	3	—	2	7	6	18
Military Engineering . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mining Engineering III, 2 . . . . .	5	4	7	9	3	26	6	7	7	2	24	9	11	18	13	4	1	33
Naval Architecture and Marine Engineering XIII . . . . .	9	7	8	9	2	35	15	7	11	5	1	39	17	18	8	6	1	55
Naval Construction XIII-A . . . . .	—	—	—	9	6	15	—	—	6	9	15	—	—	—	—	6	6	12
Physics VIII . . . . .	6	10	4	4	7	31	5	11	10	3	18	47	6	8	10	7	13	44
Railroad Operation I-A . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sanitary and Municipal Engineering XI . . . . .	2	6	5	4	—	17	3	2	6	6	—	17	3	3	6	5	2	19
Unclassified . . . . .	—	—	—	—	33	—	—	—	—	—	—	25	—	—	—	—	—	45
Totals . . . . .	495	547	603	631	362	2,671	592	559	590	572	374	2,712	668	615	552	576	412	2,868

CLASSIFICATION BY COURSES OF STUDENTS SINCE 1920

	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29
<i>Engineering Courses</i>	3,117	3,069	2,767	2,599	2,548	2,423	2,253	2,240	2,305
<i>Total</i>									
Aeronautical Engineering XVI	7	10	15	12	14	15	72	170	224
Architectural Engineering IV-A	47	54	38	67	68	92	110	90	84
Building Construction XV								66	94
Chemical Engineering X, X-A, X-B	526	492	430	370	313	294	286	300	318
Civil Engineering I	377	312	319	326	322	298	273	233	260
Electrical Engineering VI, VI-A, VI-C	561	657	658	627	676	711	622	554	513
Electrochemical Engineering XIV	105	98	74	79	61	58	50	55	50
Engineering Administration XV	529	572	484	417	421	365	334	307	303
Fuel and Gas Engineering							8	14	13
General Engineering IX-B	34	47	75	115	99	81	44	32	30
Mechanical Engineering II	651	580	471	417	397	365	329	297	283
Military Engineering							1		
Mining Engineering and Metallurgy III	140	121	94	85	96	68	57	51	51
Naval Architecture and Marine Engineering XIII	95	78	59	46	40	39	35	39	55
Naval Construction (Grad. U. S. N. A.) XII-A	30	32	41	12	12	19	15	15	12
Naval Construction (Not Grad. U. S. N. A.) XIII-A Sp.				17	17				
Sanitary and Municipal Engineering XI	15	16	9	9	12	15	17	17	19
<i>Science Courses</i>	188	208	231	226	220	219	227	248	291
<i>Total</i>									
Biology and Public Health VII	24	30	26	34	32	41	36	51	68
Chemistry V	93	106	128	130	127	110	122	108	123
General Science IX-A	8	8	11	13	10	10	6	10	11
Geology XII	19	22	20	17	20	21	15	14	26
Mathematics IX-C	2	1	8	10	10	13	17	18	19
Physics VIII	42	41	38	22	21	24	31	47	44
<i>Architecture IV</i>	83	87	117	88	126	133	150	189	218
<i>Army Ordnance</i>									
<i>School of Public Health</i>									
<i>Unclassified</i>	25	20	25	18	12	9	8	10	9
<i>Total</i>	23	95	40	18	32	29	33	25	45
<b>Grand Total</b>	<b>3,436</b>	<b>3,505</b>	<b>3,180</b>	<b>2,949</b>	<b>2,938</b>	<b>2,813</b>	<b>2,671</b>	<b>2,712</b>	<b>2,868</b>

## GEOGRAPHICAL CLASSIFICATION OF STUDENTS, 1928

UNITED STATES			
<i>North Atlantic</i> . . . . .	Total 2,098	<i>North Central</i> . . . . .	Total 270
Connecticut . . . . .	81	Illinois . . . . .	80
Maine . . . . .	47	Indiana . . . . .	13
Massachusetts . . . . .	1,411	Iowa . . . . .	8
New Hampshire . . . . .	41	Kansas . . . . .	13
New Jersey . . . . .	96	Michigan . . . . .	24
New York . . . . .	278	Minnesota . . . . .	14
Pennsylvania . . . . .	102	Missouri . . . . .	43
Rhode Island . . . . .	26	Nebraska . . . . .	5
Vermont . . . . .	16	North Dakota . . . . .	3
		Ohio . . . . .	50
		South Dakota . . . . .	—
		Wisconsin . . . . .	17
<i>South Atlantic</i> . . . . .	Total 138	<i>Western</i> . . . . .	Total 89
Delaware . . . . .	10	Arizona . . . . .	4
District of Columbia . . . . .	57	California . . . . .	32
Florida . . . . .	13	Colorado . . . . .	14
Georgia . . . . .	7	Idaho . . . . .	3
Maryland . . . . .	18	Montana . . . . .	7
North Carolina . . . . .	10	Nevada . . . . .	—
South Carolina . . . . .	5	New Mexico . . . . .	1
Virginia . . . . .	12	Oklahoma . . . . .	3
West Virginia . . . . .	6	Oregon . . . . .	9
		Utah . . . . .	4
		Washington . . . . .	12
		Wyoming . . . . .	—
<i>South Central</i> . . . . .	Total 71	<i>Territories and Dependencies</i>	
Alabama . . . . .	6	Total 19	
Arkansas . . . . .	2	Alaska . . . . .	1
Kentucky . . . . .	14	Canal Zone . . . . .	—
Louisiana . . . . .	5	Hawaii . . . . .	3
Mississippi . . . . .	4	Philippine Islands . . . . .	8
Tennessee . . . . .	8	Porto Rico . . . . .	6
Texas . . . . .	32	Virgin Islands . . . . .	1
Foreign Countries . . . . .			183
Grand Total . . . . .			2,868



LIST OF AMERICAN COLLEGES AND UNIVERSITIES, WITH NUMBER OF GRADUATES ATTENDING THE INSTITUTE 1928-1929

College	College	College			
Alabama Polytechnic In. . . . .	3	Holy Cross . . . . .	1	Rutgers . . . . .	1
Albion . . . . .	1	Idaho . . . . .	1	St. Olaf . . . . .	1
Alfred . . . . .	1	Illinois . . . . .	8	St. Paul . . . . .	2
Allegheny . . . . .	1	Iowa State . . . . .	2	Shurtleff . . . . .	1
Amherst . . . . .	2	Iowa University . . . . .	1	Simmons . . . . .	4
Antioch . . . . .	1	Johns Hopkins . . . . .	1	Simmons (Texas) . . . . .	1
Armour Institute of Tech. . . . .	1	Kansas State Agric. . . . .	4	Smith . . . . .	3
Assumption . . . . .	1	Kentucky . . . . .	4	South Carolina . . . . .	2
Bates . . . . .	2	Kenyon . . . . .	2	Southern California . . . . .	1
Baylor . . . . .	1	Lafayette . . . . .	2	Southwestern . . . . .	1
Boston College . . . . .	6	Lake Forest . . . . .	1	Stanford . . . . .	3
Boston University . . . . .	5	Lincoln University . . . . .	1	Stetson . . . . .	1
Bowdoin . . . . .	4	Louisiana State . . . . .	2	Stevens Inst. of Tech. . . . .	1
Brooklyn Polytechnic In. . . . .	1	Louisville . . . . .	1	Suffolk Law . . . . .	1
Bucknell . . . . .	1	Lowell Textile Inst. . . . .	2	Swarthmore . . . . .	1
Buffalo . . . . .	1	Loyola . . . . .	1	Syracuse . . . . .	1
Butler . . . . .	1	Maine . . . . .	3	Texas . . . . .	4
California . . . . .	5	Manhattan . . . . .	1	Texas Agri. & Mech. . . . .	3
California Inst. of Tech. . . . .	1	Maryland . . . . .	2	Tufts . . . . .	4
Carleton . . . . .	1	Mass. Inst. of Tech. . . . .	133	Tulane . . . . .	1
Carnegie Inst. of Tech. . . . .	2	Miami . . . . .	1	Union . . . . .	1
Central Mo. State Teach. . . . .	1	Michigan . . . . .	4	U. S. Military Acad. . . . .	12
Chattanooga . . . . .	1	Michigan School of Mines . . . . .	1	U. S. Naval Acad. . . . .	23
Cincinnati . . . . .	1	Middlebury . . . . .	1	Utah Agricultural . . . . .	1
Clark . . . . .	1	Minnesota . . . . .	3	Vanderbilt . . . . .	1
Clemson Agricultural . . . . .	1	Mississippi Agri. & Mech. . . . .	1	Vassar . . . . .	2
Coe . . . . .	1	Missouri . . . . .	1	Vermont . . . . .	1
Colby . . . . .	1	Montana . . . . .	1	Virginia Military Inst. . . . .	4
Colgate . . . . .	2	Muhlenberg . . . . .	1	Virginia Polytechnic Inst. . . . .	1
Colorado School of Mines . . . . .	1	Nebraska . . . . .	1	Washington . . . . .	6
Colorado University . . . . .	3	Nevada . . . . .	2	Washington and Lee . . . . .	1
Columbia . . . . .	3	New Hampshire . . . . .	1	Washington State . . . . .	1
Cornell . . . . .	6	North Carolina . . . . .	2	Wellesley . . . . .	7
Dartmouth . . . . .	7	North Carolina State . . . . .	1	Wesleyan . . . . .	4
Dayton . . . . .	1	North Dakota Agricultural . . . . .	1	West Virginia . . . . .	2
Delaware . . . . .	2	Northeastern . . . . .	3	William Jewell . . . . .	2
DePauw . . . . .	1	Norwich . . . . .	1	Williams . . . . .	7
Detroit . . . . .	1	Notre Dame . . . . .	3	Wisconsin . . . . .	2
Drexel Institute . . . . .	2	Oberlin . . . . .	2	Wittenberg . . . . .	1
Duke . . . . .	1	Ohio State . . . . .	1	Worcester Polytechnic In. . . . .	2
Elon . . . . .	1	Ohio Wesleyan . . . . .	2	Yale . . . . .	13
Emory and Henry . . . . .	1	Pennsylvania State . . . . .	5	Total . . . . .	494
Emporia . . . . .	1	Pennsylvania University . . . . .	5	No. of American Colleges	
Franklin and Marshall . . . . .	1	Physicians and Surgeons . . . . .	1	Represented . . . . .	155
Furman . . . . .	2	Pomona . . . . .	1	No. of Foreign Colleges	
Gallaudet . . . . .	1	Princeton . . . . .	7	Represented (Not	
Geneva . . . . .	1	Providence . . . . .	7	listed) . . . . .	46
George Washington . . . . .	3	Purdue . . . . .	2	Total . . . . .	201
Georgia School of Tech. . . . .	1	Radcliffe . . . . .	3	No. of College Gradu-	
Gonzaga . . . . .	1	Randolph-Macon . . . . .	2	ates Registered for Ad-	
Grinnell . . . . .	4	Reed . . . . .	2	vanced Degrees . . . . .	373
Hamilton . . . . .	4	Regis . . . . .	1	No. of College Gradu-	
Hampden-Sydney . . . . .	1	Rhode Island State . . . . .	2	ates Registered for	
Harvard . . . . .	14	Rice Institute . . . . .	3	Bachelor's Degree . . . . .	172
Haverford . . . . .	2	Rochester . . . . .	2	Total . . . . .	545
Hiram . . . . .	1	Rockhurst . . . . .	1		
Hobart . . . . .	1	Rose Polytechnic Inst. . . . .	2		

SUMMARY OF DEGREES AWARDED

Bachelor of Science . . . . .	Total	12,402
Master of Science . . . . .		1,764
Master in Architecture . . . . .		56
Doctor of Engineering (Discontinued after 1918) . . . . .		4
Doctor of Public Health . . . . .		3
Doctor of Science . . . . .		59
Doctor of Philosophy . . . . .		117
Grand Total . . . . .		14,405

## NUMBER OF DEGREES AWARDED IN JANUARY AND JUNE, 1929

Name of Course	S.B.		S.M.		M.Arch.		Ph.D.		Sc.D.		Dr.P.H.		Totals	
	Jan.	June	Jan.	June	Jan.	June	Jan.	June	Jan.	June	Jan.	June	Jan.	June
Aeronautical Engineering . . . . .	1	24	—	4	—	—	—	—	—	—	—	—	1	28
Architectural Engineering . . . . .	3	24	—	1	—	—	—	—	—	—	—	—	3	25
Architecture . . . . .	5	20	—	—	—	9	—	—	—	—	—	—	5	29
Biology and Public Health . . . . .	—	1	—	—	—	—	3	—	—	—	—	—	1	4
Building Construction . . . . .	11	8	—	—	—	—	—	—	—	—	—	—	11	45
Civil Engineering . . . . .	4	28	—	6	—	—	—	—	—	—	—	—	4	34
Chemical Engineering . . . . .	—	11	—	3	—	—	—	—	3	—	—	—	4	30
Chemical Engineering Practice . . . . .	—	18	—	4	—	—	—	—	—	—	—	—	—	28
Chemistry . . . . .	—	11	—	4	—	—	—	—	—	—	—	—	—	28
Electrical Engineering (Inc. VI-A) . . . . .	13	82	9	63	—	—	—	—	—	—	—	—	22	145
Electrochemical Engineering . . . . .	2	10	—	2	—	—	—	—	—	—	—	—	2	12
Engineering Administration . . . . .	11	63	—	—	—	—	—	—	—	—	—	—	11	65
Fuel and Gas Engineering . . . . .	—	—	—	6	—	—	—	—	—	—	—	—	—	6
Geology . . . . .	—	2	—	4	—	—	—	—	—	—	—	—	1	7
General Engineering . . . . .	2	11	—	—	—	—	—	—	—	—	—	—	2	11
General Science . . . . .	1	1	—	—	—	—	—	—	—	—	—	—	1	1
Industrial Biology . . . . .	—	6	—	—	—	—	—	—	—	—	—	—	—	6
Mathematics . . . . .	—	5	—	2	—	—	—	—	—	—	—	—	—	8
Mechanical Engineering . . . . .	8	53	—	13	—	—	—	—	—	—	—	—	8	66
Mining Engineering . . . . .	2	2	—	—	—	—	—	—	—	—	—	—	2	2
Metallurgy . . . . .	2	4	—	—	—	—	—	—	—	—	—	—	2	5
Naval Architecture and Marine Engineering . . . . .	—	3	—	—	—	—	—	—	—	1	—	—	—	4
Naval Construction . . . . .	—	—	—	6	—	—	—	—	—	1	—	—	—	6
Physics . . . . .	1	3	—	1	—	—	—	—	—	—	—	—	2	5
Sanitary and Municipal Engineering . . . . .	1	5	—	1	—	—	—	—	—	—	—	—	2	5
Without Course Classification . . . . .	—	—	2	38	—	—	—	—	—	—	—	—	2	38
Totals . . . . .	67	423	13	174	—	9	3	11	—	6	—	—	83	623

## The Treasurer

The statements submitted herewith show the financial condition of the Massachusetts Institute of Technology as of June 30, 1929, as well as the financial transactions during the fiscal year ended on that date.

The following gifts and legacies have been received during the year:

### Capital Gifts:

Alfred P. Sloan, for new Aero Engine Laboratory.	\$65,000.00
Relatives of R. M. Homberg, '23 (deceased), for Memorial Infirmary (additional) . . . . .	35,150.00
Daniel Guggenheim Foundation, for Meteorology.	34,000.00
Estate of E. D. Barbour (additional) . . . . .	16,869.09
Estate of H. C. Frick (additional) . . . . .	191,208.11
Estate of George A. Osborne, for Mathematical Library . . . . .	10,000.00
William T. Sedgwick Trust Fund . . . . .	69,619.34
Estate of S. H. Thorndike . . . . .	15,000.00
Elihu Thomson, for Special Fund . . . . .	5,000.00
Redfield Proctor, for Vermont Scholarship (additional) . . . . .	2,000.00
Harriet A. Henshaw, for F. W. Boles Memorial (additional) . . . . .	10,200.00
Samuel C. Cobb Fund (additional), for Salaries . . . . .	25.00
Mary Frances Drown, for Thomas M. Drown Fund	50,000.00
Estate of Charles W. Eaton (additional) . . . . .	27,288.51
Industrial Fund Payments . . . . .	19,681.00
Estate of David L. Jewell, for Relief Fund . . . . .	25,000.00
Educational Endowment Fund Payments . . . . .	938.33
Alumni Dormitory Fund Payments . . . . .	108,344.85
Class of 1898 Loan Fund (additional) . . . . .	1,585.00
Class of 1896 Scholarship Fund (additional) . . . . .	630.00
Class of 1904 Prize Fund (additional) . . . . .	10.00
	<hr/>
	\$687,549.23

### Miscellaneous Gifts:

Louis J. and Mary E. Horowitz, for Course in Building Construction . . . . .	\$11,500.00
General Electric Co., for Courses VI and VIII . . . . .	20,000.00
American Telephone and Telegraph Company, for Course VI . . . . .	5,000.00
Boston and Maine Railroad for Course I-A . . . . .	3,000.00
Contributions for Eastman Portrait . . . . .	10,170.66
Contributions for Maclaurin Portrait . . . . .	5,493.21
H. M. Crane, for Equipment of Aeronautical Engine Laboratory . . . . .	20,000.00
H. M. Crane, for Fellowship . . . . .	1,000.00
E. I. du Pont de Nemours Co., for Fellowship . . . . .	750.00
E. I. du Pont de Nemours Co., for Scholarship . . . . .	\$400.00
Gerard Swope, for Fellowships . . . . .	2,500.00
Eastman Kodak Co., for Biocinema Research . . . . .	1,430.76
Lammot du Pont, for Rowing . . . . .	2,000.00
Lammot du Pont, for Summer Camp Loans . . . . .	500.00
Contributions to Bursar's Fund, for Loans . . . . .	165.00

(Continued)

Contributions to Course XV Fund . . . . .	45.00	
S. M. Weston, for Scholarship . . . . .	200.00	
F. E. Weston, for Scholarship . . . . .	200.00	
Contributions toward Tuition Fees. . . . .	1,000.00	
		\$85,354.63
		\$772,903.86

During the year our land holdings west of Massachusetts Avenue have been increased by the purchase of approximately 200,000 square feet. There have been additions to plant and equipment through gifts of Messrs. A. P. Sloan and H. M. Crane for a new Aeronautical Engine Testing Laboratory.

The Homberg Infirmary, which was opened in July, 1928, is one of the most useful additions to our facilities in recent years. Normal equipment is fifteen beds, but during the influenza epidemic in February the number of beds was temporarily doubled upon twenty-four hours' notice. Arrangements have been made so that in any future emergency the normal number of beds may be trebled.

A new schedule, that of the Department of Hygiene, including the operation of the Homberg Infirmary, is given in this report (Schedule C-6, page II). The increased expense of the department due to the operation of the Infirmary was \$12,500.

Tuition was increased this year from \$300 to \$400. By the elimination of laboratory and other fees, this represents an actual addition in cost to the student of only about \$80. The net increase in income is about \$220,000.

Our total investments have a book value of about \$30,000,000. About 23 per cent of the total is invested in stocks with the result that the market value considerably exceeds the book value.

Due to special circumstances, the Eastman Contract and the H. C. Frick Funds, amounting to about \$10,000,000, are separately invested. There are seven other funds totaling about \$800,000 which, owing to the terms of gift, have to be invested separately. The provision for separate investment of these funds is detrimental to them, both from the standpoint of security and of income.

The other one hundred fifty Funds are consolidated into our General Investment Account, which has a book value of about \$18,500,000. The income for the year on this account was 5.69 per cent, of which 5.55 per cent was allocated as the income of each fund. The balance was allocated to Endowment Reserve, which now exceeds \$635,000.

A financial statement of the Trustees of the Massachusetts Institute of Technology Pension Association follows herewith:

BALANCE SHEET, JUNE 30, 1929

<i>Assets</i>	
Investments (as listed below) . . . . .	\$252,659.50
Cash . . . . .	9,109.60
Total . . . . .	<u>\$261,769.10</u>

<i>Liabilities</i>	
Teachers' Annuity Fund (5% salary deduction plus interest) . . . . .	\$144,410.35
M. I. T. Pension Fund (3% of salary deducted, plus interest) . . . . .	90,934.61
Reserve Fund (and interest). . . . .	26,424.14
Total . . . . .	<u>\$261,769.10</u>

<i>Investments (as above)</i>				
\$5,000	Dominion of Canada . . . . .	5½%	1929	\$5,000.00
10,000	Dominion of Canada . . . . .	4½%	1936	9,825.00
10,000	Montreal, City of. . . . .	5%	1936	10,000.00
15,000	Gov't. of U. K., G. B. & Ireland . . . . .	5½%	1937	15,443.00
15,000	Allis Chalmers Mfg. Co. . . . .	5%	1937	15,007.00
6,000	American Sugar Refining Co. . . . .	6%	1937	6,173.00
15,000	Chicago P. O. Service Bldg., 1st . . . . .	5½%	1936	15,000.00
10,000	Chile Copper Co. . . . .	5%	1947	9,587.50
16,000	U. S. Steel Corporation . . . . .	5%	1963	17,301.00
25,000	Am. Tel. & Tel. Co. . . . .	5%	1946	25,926.00
10,000	Cedar Rapids Mfg. & Power Co. . . . .	5%	1953	10,000.00
20,000	Detroit Edison Co. . . . .	5%	1940	20,182.00
15,000	Mississippi River Power Co. . . . .	5%	1951	15,000.00
10,000	Canadian National Railways. . . . .	4½%	1957	9,775.00
5,000	Chicago & N. W. Ry. Co., Eq. Tr. . . . .	5%	1933	5,000.00
5,000	Chicago & N. W. Ry. Co., Eq. Tr. . . . .	5%	1937	5,000.00
16,000	Kans. City, Memphis & Birm. R. R. . . . .	5%	1934	16,000.00
15,000	Penn. R. R. Gen. Eq. Tr. . . . .	5%	1930	15,000.00
15,000	Union Pacific R. R. . . . .	4½%	1967	14,940.00
7,000	Central District Mfg. Co., 1st . . . . .	5½%	1937	7,000.00
500	(shares) General Electric Special Stock . . . . .			5,500.00
				<u>\$252,659.50</u>

Respectfully submitted,

EVERETT MORSS,

Treasurer.

October 1, 1929.

**SCHEDULE A**  
**FINANCIAL RESULT OF OPERATION FOR YEAR ENDED JUNE 30, 1929**  
**COMPARED WITH THE PREVIOUS YEAR**

	<i>1927-28</i>	<i>1928-29</i>
Current Operating Expense (Schedule C) . . .	\$3,112,921.22	\$3,830,939.04
Current Operating Income (Schedule B) . . .	3,050,865.03	3,272,930.82
	\$62,056.19	\$558,008.22
<b>PROFIT AND LOSS</b>		
Net Profit (Schedule S) . . . . .	119.63	1,823.91
Net Loss . . . . .	\$61,936.56	\$556,184.31
Excess Expense of Funds, charged to Funds .	48,290.59	560,868.27
	\$13,645.97	.....
Decrease of Current Surplus 1927-28	\$13,645.97	.....
Increase of Current Surplus 1928-29 (Schedule S). . . . .	.....	\$4,683.96

**SCHEDULE B**  
**OPERATING INCOME FOR YEAR 1928-1929**

	<i>Regular Courses</i>	<i>Research and Funds</i>	<i>Total</i>
<b>INCOME FROM STUDENTS:</b>			
(a) Tuition Fees . . . . .	\$1,127,108.41	.....	.....
Locker Fees . . . . .	1,851.67	.....	.....
Entrance Examination Fees . . . . .	4,130.00	.....	.....
Condition Examination Fees . . . . .	12,685.44	.....	.....
Late Registration Fees . . . . .	2,620.00	.....	.....
Net Dormitory Income (Schedule C-18) . . . . .	26,712.06	.....	.....
	<u>\$1,175,107.58</u>	.....	<u>\$1,175,107.58</u>
<b>INCOME FROM INVESTMENTS:</b>			
Endowments, General Purposes, (Schedule P) . . . . .	\$1,080,038.40	\$300,954.26	\$1,380,992.66
(b) Endowment for Scholarships, applied . . . . .	61,526.00	.....	61,526.00
Endowments, Designated Purposes (Schedule Q) . . . . .	107,247.74	123,339.33	292,113.07
(c) Net (Schedule Q) . . . . .	<u>\$1,248,812.14</u>	<u>\$424,293.59</u>	<u>\$1,673,105.73</u>
<b>INCOME FROM NATIONAL GRANTS:</b>			
Federal Aid from Act 1862 . . . . .	\$5,306.68	.....	.....
Act 1890 . . . . .	16,666.67	.....	.....
	<u>\$21,973.35</u>	.....	<u>\$21,973.35</u>
<b>INCOME FROM OTHER SOURCES:</b>			
American Telephone and Telegraph Co., Course VI-A . . . . .	\$5,000.00	.....	.....
General Electric Co., Course VI-A . . . . .	5,000.00	.....	.....
General Electric Co., Courses VI and VIII . . . . .	15,000.00	.....	.....
Boston & Maine R. R., Course I-A . . . . .	3,000.00	.....	.....
Daniel Guggenheim Fund . . . . .	8,779.00	.....	.....
Horowitz Foundation . . . . .	11,500.00	.....	.....
W. E. Nickerson Fund . . . . .	4,879.93	.....	.....
Division of Laboratory Supplies . . . . .	5,705.47	.....	.....
Trustees H. C. Frick Estate . . . . .	60,389.58	.....	.....
E. A. Wyeth Fund . . . . .	21,666.44	.....	.....
Bank Interest . . . . .	11,640.30	.....	.....
Huntington Hall Rentals . . . . .	4,058.00	.....	.....
Walker Building, Boston . . . . .	10,000.00	.....	.....
	<u>\$166,618.72</u>	.....	<u>\$166,618.72</u>
<b>MINOR FUND EARNINGS:</b>			
Total (Schedule R) . . . . .	.....	\$236,125.44	\$236,125.44
<b>TOTAL OPERATING INCOME</b>			
(Schedule A) . . . . .	<u>\$2,612,511.79</u>	<u>\$660,419.03</u>	<u>\$3,272,930.82</u>
<b>(a) STATEMENT OF TUITION FEES AND SCHOLARSHIPS:</b>			
Received in Cash for year 1928-1929 . . . . .			\$976,535.74
Appropriated for Scholarships from Current Income . . . . .			13,660.00
Received in Cash for Summer Session 1928 . . . . .			136,912.67
			<u>\$1,127,108.41</u>
(b) Add Appropriation for Scholarships from Funds . . . . .			61,526.00
Total Tuitions and Scholarships . . . . .			<u>\$1,188,634.41</u>
(c) Additional Income offset by Accrued Interest, Expenses, etc.			

**SCHEDULE C**  
**OPERATING EXPENSE FOR YEAR 1928-1929**

	<i>Regular Courses</i>	<i>Research and Funds</i>	<i>Total</i>
<b>ACADEMIC EXPENSES:</b>			
Salaries of Teachers (C-1) . . .	\$1,235,232.98	.....	.....
Wages Accessory to Teaching (C-1)	47,129.17	.....	.....
Wages, Laboratory Service (C-1)	58,328.78	.....	.....
Department Expenses (C-2) . . .	137,244.75	.....	.....
General Library (Schedule C-3)	49,045.51	.....	.....
	<b>\$1,526,981.19</b>	.....	<b>\$1,526,981.19</b>
<b>ADMINISTRATION EXPENSES:</b>			
Salaries, Officers . . . . .	\$65,200.00	.....	.....
Wages, Clerical Staff (C-4) . . .	68,941.64	.....	.....
Printing and Advertising (C-5)	35,160.89	.....	.....
General Expense (C-7) . . . . .	106,125.49	.....	.....
	<b>\$275,428.02</b>	.....	<b>\$275,428.02</b>
<b>PLANT OPERATION AND MAINTENANCE:</b>			
Wages, Building Service (C-8)	\$118,709.18	.....	.....
Power Plant Operation (C-9) . . .	107,060.84	.....	.....
Fire Insurance (Net) . . . . .	6,707.02	.....	.....
Repairs and Alterations (C-10)	184,196.56	.....	.....
	<b>\$416,673.60</b>	.....	<b>\$416,673.60</b>
<b>SPECIAL APPROPRIATIONS:</b>			
Total (C-11) . . . . .	\$206,963.89	.....	\$206,963.89
<b>MISCELLANEOUS EXPENSES:</b>			
Pension and Insurance Plan . . .	\$52,002.42	.....	.....
Division of I. C. and Research Department of Hygiene (Schedule C-6) . . . . .	19,166.77	.....	.....
Summer Camps 1928 (C-12 and C-13) . . . . .	54,505.32	.....	.....
Athletic Field, Boat House and Launches . . . . .	17,399.60	.....	.....
*Walker Memorial (Schedule C-15) . . . . .	21,867.01	.....	.....
	18,663.92	.....	.....
	<b>\$183,605.04</b>	.....	<b>\$183,605.04</b>
<b>EXPENSES OF MINOR FUNDS:</b>			
Total, including Salaries (Schedule R) . . . . .	.....	\$380,312.71	\$380,312.71
<b>AWARDS (other than Und. Schol.):</b>			
Total (Schedule C-16) . . . . .	.....	54,292.37	54,292.37
<b>PAYMENTS FROM SPECIAL FUNDS:</b>			
Total (Schedule C-17) . . . . .	.....	\$786,682.22	786,682.22
<b>TOTAL OPERATING EXPENSE</b>			
(Schedule A) . . . . .	<b>\$2,609,651.74</b>	<b>\$1,221,287.30</b>	<b>\$3,830,939.04</b>

\*Not including Dining Service (see Schedule C-14).



**SCHEDULE C-1**  
**SALARIES OF TEACHERS, WAGES ACCESSORY TO TEACHING**  
**AND LABORATORY SERVICE**

<i>Department</i>	<i>Teachers Salaries (Net)</i>	<i>Wages Accessory to Teaching (Net)</i>	<i>Wages Laboratory Service (Net)</i>
Summer Session . . . . .	\$80,460.17	.....	.....
Aeronautics . . . . .	31,869.35	\$2,517.93	.....
Architecture . . . . .	67,965.00	4,493.00	\$1,843.26
Biology and Public Health . . . .	33,200.00	1,273.99	1,716.00
Building Construction . . . . .	14,863.00	920.00	.....
Chemistry . . . . .	118,557.95	3,713.74	3,034.00
Chemistry, Res. Lab. of Physical.	25,800.00	1,291.84	*.....
Chemical Engineering . . . . .	25,950.00	1,479.00	1,820.00
Chemical Engineering Prac. School	17,350.00	*.....	.....
Civil Engineering . . . . .	70,560.00	2,450.00	.....
Division of Laboratory Supplies .	.....	.....	17,581.91
Drawing . . . . .	25,600.00	251.70	.....
Economics . . . . .	61,860.00	4,420.00	.....
Electrical Engineering . . . . .	124,885.00	6,072.00	9,624.78
Electrical Engineering Research .	4,380.00	*.....	1,890.00
English and History . . . . .	52,025.50	2,404.00	.....
Fuel and Gas Engineering. . . . .	13,978.19	1,397.76	.....
General Eng. and General Science	1,000.00	*.....	.....
General Studies . . . . .	2,800.00	.....	.....
Geology. . . . .	26,150.00	1,470.00	.....
German. . . . .	11,000.00	*.....	.....
Humanics . . . . .	7,000.00	*.....	.....
Lantern Operation . . . . .	.....	.....	502.50
Mathematics. . . . .	63,700.00	*.....	.....
Mechanical Engineering. . . . .	149,182.60	5,234.17	13,524.78
Meteorology . . . . .	5,250.00	*.....	*.....
Military Science . . . . .	6,230.00	1,248.00	.....
Mining and Metallurgy . . . . .	47,452.89	2,678.00	4,394.30
Naval Architecture. . . . .	31,900.00	1,184.00	1,148.25
Naval R. O. T. C. . . . .	350.00	.....	.....
Physics . . . . .	106,163.33	2,545.33	1,249.00
Romance Languages . . . . .	7,750.00	84.71	.....
Totals (Schedule C) . . . . .	<u>\$1,235,232.98</u>	<u>\$47,129.17</u>	<u>\$58,328.78</u>

\*Included in appropriation for Department Expenses (Schedule C-2).

**SCHEDULE C-2**  
**\*DEPARTMENT EXPENSES (Net)**

<i>Department</i>	<i>Expense (Net)</i>	<i>Overdrafts</i>
Aeronautics . . . . .	\$5,500.00	\$277.59
Architecture . . . . .	3,250.00	120.39
Biology . . . . .	3,000.00	.....
Building Construction . . . . .	2,000.00	201.65
Chemistry . . . . .	15,300.00	63.50
Chemistry, Research Laboratory of Physical . . . . .	2,500.00	65.73
Chemical Engineering . . . . .	4,100.00	44.62
Chemical Engineering Practice School . . . . .	14,500.00	1,418.51
Civil Engineering . . . . .	1,900.00	.....
Drawing . . . . .	800.00	55.91
Economics . . . . .	1,800.00	.....
Economics, Special . . . . .	600.00	.....
Electrical Engineering . . . . .	9,000.00	240.34
Electrical Engineering, Communications Laboratory . . . . .	3,500.00	.....
Electrical Engineering, Research and Theses . . . . .	7,967.51	.....
English and History . . . . .	700.00	.....
Fuel and Gas Engineering (inc. Field Stations) . . . . .	5,600.00	.....
General Engineering and General Science . . . . .	696.11	.....
General Studies . . . . .	250.00	5.19
Geology . . . . .	2,000.00	6.84
German . . . . .	400.00	9.32
Humanics . . . . .	710.43	.....
Mathematics . . . . .	900.00	.....
Mechanical Engineering . . . . .	19,500.00	130.90
Meteorology . . . . .	5,000.00	676.46
Military Science . . . . .	1,975.00	47.43
Mining and Metallurgy . . . . .	4,900.00	.....
Naval Architecture . . . . .	1,253.89	.....
Physics . . . . .	17,200.00	1,298.11
Romance Languages . . . . .	160.55	.....
United States Army and Navy Officers . . . . .	276.26	.....
	<u>\$137,244.75</u>	<u>\$4,662.49</u>
	(Schedule C)	(Schedule D-2)

**SCHEDULE C-3**  
**GENERAL LIBRARY**

Salaries of Officers . . . . .	\$6,250.00
Wages, Clerical Staff . . . . .	26,023.75
*Expenses . . . . .	16,771.76
Total (Schedule C) . . . . .	<u>\$49,045.51</u>

\*Certain special appropriations not included (see Schedule C-11).

**SCHEDULE C-4  
WAGES, CLERICAL STAFF, ADMINISTRATION OFFICES**

Offices of the President and Dean . . . . .	\$8,771.45
Registrar's Office. . . . .	24,734.10
Secretary's Office. . . . .	7,833.49
Bursar's Office. . . . .	19,459.34
Superintendent's Office . . . . .	8,143.26
Total (Schedule C). . . . .	<u>\$68,941.64</u>

**SCHEDULE C-5  
PRINTING AND ADVERTISING**

Printing, Bursar's Office . . . . .	\$1,246.95
Printing, Registrar's Office. . . . .	6,662.25
Printing, Offices of President, Dean, Secretary and Superintendent	1,458.85
Advertising in M. I. T. Publications . . . . .	2,259.22
Bulletins: President's and Treasurer's Reports . . . . .	886.00
General Catalogue . . . . .	5,364.05
Directory. . . . .	1,092.50
Concerning M. I. T. . . . .	1,034.50
Summer Session 1929 . . . . .	2,563.00
Course Pamphlets, etc. . . . .	2,596.76
Graduate Study and Research . . . . .	903.00
Examinations . . . . .	1,532.99
Class Schedules . . . . .	801.00
Maintenance of Catalogue of Former Students. . . . .	2,363.13
1928 Summer Session Advertising . . . . .	2,410.79
Reprints and Binding. . . . .	899.50
Abstracts of Staff Papers . . . . .	1,086.40
Total (Schedule C) . . . . .	<u>\$35,160.89</u>

**SCHEDULE C-6  
DEPARTMENT OF HYGIENE**

Salaries, Medical Director, Assistants and Infirmary Staff . . . . .	\$24,084.87
Additional Medical Services . . . . .	716.00
Physical Training and Coaching . . . . .	15,168.00
Medical and Other Supplies . . . . .	3,634.67
Physical Examinations . . . . .	5,459.93
Nutrition Class . . . . .	1,200.00
Equipment . . . . .	1,902.04
Food Account, Cost . . . . .	\$3,436.38
Less Income . . . . .	3,196.00
	<u>240.38</u>
Laundry . . . . .	1,113.49
Miscellaneous . . . . .	985.94
Total (Schedule C). . . . .	<u>\$54,505.32</u>

**SCHEDULE C-7  
GENERAL EXPENSE (Net)**

Bursar's Office . . . . .		\$3,888.71
Registrar's Office. . . . .		3,432.75
Superintendent's Office . . . . .		3,559.44
Fees, Dues, Commissions, etc. . . . .		47,451.98
Secretary's Office. . . . .		1,180.97
Graduation, Receptions, etc.. . . . .		9,730.09
President's Office. . . . .		3,068.49
Ice and Ice Water . . . . .		1,160.44
Dean's Office . . . . .		699.64
Trucking of Mail. . . . .		2,138.84
News Service . . . . .		5,231.19
New Student Publicity . . . . .		1,998.59
Undergraduate Scholarship Committee . . . . .		476.14
Traveling Expenses. . . . .		1,911.87
Telephone Service . . . . .		17,124.40
Towel Supply . . . . .		91.91
Identification Photos . . . . .		97.79
Janitors' Supplies (net) . . . . .		273.57
Laundry Equipment (net). . . . .		4,042.09
Miscellaneous . . . . .		522.58
		<hr/>
Total . . . . .		\$108,081.48
Less Credits, Office Supplies. . . . .	\$1,044.83	
Postage. . . . .	56.04	
Blue Printing . . . . .	53.31	
Trucking . . . . .	652.42	
Liquid Soap Account . . . . .	149.39	
		<hr/>
		1,955.99
		<hr/>
Total (Schedule C) . . . . .		<u>\$106,125.49</u>

**SCHEDULE C-8  
WAGES, BUILDING SERVICE**

Shop Foremen (net) . . . . .		\$3,289.10
Janitors: Supervisory. . . . .		2,640.00
Staff . . . . .		50,513.46
Night Cleaners . . . . .		17,928.93
Watchmen (including Cambridge Police) . . . . .		16,943.71
Window Cleaning . . . . .		8,209.32
Heating and Ventilation . . . . .		9,503.85
Messengers . . . . .		901.60
Mail Service. . . . .		2,996.50
Elevator, Shipper, Stockroom and Matron . . . . .		5,782.71
		<hr/>
Total (Schedule C). . . . .		<u>\$118,709.18</u>

**SCHEDULE C-9**  
**POWER PLANT OPERATION (Net)**

Coal . . . . .		\$78,052.15
Water . . . . .		4,158.40
Supplies . . . . .		3,603.23
Repairs . . . . .		13,482.03
Ashes and Trucking . . . . .		452.81
Salaries . . . . .		32,000.44
Electricity (Rogers Building) . . . . .		2,958.30
<b>Total</b> . . . . .		<b>\$134,707.36</b>
Less Transfers to Dormitories, Dining Service, Walker Memorial, Laundry and Lowell Institute	\$19,949.97	
Ashes sold . . . . .	335.00	
Inventory, Coal (Schedule D-2) . . . . .	7,361.55	
		<u>27,646.52</u>
<b>Total (Schedule C)</b> . . . . .		<b><u>\$107,060.84</u></b>

**SCHEDULE C-10**  
**REPAIRS, ALTERATIONS AND MAINTENANCE**

	<i>Supplies and Repairs</i>	<i>Alterations</i>	<i>Total</i>
Buildings, etc.			
No. 1 . . . . .	\$6,068.95	\$6,297.97	\$12,366.92
No. 2 . . . . .	6,697.49	2,409.24	9,106.73
No. 3 . . . . .	10,726.47	4,317.23	15,043.70
No. 4 . . . . .	10,476.63	873.26	11,349.89
No. 5 . . . . .	2,910.25	. . . . .	2,910.25
No. 8 . . . . .	4,589.30	383.62	4,972.92
No. 10 . . . . .	9,255.56	177.19	9,432.75
No. 11 . . . . .	2,276.16	833.56	3,109.72
Rogers Building, Boston . . . . .	7,139.93	466.49	7,606.42
No. 30, Service Building . . . . .	1,008.14	3,160.46	4,168.60
No. 33, Aero. Engineering . . . . .	3,100.97	486.00	3,586.97
No. 35, Mechanic Arts . . . . .	748.72	1,000.66	1,749.38
No. 46, Compression Lab. . . . .	341.62	. . . . .	341.62
Miscellaneous Buildings . . . . .	3,114.56	. . . . .	3,114.56
President's House . . . . .	5,613.22	. . . . .	5,613.22
Furniture . . . . .	4,217.01	. . . . .	4,217.01
Elevators . . . . .	3,031.14	. . . . .	3,031.14
Water . . . . .	6,466.22	. . . . .	6,466.22
Gas . . . . .	2,525.84	. . . . .	2,525.84
Grounds . . . . .	44,131.08	. . . . .	44,131.08
Great Court . . . . .	3,725.38	7,435.24	11,160.62
Tennis Courts . . . . .	432.65	. . . . .	432.65
Building Protection . . . . .	445.19	. . . . .	445.19
Rubbish . . . . .	2,728.98	. . . . .	2,728.98
New Steam Tunnel . . . . .	. . . . .	6,455.54	6,455.54
Undistributed (net) . . . . .	8,128.64	. . . . .	8,128.64
<b>Total (Schedule C)</b> . . . . .	<u>\$149,900.10</u>	<u>\$34,296.46</u>	<u>\$184,196.56</u>

SCHEDULE C-11  
SPECIAL APPROPRIATIONS

Graduate Scholarships . . . . .	\$9,290.33
Undergraduate Scholarships . . . . .	13,660.00
Lecturers . . . . .	6,258.50
Undergraduate Dues. . . . .	19,596.50
*Journal of Mathematics and Physics . . . . .	3,000.00
Society of Arts . . . . .	2,064.52
New Office and Classroom Equipment . . . . .	12,127.73
Chemicals furnished to Laboratories. . . . .	6,896.76
Chemicals and Apparatus furnished Students . . . . .	7,053.53
*Civil Engineering Dept., Nos. 604, 616, 632, 641, 650 . . . . .	4,425.00
For Homberg Infirmary Equipment . . . . .	4,000.00
For Building 31, Aero Engineering Laboratory . . . . .	49,000.00
*For Ceramics . . . . .	2,000.00
*Dept. of Biology and Public Health for Health Education. . . . .	500.00
*Dept. of Biology and Public Health for Food and Fisheries . . . . .	1,000.00
*New England Power Cons. Co., No. 633 . . . . .	5,000.00
*Chemical Engineering Dept., Special . . . . .	4,000.00
*For Music Fund . . . . .	600.00
Biology Dept., Special 620 . . . . .	1,500.00
*Economics Dept., Special 645, etc. . . . .	5,594.71
Naval Tank, No. 638 . . . . .	1,157.48
Architectural Dept., Special . . . . .	100.35
Fuel and Gas Engineering, Special . . . . .	2,870.00
*Historic Memorials Committee . . . . .	1,000.00
*Mechanical Engineering Dept., Special 612, 634, 643 . . . . .	13,250.00
*Physics Dept., Special Travel 658 . . . . .	2,200.00
Wind Tunnel, Additional. . . . .	1,000.00
Metallography Laboratory . . . . .	6,118.50
Organic Laboratory . . . . .	1,065.48
Additional Work in Library. . . . .	4,893.00
*Electrical Engineering Dept., Nos. 666, etc. . . . .	9,141.18
Employees' Group Life Insurance . . . . .	4,723.48
*Miscellaneous . . . . .	1,876.84
	\$206,963.89

SCHEDULE C-12  
CIVIL ENGINEERING SUMMER CAMP (1928)  
TECHNOLOGY, MAINE

<i>Income:</i>	
From Students and Staff . . . . .	\$6,843.92
Miscellaneous. . . . .	105.62
Total Income. . . . .	\$6,949.54
<i>Expenses:</i>	
Teachers' Salaries and Expenses. . . . .	\$6,889.29
Construction and Repairs . . . . .	3,033.80
Caretaker . . . . .	1,440.00
Taxes and Insurance. . . . .	1,500.58
Administration, Telephone, etc.. . . . .	818.70
Wages — Operating . . . . .	1,835.96
Provisions and Supplies . . . . .	3,505.38
Coal, Wood, Gas and Ice. . . . .	1,151.66
Express and Freight. . . . .	530.91
Laundry, etc.. . . . .	73.16
Total Expense . . . . .	20,779.44
Net Expense . . . . .	\$13,829.90

\* See Minor Funds, pp. 62 and 63.

**SCHEDULE C-13**  
**MINING ENGINEERING SUMMER CAMP (1928) DOVER, N. J.**

<i>Income:</i>		
From Students and Staff. . . . .	\$861.64	
Miscellaneous. . . . .	34.58	
	_____	
Total Income. . . . .		\$896.22
<i>Expenses:</i>		
Teachers' Salaries and Expenses . . . . .	\$2,116.87	
Repairs and Equipment . . . . .	455.53	
Caretaker . . . . .	360.00	
Insurance . . . . .	326.07	
Administration, Telephone, etc. . . . .	261.57	
Wages — Operating . . . . .	402.00	
Provisions and Supplies . . . . .	473.22	
Light and Power . . . . .	70.66	
	_____	
Total Expense . . . . .		4,465.92
Net Expense . . . . .		\$3,569.70
Total Expense of Camps (Schedule C) . . .		\$17,399.60

**SCHEDULE C-14**  
**DINING SERVICE (Net)**

<i>Inventory, July 1, 1928</i>		
Utensils . . . . .	\$8,898.17	
Stock . . . . .	3,042.21	
	_____	
		\$11,940.38
<i>Expenditures:</i>		
Food. . . . .	\$67,431.31	
Salaries . . . . .	44,431.24	
Light, Heat and Water. . . . .	5,706.26	
Ice, Refrigeration . . . . .	170.36	
Laundry . . . . .	3,195.26	
Dining Room and Kitchen Equipment. . . . .	2,468.60	
Repairs . . . . .	2,322.59	
Printing and Advertising. . . . .	1,030.60	
Administration Expense . . . . .	1,213.37	
Express, Freight, etc. . . . .	173.39	
Insurance . . . . .	634.36	
Dining Service, Reserve Fund (Schedule R). . . . .	7,549.64	
	_____	
Total . . . . .		136,326.98
		\$148,267.36
<i>Income:</i>		
Coupon Books . . . . .	\$66,844.63	
Less Outstanding Coupons (Schedule D) . . . . .	308.31	
	_____	
Cash . . . . .	69,581.54	
	_____	
		\$136,117.86
<i>Inventory, June 30, 1929</i>		
Utensils . . . . .	\$9,177.98	
Stock . . . . .	2,971.52	
	_____	
Total . . . . .		12,149.50
		\$148,267.36

**SCHEDULE C-15**  
**WALKER MEMORIAL (Net)**

<i>Income:</i>	
Games . . . . .	\$4,127.87
	<u>\$4,127.87</u>
<i>Expenses:</i>	
Salaries . . . . .	\$9,095.18
Light, Heat, Power . . . . .	4,806.84
Water . . . . .	441.53
Repairs, Alterations, Maintenance. . . . .	7,165.50
New Equipment. . . . .	235.86
Trucking and Administration. . . . .	334.25
Supplies . . . . .	449.68
Insurance . . . . .	240.00
Magazines and Papers . . . . .	22.95
	<u>22,791.79</u>
Total . . . . .	22,791.79
Net Expense (Schedule C) . . . . .	<u>\$18,663.92</u>

**SCHEDULE C-16**  
**AWARDS FROM FUNDS (Other than Undergraduate Scholarships)**

Edward Austin Fund for Travelling Fellowship . . . . .	\$1,500.00
Edward Austin Fund for Graduate Scholarships. . . . .	22,875.00
Teachers' Fund, Retiring Allowances. . . . .	3,100.00
Robert A. Boit Fund, Prizes . . . . .	275.00
Roger D. Hunneman Fund, Prizes . . . . .	50.00
Arthur Rotch Prize Fund, Prizes . . . . .	100.00
William Barton Rogers Fund for Student Loans . . . . .	1,330.00
Bursar's Fund, for Student Loans . . . . .	7,398.37
Dean's Fund, for Student Loans . . . . .	1,339.00
Summer Surveying Camp Fund, for Loans . . . . .	400.00
Misc. Funds, for Graduate Scholarships and Fellowships . . . . .	11,625.00
 Jonathan Whitney Fund:	
Graduate Scholarships . . . . .	2,800.00
Technology Christian Association . . . . .	1,500.00
	<u>\$54,292.37</u>
Total (Schedule C) . . . . .	<u>\$54,292.37</u>



**SCHEDULE C-17**  
**PAYMENTS FROM SPECIAL FUNDS**

Edmund D. Barbour, for New Land . . . . .	\$234,634.18
Walter S. Barker, for Books . . . . .	449.26
Frank Harvey Cilley, for Books . . . . .	1,901.83
Class Endowment Reserve Funds, for Premium Payments. . . . .	3,093.46
Charles Lewis Flint, for Books. . . . .	221.57
William Hall Kerr, for Books . . . . .	11.08
George A. Osborne, for Books . . . . .	160.90
M. I. T. Teachers' Insurance, for Premium Payments . . . . .	22,450.00
John Hume Tod, for Books . . . . .	132.24
Technology Matrons' Teas, for Teas . . . . .	715.95
Ednah Dow Cheney, for Salaries. . . . .	631.12
F. Jewett Moore, for Chemical Department . . . . .	1,782.10
F. W. Boles Memorial, for Architecture Department . . . . .	665.86
W. E. Nickerson, for Humanities . . . . .	7,710.43
Edmund K. Turner, for Annuity and Tax. . . . .	2,040.00
Pratt Naval Architectural, for Annuity and Nautical Museum. . . . .	13,816.21
John A. Aldred, for Division of Municipal and Industrial Research . . . . .	40,574.23
Edward D. Peters, for Geology Department . . . . .	390.00
Samuel Cabot, for Applied Chemistry Research . . . . .	3,300.00
C. B. Richardson, for Applied Chemistry Research . . . . .	1,600.00
New Dormitory, for Dormitories . . . . .	21,745.23
Crane Automotive Research, for Equipment. . . . .	7,694.10
Ellen H. Richards, for Research . . . . .	725.24
Edward Whitney, for Volcanic Research . . . . .	250.00
Eastman Contract, to George Eastman . . . . .	300,000.00
Miscellaneous Restricted Funds for Plant Endowment . . . . .	129,987.23
 Total (Schedule C). . . . .	 <u>\$786,682.22</u>

**SCHEDULE C-18**  
**DORMITORY OPERATION (Net)**

<i>Income:</i>	
From Rentals . . . . .	\$105,607.84
Fee Refunds. . . . .	5,889.09
 Total. . . . .	 <u>\$99,718.75</u>
 <i>Expenses:</i>	
Salaries . . . . .	\$25,914.05
Laundry . . . . .	3,287.92
Heat, Light, Power. . . . .	10,978.38
Water. . . . .	1,306.95
Repairs . . . . .	18,019.19
Supplies . . . . .	\$5,132.52
Less Inventory (June 30, 1929). . . . .	3,959.45
(Schedule D-2)	<u>1,173.07</u>
 Insurance . . . . .	 568.00
Trucking . . . . .	79.88
Printing, Administration, Telephone . . . . .	1,263.09
New Equipment . . . . .	2,916.16
Interest on Mortgage Loan (Whitney Fund). . . . .	7,500.00
 Total. . . . .	 <u>73,006.69</u>
 Net Income (Schedule B) . . . . .	 <u>\$26,712.06</u>

**SCHEDULE D**  
**TREASURER'S BALANCE SHEET**

1

**ENDOWMENT ASSETS**

Securities and Real Estate (Schedule H) . . . . .	\$29,675,881.53
Borrowed for Educational Plant ( <i>contra</i> ) . . . . .	9,212.88
Cash: For Investment (Schedule D-3) . . . . .	408,668.94
	\$30,093,763.35

2

**CURRENT ASSETS**

Cash: For General Purposes (Schedule D-3) . . . . .	\$89,649.60
Accounts Receivable (Schedule D-1) . . . . .	35,983.04
Students' Fees, Receivable. . . . .	981.88
Students' Deposits, Receivable. . . . .	188.78
Deposit on Fire Insurance Account. . . . .	44,000.00
Inventories and Advances for 1929-30 (Schedule D-2). . . . .	110,618.45
	\$281,421.75

3

**EDUCATIONAL PLANT ASSETS**

Land, Buildings, and Equipment, June 30, 1928 . . . . .	\$13,453,954.01
Additions during year. . . . .	429,090.18
	\$13,883,044.19

## SCHEDULE D

JUNE 30, 1929

1

ENDOWMENT FUNDS

Funds (Schedule Q) . . . . .	\$30,093,763.35
Total, June 30, 1929 . . . . .	<u>\$30,093,763.35</u>

2

CURRENT LIABILITIES

Minor Funds (Schedule R) . . . . .	\$108,248.48
Accounts Payable . . . . .	19,827.64
Students' Fees and Deposits Payable (Schedule D-4) . . . . .	107,135.07
*Undergraduate Dues, Balance . . . . .	446.57
Dining Room Coupons, Outstanding . . . . .	308.31
Total . . . . .	<u>\$235,966.07</u>
Surplus, Available for Current Expenses (Schedule S) . . . . .	45,455.68
Total June 30, 1929. . . . .	<u>\$281,421.75</u>

3

EDUCATIONAL PLANT CAPITAL

Endowment for Educational Plant, June 30, 1928 . . . . .	\$13,334,314.67
Appropriated During Year. . . . .	539,516.64
Borrowed from Investment Cash ( <i>contra</i> ) . . . . .	9,212.88
Total, June 30, 1929 (Schedule K) . . . . .	<u>\$13,883,044.19</u>

\*See also Undergraduate Dues Reserve (Schedule Q, p. 57).

**SCHEDULE D-1**  
**DETAIL OF ACCOUNTS RECEIVABLE**

Division of I. C. & R. . . . .	\$5,197.36
Investment Income (June, 1929) . . . . .	3,241.67
1929-1930 Income Account . . . . .	6,182.96
R. L. A. C. Contracts . . . . .	8,914.70
Harvard Coöperative Society, Inc. (Notes) . . . . .	1,182.71
Thorp & Martin, Inc. (June rental). . . . .	3,282.00
Miscellaneous Accounts . . . . .	7,981.64
	<hr/>
Total (Schedule D). . . . .	<u>\$35,983.04</u>

**SCHEDULE D-2**  
**DETAIL OF INVENTORIES AND ADVANCES FOR 1929-1930**

Department Overdrafts (Schedule C-2) . . . . .	\$4,662.49
Summer Session Salaries, Advanced . . . . .	3,489.50
Civil Engineering Summer Camp 1929, Advanced . . . . .	1,962.73
Mining Engineering Summer Camp 1929, Advanced . . . . .	110.82
Premiums Paid on Unexpired Insurance . . . . .	5,116.23
Inventories — Notes held by Coöperative Society and M. I. T.	3,293.88
Dormitory Supplies . . . . .	3,959.45
Dining Service, Food, Utensils, etc. . . . .	12,149.50
Walker Memorial Games, Candy, Cigars, etc. . . . .	276.67
Letter Shop Supplies. . . . .	530.28
Stamps . . . . .	810.07
Office Supplies . . . . .	1,864.15
Building and Janitors' Supplies . . . . .	2,996.32
Architectural Students' Supply Room, Stock . . . . .	1,304.07
Stock Room: Pipe, Fittings, Lumber, Hardware, Paint, Oil, Glass and Miscellaneous Supplies . . . . .	14,138.40
Division of Laboratory Supplies: Chemicals, Glassware, Platinum, etc. . . . .	46,224.59
Liquid Soap . . . . .	367.75
Coal. . . . .	7,361.55
	<hr/>
Total (Schedule D). . . . .	<u>\$110,618.45</u>

**SCHEDULE D-3****TOTAL CASH RECEIPTS AND DISBURSEMENTS FOR THE YEAR**

Total Cash Receipts . . . . .	\$6,055,940.72
Total Cash Disbursements . . . . .	6,155,263.20
Excess of Disbursements . . . . .	\$99,322.48
Cash, June 30, 1928 . . . . .	597,641.02
Cash, June 30, 1929 . . . . .	<u>\$498,318.54</u>

**CASH BALANCE**

Cash for Investment — on Deposit (Schedule D) . . . . .	\$408,668.94
Cash for Current Purposes (Schedule D)	
On Deposit . . . . .	\$87,863.52
In Office . . . . .	1,786.08
	<u>89,649.60</u>
Total Cash (Schedule D) . . . . .	<u>\$498,318.54</u>

**SCHEDULE D-4****STUDENTS' FEES AND DEPOSITS, PAYABLE AND IN ADVANCE**

Registration Fees, Summer Session 1929 . . . . .	\$4,095.00
Tuition Fees, Summer Session 1929 . . . . .	83,938.17
Tuition Fees 1929-1930 . . . . .	253.00
Students' Deposits Payable . . . . .	5,923.25
Students' Deposits, Summer Session 1929 . . . . .	3,575.40
Dormitory Deposits in Advance . . . . .	2,150.00
Dormitory Rentals, Summer Session 1929 . . . . .	6,260.00
Deposits, Civil Engineering Camp 1929 . . . . .	615.25
Deposits, Mining Engineering Summer Camp 1929 . . . . .	325.00
Total (Schedule D) . . . . .	<u>\$107,135.07</u>

## SCHEDULE H

## INVESTMENTS, BONDS, STOCKS,

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>GOVERNMENT AND MUNICIPAL BONDS</u>				
\$54,000	Canada, Dominion of, 10-Year Gold.	4½%	1936	\$63,120.00
260,000	Canada, Dominion of, 30-Year Gold.	5%	1952	258,511.88
20,000	Canada, Dominion of, 10-Year Gold.	5½%	1929	20,000.00
100,000	Chelsea, City of, Tax Notes Disc. . . . .		1929	.....
1,000	Cincinnati, City of, Street Imp. . . . .	4½%	1933	1,007.00
500	Cincinnati, City of, Street Imp. . . . .	4½%	1935	513.00
1,000	Cincinnati, City of, Street Imp. . . . .	4½%	1935	1,033.00
6,500	Cincinnati, City of, Condemnation . . . . .	4½%	1945	6,980.00
100,000	Columbus, City of, Water Ext. No. 2	4½%	1944	105,120.00
70,000	Great Britain and Ireland . . . . .	5½%	1937	75,325.00
18,000	Kansas City, Sewer, 2d Issue . . . . .	4½%	1935	18,511.00
5,000	Kansas City, 23d St. Trafficway . . . . .	4½%	1935	5,141.00
50,000	Los Angeles, City of, Water Works . . . . .	4½%	1942	51,661.00
10,000	Los Angeles, City of, Water Works . . . . .	4½%	1943	10,258.00
15,000	Los Angeles, City of, Water Works . . . . .	4½%	1943	15,390.00
50,000	Maisonneuve, City of (Montreal) . . . . .	5%	1954	49,000.00
5,000	Mass., Comlth. of, Met. Park Loan . . . . .	3½%	1936	4,900.00
15,000	Montreal, City of . . . . .	5%	1936	15,000.00
100,000	Montreal, City of . . . . .	5%	1942	97,500.00
10,000	New York, City of, Corporate Stock.	4¼%	1964	10,331.00
5,000	New York, City of, Corporate Stock.	4½%	1967	4,625.00
33,000	Norfolk, City of, Va., Appropriation.	4%	1954	33,000.00
50,000	Omaha, City of, Nebraska . . . . .	4½%	1934	51,179.00
50,000	Omaha, City of, Water Works . . . . .	4½%	1941	52,375.00
149,000	Ontario, Province of, Debenture . . . . .	4%	1932	146,394.03
50,000	Ontario, Province of, Debenture . . . . .	5½%	1937	50,393.00
50,000	Ontario, Province of, Debenture . . . . .	6%	1943	53,411.00
50,000	Ontario, Province of, Debenture . . . . .	5%	1952	49,250.00
14,000	Ontario, Province of, Debenture . . . . .	5%	1959	.....
41,000	Ottawa, City of, Ontario . . . . .	4½%	1930	39,003.30
1,000	Ottawa, City of, Ontario . . . . .	4½%	1935	945.00
2,000	Ottawa, City of, Ontario . . . . .	5%	1930	1,995.00
10,000	Ottawa, City of, Ontario . . . . .	5%	1945	9,975.00
5,000	Ottawa, City of, Ontario . . . . .	5%	1947	5,054.00
7,000	Ottawa, City of, Ontario . . . . .	5½%	1931	7,036.00
42,000	Ottawa, City of, Ontario . . . . .	5½%	1932	42,315.00
60,000	Ottawa, City of, Ontario . . . . .	5½%	1939	61,452.00
1,000	Ottawa, City of, Ontario . . . . .	6%	1929	1,000.00
1,000	Ottawa, City of, Ontario . . . . .	6%	1931	1,013.00

SCHEDULE H

REAL ESTATE AND MORTGAGES

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$9,862.50	\$53,257.50	.....	\$2,842.50
.....	.....	258,511.88	.....	13,000.00
.....	.....	20,000.00	.....	1,100.00
\$96,163.34	.....	96,163.34	.....	*1,918.33
.....	2.00	1,005.00	.....	45.00
.....	3.00	510.00	.....	22.50
.....	5.00	1,028.00	.....	45.00
.....	30.00	6,950.00	.....	292.50
.....	342.00	104,778.00	.....	4,500.00
419.48	5,268.48	70,476.00	.....	3,964.58
.....	86.00	18,425.00	.....	810.00
.....	24.00	5,117.00	.....	225.00
.....	128.00	51,533.00	.....	2,250.00
.....	19.00	10,239.00	.....	450.00
.....	28.00	15,362.00	.....	675.00
.....	.....	49,000.00	.....	2,500.00
.....	.....	4,900.00	.....	175.00
.....	.....	15,000.00	.....	750.00
.....	.....	97,500.00	.....	5,000.00
.....	10.00	10,321.00	.....	425.00
.....	.....	4,625.00	.....	225.00
.....	.....	33,000.00	.....	1,320.00
.....	237.00	50,942.00	.....	2,250.00
.....	198.00	52,177.00	.....	2,250.00
.....	.....	146,394.03	.....	5,960.00
.....	49.00	50,344.00	.....	2,750.00
.....	244.00	53,167.00	.....	3,000.00
.....	.....	49,250.00	.....	2,500.00
13,930.00	.....	13,930.00	\$33.06	.....
.....	.....	39,003.30	.....	1,845.00
.....	.....	945.00	.....	45.00
.....	.....	1,995.00	.....	100.00
.....	.....	9,975.00	.....	500.00
.....	3.00	5,051.00	.....	250.00
.....	18.00	7,018.00	.....	385.00
.....	105.00	42,210.00	.....	2,310.00
.....	146.00	61,306.00	.....	3,300.00
.....	.....	1,000.00	.....	60.00
.....	7.00	1,006.00	.....	60.00

\*Net for 1928-1929.

Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>GOVERNMENT AND MUNICIPAL BONDS (Continued)</u>				
\$5,000	Ottawa, City of, Ontario . . . . .	6%	1936	\$5,210.00
1,000	Ottawa, City of, Ontario . . . . .	6%	1938	1,055.00
8,000	Ottawa, City of, Ontario . . . . .	6%	1939	8,446.00
8,000	Ottawa, City of, Ontario . . . . .	6%	1940	8,478.00
1,000	Ottawa, City of, Ontario . . . . .	6%	1948	1,076.00
10,000	Ottawa, City of, Ontario . . . . .	6%	1951	10,784.00
50,000	Somerville, City of, Revenue Notes .	Disc.	1929	.....
50,000	Toronto, City of, Ontario, Gen. Loan	5%	1932	50,000.00
10,000	Toronto, City of, Ontario . . . . .	5%	1935	9,845.00
35,000	Toronto, City of, Ontario . . . . .	5%	1936	34,475.00
18,000	Toronto, City of, Ontario . . . . .	5%	1937	17,721.00
23,000	Toronto, City of, Ontario . . . . .	5%	1939	22,655.00
9,000	Toronto, City of, Ontario . . . . .	5%	1942	8,830.80
5,000	Toronto, City of, Ontario . . . . .	6%	1934	5,119.00
23,000	Toronto, City of, Consolidated Loan	6%	1944	24,000.00
18,000	Toronto, City of, Consolidated Loan	6%	1945	18,818.00
9,000	Toronto, City of, Consolidated Loan	6%	1946	9,424.00
50,000	Winnipeg, City of, Debenture . . . .	5%	1943	48,750.00
7,000	Winnipeg, City of, Gr. Water Dist. .	5%	1952	6,790.00
25,000	Winnipeg, City of . . . . .	6%	1946	26,478.00
	Sold or matured during year . . . . .			2,000.00
<b>\$1,877,000</b>	<b>Total Government and Municipal Bonds</b>			<b>\$1,739,672.01</b>
<u>INDUSTRIAL BONDS</u>				
\$35,000	Allis-Chalmers Mfg. Co., Gold Deb.	5%	1937	\$41,475.00
30,000	Am. Agri. Chem. Co., 1st Ref. S. F.	7½%	1941	30,070.00
47,000	American Sugar Ref. Co. . . . .	6%	1937	77,257.00
50,000	Anaconda Cop. Min. Co., 1st Con. "A"	6%	1953	49,125.00
25,000	Armour & Co. of Del., 1st Mtge. "A"	5½%	1943	24,000.00
35,000	Chicago P. O. Serv. Bldg. 1st Mtg. "A"	5½%	1936	34,562.50
40,000	Chile Copper Co. Gold . . . . .	5%	1947	48,225.00
1,250	Eastern States Exposition Gold (Reg.)	4%	1963	312.50
25,000	Fruit Growers Ex. Co., Equip. Tr. "G"	4½%	1934	24,607.25
25,000	Fruit Growers Ex. Co., Equip. Tr. "G"	4½%	1935	24,573.75
100,000	Gulf Oil Corp. of Pennsylvania Gold	5%	1937	96,750.00
100,000	International Cement Corp. . . . .	5%	1948	96,750.00
1,000	Inter. Paper Co., 1st & Ref. Gold "B"	5%	1947	1,000.00
1,300	Phila. & Reading Coal & Iron Ref. Mtg.	5%	1973	1,300.00
50,000	Prudence Co., Inc., Mtg. . . . .	5½%	1933	49,875.00
2,700	Reading Co., Gen. & Ref. Mtge. "A"	4½%	1997	2,646.00
25,000	Simonds Saw & Steel Co., Deb. "G"	5½%	1930	24,645.00
48,000	Smith & Wesson, Inc., 1st Mtge. S. F.	5½%	1938	49,500.00



<i>Purchases and Charges during the year</i>	<b>Schedule H (Continued)</b>			<i>Income Received</i>
	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	
.....	\$30.00	\$5,180.00	.....	\$300.00
.....	6.00	1,049.00	.....	60.00
.....	45.00	8,401.00	.....	480.00
.....	44.00	8,434.00	.....	480.00
.....	4.00	1,072.00	.....	60.00
.....	36.00	10,748.00	.....	600.00
<b>\$48,376.18</b>	.....	48,376.18	.....	*638.82
.....	.....	50,000.00	.....	2,500.00
.....	.....	9,845.00	.....	500.00
.....	.....	34,475.00	.....	1,750.00
.....	.....	17,721.00	.....	900.00
.....	.....	22,655.00	.....	1,150.00
.....	.....	8,830.80	.....	450.00
.....	23.00	5,096.00	.....	300.00
.....	67.00	23,933.00	.....	1,380.00
.....	51.00	18,767.00	.....	1,080.00
.....	25.00	9,399.00	.....	540.00
.....	.....	48,750.00	.....	2,500.00
.....	.....	6,790.00	.....	350.00
.....	87.00	26,391.00	.....	1,500.00
.....	2,000.00	.....	\$282.79	9,839.71
<b>\$158,889.00</b>	<b>\$19,232.98</b>	<b>\$1,879,328.03</b>	<b>\$315.85</b>	<b>\$97,458.94</b>
<b>\$78.75</b>	<b>\$6,991.25</b>	<b>\$34,562.50</b>	.....	<b>\$1,925.00</b>
65.00	1,035.00	29,100.00	.....	2,287.50
680.36	30,257.36	47,680.00	.....	4,305.00
.....	.....	49,125.00	.....	3,000.00
.....	.....	24,000.00	.....	1,375.00
.....	.....	34,562.50	.....	1,925.00
15.00	9,660.00	38,580.00	.....	2,458.33
.....	.....	312.50	.....	.....
.....	.....	24,607.25	.....	1,125.00
.....	.....	24,573.75	.....	1,125.00
.....	.....	96,750.00	.....	5,000.00
.....	.....	96,750.00	.....	5,000.00
.....	.....	1,000.00	.....	50.00
.....	.....	1,300.00	.....	65.00
.....	.....	49,875.00	.....	2,750.00
.....	.....	2,646.00	.....	121.50
.....	.....	24,645.00	.....	1,375.00
120.00	2,100.00	47,520.00	.....	2,695.00

\*Net for 1928-1929.

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1938</i>
<u>INDUSTRIAL BONDS (Continued)</u>				
\$100,000	Solvay Am. Inv. Corp., Sec. Gold Notes	5%	1942	\$99,500.00
15,000	Standard Oil Co. of N. J. . . . .	5%	1946	15,067.00
100,000	Standard Oil Co. of N. Y. . . . .	4½%	1951	95,625.00
74,000	Swift & Co., 1st S. F. . . . .	5%	1944	70,827.50
100,000	United Drug Co. . . . .	5%	1953	98,750.00
188,000	U. S. Steel, 10-60 Yr. S. F. . . . .	5%	1963	213,921.00
50,000	Waltham Watch & Clock Co. . . . .	6%	1943	49,000.00
5,000	Winchester Repeat. Arms Co., 1st Mtg.	7½%	1941	5,214.00
	Sold or matured during year . . . . .			141,987.50
<b>\$1,273,250</b>	<i>Total Industrial Bonds</i>			<b>\$1,466,566.00</b>
<u>INDUSTRIAL STOCKS</u>				
		<i>Div.</i>	<i>Shares</i>	
*\$50,000	American Car & Foundry Co., Com.	6%	500	\$50,875.00
13,750	American Pneumatic Serv. Co., 1st Pf.	7%	275	13,750.00
50,000	Amoskeag Mfg. Co., Pref. . . . .	4½%	500	41,395.00
50,000	Anaconda Copper Mining Co., Cap. .	7%	1,000	47,500.00
16,000	Brill Corporation, Class A . . . . .		160	8,183.00
8,000	Brill Corporation, Class B . . . . .		80	1,636.60
25,000	Century Ribbon Mills, Inc., Pref. .	7%	250	24,500.00
11,500	Charlton Mills, Capital . . . . .	8%	115	11,486.04
10,000	Devoe & Reynolds Co., Inc., 1st Pref.	7%	100	9,800.00
* . . . . .	Eastern Mfg. Co., New Common . . .		1,000	. . . . .
25,000	Eastern Mfg. Co., Prior Preference .	7%	500	15,000.00
*1,250,000	Eastman Kodak Co., Common . . . .	8%	12,500	1,000,000.00
80,600	Eng'rs. Public Service Co., Common. .		806	24,930.00
14,700	Fairhaven Mills, Pref. . . . .		147	735.00
*300,000	General Electric Company, Capital .	4%	3,000	122,287.50
14,710	General Electric Co., Special . . . .	6%	1,471	14,850.00
*105,000	Gillette Safety Razor Co. . . . .	5%	1,050	58,757.00
*12,500	Lackawanna Securities Co., Common	4%	125	8,250.00
14,300	Lancaster Mills, Capital . . . . .		143	2,145.00
29,000	Merchants' Mfg. Co., Capital . . . .		290	7,830.00
50,000	Nashua Mfg. Company, Common . . .		500	20,000.00
*8,700	Phila. Reading Coal & Iron Corp. Com.		87	872.93
*49,200	Pullman Incorporated, Capital . . . .	4%	492	36,751.83
* . . . . .	Quebradas Company . . . . .		2,249	. . . . .
6,500	Queen City Cotton Co., Capital . . .		65	1,300.00
*7,500	Samson Cordage Company . . . . .	8%	75	5,000.00
*65,000	Standard Oil Co. of California, Capital	\$2.50	650	29,981.25
16,000	Union Cotton Mfg. Co., Capital . . .	6%	160	8,640.00
*525,000	United Fruit Company, Capital. . . .	4%	5,250	212,870.00
50,000	U. S. Steel Corp., Cum. Pref. . . . .	7%	500	55,162.50

\*No par value.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc</i>	<i>Income Received</i>
.....	.....	\$99,500.00	.....	\$5,000.00
.....	\$4.00	15,063.00	.....	750.00
.....	.....	95,625.00	.....	4,500.00
\$80.63	1,025.00	69,883.13	.....	3,725.00
.....	.....	98,750.00	.....	5,000.00
984.75	20,805.75	194,100.00	.....	10,333.33
.....	.....	49,000.00	.....	3,000.00
.....	18.00	5,196.00	.....	375.00
.....	141,987.50	.....	.....	4,825.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$2,024.49	\$213,883.86	\$1,254,706.63	.....	\$74,090.66
.....	.....	\$50,875.00	.....	\$3,000.00
.....	.....	13,750.00	.....	962.48
.....	.....	41,395.00	.....	2,250.00
.....	\$19,246.00	28,254.00	.....	5,250.00
.....	.....	8,183.00	.....	240.00
.....	.....	1,636.60	.....	.....
.....	.....	24,500.00	.....	1,750.00
.....	.....	11,486.04	.....	920.00
.....	.....	9,800.00	.....	700.00
.....	.....	.....	.....	.....
.....	.....	15,000.00	.....	.....
.....	.....	1,000,000.00	.....	100,000.00
\$3,060.00	18.76	27,971.24	.....	360.00
.....	.....	735.00	.....	.....
.....	.....	122,287.50	.....	18,000.00
.....	.....	14,850.00	.....	882.60
20,204.95	.....	78,961.95	.....	5,125.00
.....	.....	8,250.00	.....	500.00
.....	.....	2,145.00	.....	.....
.....	.....	7,830.00	.....	.....
.....	.....	20,000.00	.....	.....
.....	.....	872.93	.....	.....
.....	.....	36,751.83	.....	1,968.00
.....	.....	.....	.....	2,000.00
.....	.....	1,300.00	.....	65.00
.....	.....	5,000.00	.....	600.00
.....	.....	29,981.25	.....	1,950.00
.....	.....	8,640.00	.....	960.00
.....	.....	212,870.00	.....	20,335.00
.....	.....	55,162.50	.....	3,500.00

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Div.</i>	<i>Shares</i>	<i>Balance June 30, 1928</i>
<u>INDUSTRIAL STOCKS (Continued)</u>				
\$32,100	Wamsutta Mills, Capital . . . . .		321	\$32,528.00
5,000	Westinghouse Elec. & Mfg. Co., Pref. 8%		100	6,393.90
51,100	Westinghouse Elec. & Mfg. Co., Com. 8%		1,022	50,338.35
<hr/>				<hr/>
\$2,946,160	<i>Total Industrial Stocks</i>			\$1,923,748.90
<u>PUBLIC UTILITY BONDS</u>				
		<i>Rate</i>	<i>Maturity</i>	
\$151,000	Am. Tel. & Tel. Co., Col. Trust. . . . .	4%	1929	\$147,875.00
62,000	Am. Tel. & Tel. Co., Col. Trust. . . . .	5%	1946	80,547.90
765	Am. Tel. & Tel. Co. Rights, 10-Yr. Conv. 4½%		1939	.....
50,000	Appalachian Elec. P'r Co., 1st & Ref. Mt. 5%		1956	48,375.00
50,000	Blackstone Valley Gas & El. Co., Mt. 5%		1939	50,107.00
46,000	Boston Elevated Ry. Co. . . . .	6%	1933	45,100.00
5,000	Boston Elevated Ry. Co. . . . .	4%	1935	4,600.00
100,000	Boston Elevated Ry. Co. . . . .	5%	1937	99,875.00
3,300	Brooklyn Union Gas Co., Conv. Deb. 5½%		1936	3,300.00
185,000	Cedars Rapids Mfg. & P. Co., 1st Mt. S.F. 5%		1953	172,903.85
25,000	Central Illinois Pub. Ser. Co. . . . .	4½%	1930	24,984.38
25,000	Central Illinois Pub. Ser. Co. . . . .	4½%	1931	24,796.25
25,000	Chesa. & Potomac Tel. Co., S.F. "A" 5%		1943	24,500.00
50,000	Chicago City Railway Co., 1st Mtge. 5%		1927	49,750.00
5,000	Chicago Railways Co., 1st Mtge. . . . .	5%	1927	3,750.00
101,000	Cleveland Elec. Ill. Co., 1st Mtge. . . . .	5%	1939	101,512.00
120,000	Commonwealth Edison Co., 1st Mtg. 5%		1943	119,400.00
46,000	Conn. Lt. & Pr. Co., 1st Mt. S.F. "A" 7%		1951	43,324.48
52,000	Conn. Lt. & Pr. Co., 1st Mtg. "C" . . . . .	4½%	1956	49,465.00
150,000	Con. Gas, Elec. Lt. & Power Co., Mtg. 4½%		1935	141,475.00
50,000	Dallas Ry. & Terminal Co., 1st Mtge. 6%		1951	48,125.00
25,000	Detroit Edison Co., 1st Mtge. . . . .	5%	1933	25,132.00
131,000	Detroit Edison Co., 1st & Ref. Mt. "A" 5%		1940	138,544.80
100,000	Duquesne Lt. & Pr. Co., 1st Mt., Gold 4½%		1967	94,750.00
35,000	East. Mass. St. Ry. Co., Ref. Mt. "A" 4½%		1948	35,000.00
100,000	Edison Elec. Ill. Co. of Boston, Gold 4½%		1930	100,083.00
25,000	Em. Gas & El. Co. & Em. Coke Co., Jt. 5%		1941	18,250.00
41,000	Georgia Ry. & El. Co., 1st Cons. Mt. 5%		1932	41,064.00
1,000	Georgia & Southern Utilities Co. . . . .	8%	1922	1,000.00
50,000	Great Lakes Power Co., Ltd., 1st Mt. 6%		1943	43,187.50
50,000	Gulf States Util. Co., 1st & Ref. Mt. "A" 5%		1956	.....
163,000	Hydraulic P'r. Co. of Niag. F'ls, Ref. & Im. 5%		1951	155,095.00
59,000	Illinois Bell Tel. Co., 1st & Ref. "A" 5%		1956	47,375.00
25,000	Indianapolis Water Co., 1st Lien & Ref. 5½%		1953	24,000.00
100,000	Laclede Gas Lt. Co., 1st Mt. Col. & Ref. 5½%		1953	96,122.50
200,000	Laurentide P'r. Co., Ltd., 1st Mt. S. F. 5%		1946	190,730.00

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$32,528.00	.....	.....
.....	.....	6,393.90	.....	\$400.00
.....	\$5,186.43	45,151.92	.....	4,083.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$23,264.95	\$24,451.19	\$1,922,562.66	.....	\$175,806.08
.....	.....	\$147,875.00	.....	\$6,040.00
\$1,204.19	\$20,850.00	60,902.09	.....	3,641.67
765.45	.....	765.45	.....	.....
.....	.....	48,375.00	.....	2,500.00
.....	11.00	50,096.00	.....	2,500.00
.....	.....	45,100.00	.....	2,760.00
.....	.....	4,600.00	.....	200.00
.....	.....	99,875.00	.....	5,000.00
.....	.....	3,300.00	.....	181.50
.....	.....	172,903.85	.....	9,250.00
.....	.....	24,984.38	.....	1,125.00
.....	.....	24,796.25	.....	1,125.00
.....	.....	24,500.00	.....	1,250.00
.....	.....	49,750.00	.....	2,500.00
.....	.....	3,750.00	.....	250.00
.....	52.00	101,460.00	.....	5,050.00
.....	.....	119,400.00	.....	6,000.00
.....	.....	43,324.48	.....	3,220.00
.....	.....	49,465.00	.....	2,340.00
.....	.....	141,475.00	.....	6,750.00
.....	.....	48,125.00	.....	3,000.00
.....	33.00	25,099.00	.....	1,250.00
374.13	10,200.00	128,718.93	.....	7,008.33
.....	.....	94,750.00	.....	4,500.00
.....	.....	35,000.00	.....	1,575.00
.....	42.00	100,041.00	.....	4,500.00
.....	.....	18,250.00	.....	1,250.00
.....	22.00	41,042.00	.....	2,050.00
.....	.....	1,000.00	.....	.....
.....	.....	43,187.50	.....	3,000.00
46,875.00	.....	46,875.00	576.39	.....
.....	.....	155,095.00	.....	8,150.00
9,337.50	.....	56,712.50	.....	2,950.00
.....	.....	24,000.00	.....	1,375.00
.....	.....	96,122.50	.....	5,500.00
.....	.....	190,730.00	.....	10,000.00

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>PUBLIC UTILITY BONDS (Continued)</u>				
\$100,000	Los Angeles Gas & El. Corp., Ref. "F"	5½%	1943	\$95,750.00
50,000	Los Angeles Gas & El. Corp., Gen'l Mt.	5%	1961	49,125.00
200,000	Louisville Gas & El. Co., 1st & Ref. Mt.	5%	1952	184,546.25
3,000	Lynn & Boston R. R., 1st Mtge.	6%	1929	3,000.00
200,000	Massachusetts Gas Co., Consolidated	4½%	1931	192,312.50
50,000	Milwaukee El. Ry. & Lt. Co., 1st Mt.	5%	1961	46,125.00
50,000	Minneapolis Gen. Elec. Co., Mtge.	5%	1934	50,145.00
110,000	Mississippi River Power Co., 1st Mt.	5%	1951	108,387.72
100,000	Montreal Light, Heat & Power Co.	4½%	1932	93,812.50
50,000	Nevada California Electric Co.	5%	1956	47,750.00
200,000	New Bedford Gas & Edison Lt. Co.	5%	1933	203,600.00
50,000	New England Tel. & Tel. Co., Deb.	4%	1930	50,022.00
55,000	New England Tel. & Tel. Co., Deb.	5%	1932	50,198.00
150,000	New Orleans Pub. Serv., Inc., 1st Ref. Mt.	5%	1952	134,375.00
60,000	New York Telephone Co., 1st Mtge.	4½%	1939	58,043.36
5,000	New York & Queen Gas Co., 1st & G.M.	5%	1934	.....
1,000	Nia., Lock. & Ont. P. Co., 1st & Ref. Mt.	5%	1955	1,000.00
100,000	North Boston Lighting Prop. Co. Notes	5%	1932	.....
50,000	North. States Pr. Co., 1st & Ref. Mt.	5%	1941	45,000.00
100,000	Oklahoma Gas & Electric Co., 1st Mtge.	5%	1950	94,750.00
50,000	Ontario Power Co., 1st Mtge. S. F.	5%	1943	49,312.50
75,000	Pacific Gas & El. Co., 1st Ref. Mt. "B"	6%	1941	77,871.00
75,000	Pacific Tel. & Tel. Co., 1st Mt. Col. Tr. S. F.	5%	1937	73,915.10
50,000	Pennsylvania Pr. & Lt. Co., 1st Mt. "D"	5%	1953	49,250.00
25,000	Portland Gen. Electric Co., 1st Mtge.	5%	1935	25,162.00
97,000	Potomac Elec. Power Co., Mtge. "B"	6%	1953	100,914.00
50,000	Salmon River Power Co., 1st Mtge.	5%	1952	47,625.00
19,000	Seattle Electric Co., Cons. Mtge.	5%	1929	18,430.00
100,000	Southern Bell Tel. & Tel. Co., 1st Mt. S. F.	5%	1941	100,717.00
165,000	Southern Calif. Edison Co., Gen. Mtge.	5%	1939	158,125.00
300,000	Texas Power & Light Co., 1st Mtge.	5%	1937	291,437.50
50,000	Virginia Ry. & Pr. Co., 1st Mtge.	5%	1936	46,375.00
100,000	West Penn. Power Co., 1st Mtge. "E"	5%	1963	93,482.50
50,000	West Penn. Power Co., 1st Mtge.	5½%	1953	51,105.00
75,000	Western Tel. & Tel. Co., Col. Tr.	5%	1932	75,210.00
75,000	Western Union Tel. Co.	5%	1951	75,244.00
	Sold or matured during year			30,000.00
<u>\$5,447,065</u>	<i>Total Public Utility Bonds</i>			<u>\$5,166,217.59</u>

Schedule H (Continued)				
<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$95,750.00	.....	\$5,500.00
.....	.....	49,125.00	.....	2,500.00
.....	.....	184,546.25	.....	10,000.00
.....	.....	3,000.00	.....	180.00
.....	.....	192,312.50	.....	9,000.00
.....	.....	46,125.00	.....	2,500.00
.....	\$29.00	50,116.00	.....	2,500.00
\$651.68	8,000.00	101,039.40	.....	6,000.00
.....	.....	93,812.50	.....	4,500.00
.....	.....	47,750.00	.....	2,500.00
.....	900.00	202,700.00	.....	10,000.00
.....	22.00	50,000.00	.....	2,000.00
5,012.50	70.50	55,140.00	.....	2,625.00
.....	.....	134,375.00	.....	7,500.00
.....	.....	58,043.36	.....	2,700.00
4,900.00	.....	4,900.00	.....	125.00
.....	.....	1,000.00	.....	50.00
99,250.00	.....	99,250.00	\$69.44	.....
.....	.....	45,000.00	.....	2,500.00
.....	.....	94,750.00	.....	5,000.00
.....	.....	49,312.50	.....	2,500.00
.....	239.00	77,632.00	.....	4,500.00
.....	.....	73,915.10	.....	3,750.00
.....	.....	49,250.00	.....	2,500.00
.....	27.00	25,135.00	.....	1,250.00
45.26	1,195.26	99,764.00	.....	5,850.00
.....	.....	47,625.00	.....	2,500.00
.....	.....	18,430.00	.....	950.00
.....	60.00	100,657.00	.....	5,000.00
5,093.75	.....	163,218.75	.....	8,125.00
.....	.....	291,437.50	.....	15,000.00
.....	.....	46,375.00	.....	2,500.00
.....	.....	93,482.50	.....	5,000.00
.....	46.00	51,059.00	.....	2,750.00
.....	70.00	75,140.00	.....	3,750.00
.....	12.00	75,232.00	.....	3,750.00
.....	30,000.00	.....	.....	1,350.00
\$173,509.46	\$71,880.76	\$5,267,846.29	\$645.83	\$266,496.50

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Div.</i>	<i>Shares</i>	<i>Balance June 30, 1928</i>
<u>PUBLIC UTILITY STOCKS</u>				
\$281,100	American Tel. & Tel. Co., Capital. . .	9%	2,811	\$353,448.11
*15,000	Brooklyn Union Gas Co., Capital. . .	5%	150	8,587.50
*50,000	Consolidated Gas Co. of N. Y., Pfd..	5%	1,000	92,950.00
200,100	Electric Bond & Share Co. Com. . . .	1%	2,001	36,206.23
2,000	Mass. Gas Companies, Common . . .	6%	20	1,540.00
5,000	Mass. Gas Companies, Preferred . . .	4%	50	4,100.00
Sold or matured during year . . . .				.....
<b>\$553,200</b>	<b>Total Public Utility Stocks . . . .</b>			<b>\$496,831.84</b>

<u>RAILROAD BONDS</u>		<i>Rate</i>	<i>Maturity</i>	
\$75,000	Atch. Top. & S. F., Cal. & Ariz. Lines	4½%	1962	\$73,143.75
100,000	Atch. Top. & Santa Fe, Gen. Mtge. . .	4%	1995	96,470.00
13,000	Atch. Top. & Santa Fe, 20-Yr. . . . .	4½%	1948	.....
10,000	Boston & Albany Railroad Improvement	4%	1934	9,450.00
1,000	Boston & Maine Railroad . . . . .	4½%	1944	850.00
50,000	Boston & Maine R. R., 1st Mtge. "AC"	5%	1967	46,500.00
90,000	Canadian Nat'l Railway Co. . . . .	4½%	1957	98,250.00
25,000	Canadian Nat'l Rys. Equip. Tr. "J" . .	4½%	1938	24,575.00
75,000	Central New England Railways, 1st Mtge.	4%	1961	56,281.25
50,000	Gen. Pacific Ry. Co., Short Line Mtge.	4%	1954	40,918.75
17,000	Chesapeake & Ohio Ry. Co. . . . .	4½%	1930	.....
100,000	Ches. & Ohio Ry. Co., Cons'd. 1st Mtge.	5%	1939	103,780.00
51,000	Chicago, Burlington & Quincy, Mtge. .	4%	1958	50,307.00
100,000	Chic., Burl. & Quincy, 1st Ref. Mtge. "B"	4½%	1977	96,750.00
100,000	Chic. J. Rys. & Un. St. Yds. Mt. & Co. Tr.	4%	1940	94,250.00
75,000	Chic. J. Rys. & Un. St. Yd. Ref. Mt. & Co. Tr.	5%	1940	74,143.75
17,000	C. M. St. P. & Pacific R.R. Co., Gold "A"	5%	1975	10,410.00
68,000	C. M. St. P. & Pac. R.R. Con. Gold "A"	5%	2000	41,640.00
65,000	Chicago Union Station, 1st Mtge. "A".	4½%	1963	65,361.00
100,000	Chicago Union Station, 1st Mtge. "C".	6½%	1963	113,125.00
80,000	Chicago & Northwestern Ry. Co. . . .	4½%	1930	80,276.00
120,000	Chicago & Northwestern Ry. Co. . . .	4½%	1931	120,768.00
5,000	Chic. & N.W. Ry. Co., Equip. Tr. of 1922	5%	1930	4,925.70
5,000	Chic. & N.W. Ry. Co., Equip. Tr. of 1922	5%	1931	4,920.60
5,000	Chic. & N.W. Ry. Co., Equip. Tr. of 1922	5%	1932	4,916.10
5,000	Chic. & N.W. Ry. Co., Equip. Tr. of 1922	5%	1934	4,907.10
5,000	Chic. & N.W. Ry. Co., Equip. Tr. of 1922	5%	1935	4,902.90
5,000	Chic. & N.W. Ry. Co., Equip. Tr. of 1922	5%	1936	4,899.30
200,000	Chic. & N. W. Ry. Co., 1st & Ref. Mtge.	4½%	2037	189,500.00
25,000	Cleveland & Pittsburg R. R. Co., Mtge.	4½%	1942	25,384.00

\*No par value.



Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$353,448.11	.....	\$25,299.00
.....	.....	8,587.50	.....	750.00
.....	.....	92,950.00	.....	5,000.00
.....	4,831.27	31,374.96	.....	667.00
.....	.....	1,540.00	.....	105.00
.....	.....	4,100.00	.....	200.00
.....	.....	.....	.....	505.00
.....	<b>\$4,831.27</b>	<b>\$492,000.57</b>	.....	<b>\$32,526.00</b>
.....	.....	\$73,143.75	.....	\$3,375.00
.....	.....	96,470.00	.....	4,000.00
<b>\$13,000.00</b>	.....	13,000.00	<b>\$107.25</b>	292.50
.....	.....	9,450.00	.....	400.00
.....	.....	850.00	.....	45.00
.....	.....	46,500.00	.....	2,500.00
.....	<b>\$9,825.00</b>	88,425.00	.....	4,470.00
.....	.....	24,575.00	.....	1,125.00
.....	.....	56,281.25	.....	3,000.00
.....	.....	40,918.75	.....	2,000.00
<b>16,936.36</b>	.....	16,936.36	<b>372.96</b>	765.00
.....	<b>378.00</b>	103,402.00	.....	5,000.00
.....	.....	50,307.00	.....	2,040.00
.....	.....	96,750.00	.....	4,500.00
.....	.....	94,250.00	.....	4,000.00
.....	.....	74,143.75	.....	3,750.00
.....	.....	10,410.00	.....	850.00
.....	.....	41,640.00	.....	3,400.00
.....	11.00	65,350.00	.....	2,925.00
.....	386.00	112,739.00	.....	6,500.00
.....	276.00	80,000.00	.....	3,600.00
.....	<b>384.00</b>	120,384.00	.....	5,400.00
.....	.....	4,925.70	.....	250.00
.....	.....	4,920.60	.....	250.00
.....	.....	4,916.10	.....	250.00
.....	.....	4,907.10	.....	250.00
.....	.....	4,902.90	.....	250.00
.....	.....	4,899.30	.....	250.00
.....	.....	189,500.00	.....	9,000.00
.....	<b>30.00</b>	<b>25,354.00</b>	.....	<b>1,125.00</b>

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>RAILROAD BONDS (Continued)</u>				
\$190,000	Delaware & Hudson Co., 1st & Ref. Mt.	4%	1943	\$172,785.00
35,000	Fort St. Union Depot Co., 1st Mtge..	4½%	1941	34,825.00
50,000	Great Northern Railway Co. Gen. Mtge.	4½%	1976	46,273.00
10,000	Illinois Central Equip. Trust "J" . . .	5%	1930	9,825.00
10,000	Illinois Central Equip. Trust "J" . . .	5%	1931	9,825.00
10,000	Illinois Central Equip. Trust "J" . . .	5%	1932	9,825.00
10,000	Illinois Central Equip. Trust "J" . . .	5%	1935	9,825.00
10,000	Illinois Central Equip. Trust "J" . . .	5%	1936	9,825.00
10,000	Illinois Central Equip. Trust "J" . . .	5%	1937	9,825.00
5,000	Illinois Central R. R. Co., Ref. Mtge. .	4%	1955	4,700.00
75,000	Illinois Central R. R. Co., Sec. Gold. .	4%	1952	67,875.00
59,000	Ill. Cen. R. R. Co., Wes. Lines Mtge. .	4%	1951	54,526.25
9,000	Ill. Cen. R. R. Co., West. Lines Mt. (Reg.)	4%	1951	8,291.25
50,000	Indianapolis Un. Ry. Co., Gen. Mtge. .	5%	1965	49,468.75
8,500	Kan. City, Mem. & Birm. R. R. Co., Mt.	4%	1934	8,287.50
37,000	Kan. City, Mem. & Birm. R. R. Co., In. Mt.	5%	1934	34,504.25
75,000	Kansas City Terminal Co., 1st Mtge. .	4%	1960	65,437.50
90,000	Lake Shore & Michigan South. R. R. Co.	4%	1931	88,950.00
50,000	Long Island R. R. Co., Unified Mtge. .	4%	1949	48,068.75
50,000	Long Island R. R. Co., Un. Mtge. (Reg.)	4%	1949	48,068.75
75,000	Maine Central R. R. Co., 1st Mtge. .	4½%	1935	75,030.00
100,000	Minn., St. Paul & S. St. Marie Ry. Co.	4%	1938	93,425.00
10,000	Minn., St. Paul & S. St. Marie Ry. Co. Gold	5½%	1949	7,438.10
21,000	Miss. & Ill. Bridge & Belt R. R. Co., Mt.	4%	1951	13,650.00
10,000	New London Northern R. R. Co., 1st Mt.	4%	1940	8,600.00
41,000	N. Y. C. & H. R. R. . . . . .	4%	1934	39,825.00
43,000	New York Central Lines Equip. Trust .	4½%	1929	41,822.36
42,000	New York Central Lines Equip. Trust .	4½%	1930	40,702.79
15,000	New York Central Lines Equip. Trust .	4½%	1932	14,439.21
14,000	New York Central Lines Equip. Trust .	4½%	1933	13,434.36
9,000	New York Central Lines Equip. Trust .	4½%	1937	8,536.50
18,000	New York Central R. R., Equip. Trust.	7%	1932	18,776.00
6,000	New York Central R. R., Equip. Trust.	7%	1933	6,336.00
11,000	New York Central R. R., Equip. Trust.	7%	1934	11,750.00
25,000	New York Central R. R., Equip. Trust.	4½%	1936	24,702.50
52,000	New York Cen. R. R. Co., Cons. Mt. "A"	4%	1998	46,046.65
100,000	New York Connect. R. R., 1st Mtge. .	4½%	1953	98,625.00
31,200	N. Y., N. H. & H. Co., Con. Deb. (Reg.)	6%	1948	33,457.00
8,000	N. Y., N. H. & H. R. R. Co., Deb. . .	4%	1955	6,320.00

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$172,785.00	.....	\$7,600.00
.....	.....	34,825.00	.....	1,575.00
.....	.....	46,273.00	.....	2,250.00
.....	.....	9,825.00	.....	500.00
.....	.....	9,825.00	.....	500.00
.....	.....	9,825.00	.....	500.00
.....	.....	9,825.00	.....	500.00
.....	.....	9,825.00	.....	500.00
.....	.....	4,700.00	.....	200.00
.....	.....	67,875.00	.....	3,000.00
.....	.....	54,526.25	.....	2,360.00
.....	.....	8,291.25	.....	360.00
.....	.....	49,468.75	.....	2,500.00
.....	.....	8,287.50	.....	340.00
.....	\$279.25	34,225.00	.....	1,850.00
.....	.....	65,437.50	.....	3,000.00
.....	.....	88,950.00	.....	3,600.00
.....	.....	48,068.75	.....	2,000.00
.....	.....	48,068.75	.....	2,000.00
.....	5.00	75,025.00	.....	3,375.00
.....	.....	93,425.00	.....	4,000.00
.....	.....	7,438.10	.....	550.00
.....	.....	13,650.00	.....	840.00
.....	.....	8,600.00	.....	400.00
.....	.....	39,825.00	.....	1,640.00
.....	.....	41,822.36	.....	1,935.00
.....	.....	40,702.79	.....	1,890.00
.....	.....	14,439.21	.....	675.00
.....	.....	13,434.36	.....	630.00
.....	.....	8,536.50	.....	405.00
.....	258.00	18,518.00	.....	1,260.00
.....	84.00	6,252.00	.....	420.00
.....	150.00	11,600.00	.....	770.00
.....	.....	24,702.50	.....	1,125.00
.....	.....	46,046.65	.....	2,080.00
.....	.....	98,625.00	.....	4,500.00
.....	119.00	33,338.00	.....	1,872.00
.....	.....	6,320.00	.....	320.00

## Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1928
<u>RAILROAD BONDS (Continued)</u>				
\$75,000	No. Pacific R. R. Co., Prior Lien Ry. . .	4%	1997	\$67,875.00
332,000	No. Pacific Ry. Co., Ref. & Imp. . . . .	6%	2047	353,652.00
84,000	Oregon R. R. & Nav. Co., Cons. Mtge. . .	4%	1946	82,668.25
50,000	Oregon Short Line R. R. Co., Ref. (Reg.)	4%	1929	48,500.00
14,500	Oregon Short Line R. R., Cons. Mtge. . .	5%	1946	15,000.00
18,000	Pennsylvania R. R. Co., Cons. Mtge. . .	4½%	1960	18,465.00
5,000	Pennsylvania R. R. Co., Equip. Trust	5%	1931	4,961.50
100,000	Pennsylvania R. R. Co., Gen. Mtge. . .	4½%	1965	100,840.00
100,000	Pennsylvania R. R. Co., Sec. Gold . . .	7%	1930	.....
117,900	Pere Marquette Ry., 1st Mtge. "A" . . .	5%	1956	104,719.59
37,500	Pere Marquette Ry. Co., 1st Mtge. "B"	4%	1956	37,500.00
51,000	Rio Grande Western Ry. Co., Mtge. . .	4%	1939	49,935.00
1,000	Somerset Ry. Co., 1st & Ref. Mtge. . .	4%	1955	850.00
5,000	Southern Pacific Co. Gold . . . . .	4%	1949	4,575.00
212,000	Southern Pacific Co. . . . .	4½%	1969	.....
25,000	So. Ry. Co., Dev. & Gen. Mtge. . . . .	4%	1956	21,242.50
25,000	So. Ry. Co., St. Louis Div., 1st Mt. (Reg.)	4%	1951	24,875.00
100,000	Term. R. R. Asso. of St. Louis, Mtge. . .	4½%	1939	100,171.00
20,000	Union Pacific R. R. Co. . . . .	4½%	1967	19,400.00
100,000	Un. Pac. R. R. Co., 1st Mtge. & L. Gr.	4%	1947	100,682.00
10,000	Western Pacific R. R. Co., 1st Mtge. "A"	5%	1946	8,000.00
50,000	Winston Salem South. Ry. Co., Mtge. .	4%	1960	43,875.00
	Sold or matured during year . . . . .			51,135.46
<b>\$4,644,600</b>	<b>Total Railroad Bonds . . . . .</b>			<b>\$4,194,454.97</b>

RAILROAD STOCKS

		Div.	Shares	
\$33,600	Atchison, Topeka & Santa Fe Co., Pref.	5%	336	\$25,200.00
104,000	Atchison, Topeka & Santa Fe Co., Com.	10%	1,040	99,291.55
50,000	Atlanta, Birmingham & Coast R. R., Pfd.	5%	500	50,000.00
40,500	Baltimore & Ohio R. R., Common . . .	6%	405	15,620.83
50,200	Boston & Albany R. R. Co., Capital. . .	8¾%	502	94,883.25
13,300	Chic. Jet. Rwys. & Union St. Yds. Co.	6%	133	12,718.13
20,000	Chicago & Northwestern Ry., Common.	4%	200	16,975.00
103,200	Delaware & Hudson R. R., Cap . . . . .	9%	1,032	126,604.00
12,500	Del., Lack. & Western R. R. . . . .	7%	250	26,800.00
72,500	Great Northern Ry. Co., Preferred . . .	5%	725	62,815.00
8,400	Illinois Central R. R. Pref. "A" . . . . .	6%	84	8,400.00
44,000	Illinois Central R. R. Co., Capital . . .	7%	440	47,400.00
115,000	Louisville & Nashville R. R. . . . .	7%	1,150	99,251.04
17,600	Minn., St. Paul & S. St. Marie Co., Pref.	4%	176	9,680.00
7,800	N. Y., N. H. & H. R. R. Co. Pref. . . .	7%	78	7,800.00

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$67,875.00	.....	\$3,000.00
.....	\$184.00	353,468.00	.....	19,920.00
.....	.....	82,668.25	.....	3,360.00
.....	.....	48,500.00	.....	2,000.00
.....	30.00	14,970.00	.....	725.00
.....	15.00	18,450.00	.....	810.00
.....	.....	4,961.50	.....	250.00
.....	24.00	100,816.00	.....	4,500.00
\$103,621.25	1,810.62	101,810.63	\$2,469.44	7,000.00
.....	.....	104,719.59	.....	5,895.00
.....	.....	37,500.00	.....	1,500.00
.....	.....	49,935.00	.....	2,040.00
.....	.....	850.00	.....	40.00
.....	.....	4,575.00	.....	200.00
192,280.00	.....	192,280.00	1,008.50	.....
.....	.....	21,242.50	.....	1,000.00
.....	.....	24,875.00	.....	1,000.00
.....	17.00	100,154.00	.....	4,500.00
.....	.....	19,400.00	.....	900.00
.....	38.00	100,644.00	.....	4,000.00
.....	.....	8,000.00	.....	500.00
.....	.....	43,875.00	.....	2,000.00
.....	51,135.46	.....	977.78	4,495.00
<b>\$325,837.61</b>	<b>\$65,439.33</b>	<b>\$4,454,853.25</b>	<b>\$4,935.93</b>	<b>\$209,519.50</b>
.....	.....	\$25,200.00	.....	\$1,680.00
.....	.....	99,291.55	.....	10,400.00
.....	.....	50,000.00	.....	2,500.00
\$5,538.50	.....	21,159.33	.....	2,164.90
.....	.....	94,883.25	.....	4,392.50
.....	.....	12,718.13	.....	798.00
.....	.....	16,975.00	.....	900.00
.....	.....	126,604.00	.....	9,288.00
.....	.....	26,800.00	.....	1,750.00
.....	.....	62,815.00	.....	3,625.00
.....	.....	8,400.00	.....	504.00
.....	.....	47,400.00	.....	3,080.00
.....	.....	99,251.04	.....	8,050.00
.....	.....	9,680.00	.....	704.00
.....	.....	7,800.00	.....	546.00

## Schedule H (Continued)

Par Value	Description of Securities	Div.	Shares	Balance June 30, 1933
<u>RAILROAD STOCKS (Continued)</u>				
\$33,500	Norfolk & Western Ry. Co., Common	.10%	335	\$38,860.00
33,000	Northern Pacific Ry., Capital	. . . . . 5%	330	26,523.75
33,800	Old Colony R. R. Co., Capital	. . . . . 7%	338	39,612.50
65,000	Southern Pacific Co., Capital	. . . . . 6%	650	58,500.00
100,000	Union Pacific R. R., Common	. . . . . 10%	1,000	142,573.13
30,000	Vicksburg, Shreveport & Pacific Rwy. Co.	5%	300	29,250.00
	Sold or matured during year			9,500.00
<u>\$987,900</u>	<i>Total Railroad Stocks</i>			<u>\$1,048,258.18</u>

<u>REAL ESTATE BONDS</u>		Rate	Maturity	
\$10,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1931	\$9,925.00
4,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1940	3,970.00
9,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1941	8,955.00
14,000	Ellicott Sq. Co. of Buffalo, 1st Mtge.	5%	1935	13,580.00
435,000	Equitable Office Bldg. Corp., 35-Yr. Deb.	5%	1952	447,000.00
5,680	Equitable Real Estate Co., Gold Notes	6%	1930	5,688.00
4,400	Equitable Real Estate Co., Gold Notes	6%	1931	4,410.00
20,000	Equitable Real Estate Co., Gold Notes	6%	1932	20,064.00
50,000	43 Exchange Pl. Bldg., 1st Mtge. S. F.	6%	1938	49,625.00
13,000	Jersey Mtge. & Title Guaranty Co.	. . . . . 5½%	1933	12,967.50
50,000	Steiger Bldg., 1st Mtge. Gold	. . . . . 5½%	1952	49,875.00
700	Technology Club of New York W. F.	5%	....	700.00
93,500	Trinity Bldg. Corp. of N. Y., 1st Mtge.	5½%	1939	94,750.00
<u>\$709,280</u>	<i>Total Real Estate Bonds</i>			<u>\$721,509.50</u>

<u>REAL ESTATE STOCKS</u>		Div.	Shares	
\$58,800	Alaska Building Trust	. . . . . 4%	588	\$58,251.22
20,000	Boston Cham. of Com. Realty Tr., 1st pf.	7%	200	19,200.00
68,000	Boston Real Estate Trust Capital	. . . . . 5%	68	71,661.64
<u>\$146,800</u>	<i>Total Real Estate Stocks</i>			<u>\$149,112.86</u>

<u>BANK STOCKS</u>				
\$35,800	First Nat'l Bank of Boston	. . . . . 16%	1790	\$102,150.00
16,500	Guaranty Trust Co. of New York	. . . . . 20%	165	53,069.02
<u>\$52,300</u>	<i>Total Bank Stocks</i>			<u>\$155,219.02</u>

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$38,860.00	.....	\$3,350.00
.....	.....	26,523.75	.....	1,650.00
.....	.....	39,612.50	.....	2,366.00
.....	.....	58,500.00	.....	3,900.00
.....	.....	142,573.13	.....	10,000.00
.....	.....	29,250.00	.....	1,500.00
.....	\$9,500.00	.....	.....	316.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$5,538.50	\$9,500.00	\$1,044,296.68	.....	\$73,464.40
.....	.....	\$9,925.00	.....	\$550.00
.....	.....	3,970.00	.....	220.00
.....	.....	8,955.00	.....	495.00
.....	.....	13,580.00	.....	700.00
.....	\$12,000.00	435,000.00	.....	22,350.00
.....	8.00	5,680.00	.....	340.80
.....	5.00	4,405.00	.....	264.00
.....	22.00	20,042.00	.....	1,200.00
.....	.....	49,625.00	.....	3,000.00
.....	.....	12,967.50	.....	715.00
.....	.....	49,875.00	.....	2,750.00
.....	.....	700.00	.....	.....
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$284.24	4,635.00	90,399.24	.....	5,266.25
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$284.24	\$16,670.00	\$705,123.74	.....	\$37,851.05
.....	.....	\$58,251.22	.....	\$2,352.00
.....	.....	19,200.00	.....	550.00
.....	.....	71,661.64	.....	3,400.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
.....	.....	\$149,112.86	.....	\$6,302.00
.....	.....	\$112,200.00	.....	\$5,200.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$10,050.00	.....	53,069.02	.....	2,805.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$10,050.00	.....	\$165,269.02	.....	\$8,005.00

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>MORTGAGE NOTES</u>				
\$12,500	Beta Nu House Corporation . . . . .	5½%	1929	\$14,000.00
4,500	E. V. and C. H. Bigelow . . . . .	5%	....	4,500.00
40,000	Cambridge Tobacco Co. . . . .	5½%	1930	40,000.00
40,000	F. J. Holderried (2 at \$20,000 each) . . . . .	6%	1930	40,000.00
3,400	Gamma Pi Corp. . . . .	6%	....	5,000.00
7,000	N. & V. Lomusico . . . . .	5%	....	7,000.00
75,000	Ella C. Martin . . . . .	5¼%	1930	75,000.00
18,000	Theta Chi . . . . .	5½%	1931	20,000.00
	Sold or matured during year . . . . .			65,000.00
<b>\$200,400</b>	<i>Total Mortgage Notes</i>			<b>\$270,500.00</b>
<u>REAL ESTATE</u>				
\$205,632.55	Avon St. Land and Building (11-13) . . . . .			\$205,632.55
385,364.53	Franklin St. Land and Building (64-70) . . . . .			385,364.53
100.00	Dorchester Land . . . . .			100.00
15,000.00	No. 7 Central St., Winchester, Land and Building . . . . .			15,000.00
<b>\$606,097.08</b>	<i>Total Real Estate</i>			<b>\$606,097.08</b>
<u>MISCELLANEOUS</u>				
\$100,000	Aldred Investment Trust Deb. . . . .	4½%	1967	\$50,000.00
* . . . . .	Aldred Investment Trust Common . . . . .		1000†	.....
60,000	Old Colony Trust Associates . . . . .		600†	30,000.00
400,000	Collateral Demand Notes . . . . .		....	400,000.00
	Sold during year . . . . .		....	.....
<b>\$560,000</b>	<i>Total Miscellaneous</i>			<b>\$480,000.00</b>
<u>RECAPITULATION, GENERAL INVESTMENTS</u>				
		<i>Per cent of total 1929</i>	<i>Per cent of total 1928</i>	
\$1,877,000.00	Government and Municipal Bonds	10.00	9.50	\$1,739,672.01
1,273,250.00	Industrial Bonds . . . . .	6.70	8.00	1,466,566.00
2,946,160.00	Industrial Stocks . . . . .	10.30	10.40	1,923,748.90
5,447,065.00	Public Utility Bonds . . . . .	28.20	28.00	5,166,217.59
553,200.00	Public Utility Stocks . . . . .	2.65	2.70	496,831.84
4,644,600.00	Railroad Bonds . . . . .	23.90	22.80	4,194,454.97
987,900.00	Railroad Stocks . . . . .	5.60	5.70	1,048,258.18
709,280.00	Real Estate Bonds . . . . .	3.75	3.90	721,509.50
146,800.00	Real Estate Stocks . . . . .	.80	.80	149,112.86
52,300.00	Bank Stocks . . . . .	.90	.80	155,219.02
200,400.00	Mortgage Notes . . . . .	1.05	1.50	270,500.00
606,097.08	Real Estate . . . . .	2.90	3.30	606,097.08
560,000.00	Miscellaneous . . . . .	3.25	2.60	480,000.00
<b>\$20,004,052.08</b>	<i>Total General Investments</i>	<b>100.00</b>	<b>100.00</b>	<b>\$18,418,187.95</b>

\*No par value.  
Shares.



Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$1,500.00	\$12,500.00	.....	\$770.00
.....	.....	4,500.00	.....	225.00
.....	.....	40,000.00	.....	2,200.00
.....	.....	40,000.00	.....	2,400.00
.....	1,600.00	3,400.00	.....	264.00
.....	.....	7,000.00	.....	350.00
.....	.....	75,000.00	.....	3,937.50
.....	2,000.00	18,000.00	.....	1,049.73
.....	65,000.00	.....	.....	3,845.97
.....	\$70,100.00	\$200,400.00	.....	\$15,042.20
.....	.....	\$205,632.55	\$4,230.24	\$13,368.24
.....	.....	385,364.53	12,906.06	41,694.06
.....	.....	100.00	74.88	.....
.....	.....	15,000.00	640.95	1,620.00
.....	.....	\$606,097.08	\$17,852.13	\$56,682.30
\$61,625.00	\$306.00	\$111,319.00	\$881.25	\$4,500.00
.....	.....	.....	.....	1,000.00
.....	.....	30,000.00	.....	900.00
.....	.....	400,000.00	.....	26,241.47
.....	.....	.....	.....	656.94
\$61,625.00	\$306.00	\$541,319.00	\$881.25	\$33,298.41
\$158,889.00	\$19,232.98	\$1,879,328.03	\$315.85	\$97,458.94
2,024.49	213,883.86	1,254,706.63	.....	74,090.66
23,264.95	24,451.19	1,922,562.66	.....	175,806.08
173,509.46	71,880.76	5,267,846.29	645.83	266,496.50
.....	4,831.27	492,000.57	.....	32,526.00
325,837.61	65,439.33	4,454,853.25	4,935.93	209,519.50
5,538.50	9,500.00	1,044,296.68	.....	73,464.40
284.24	16,670.00	705,123.74	.....	37,851.05
.....	.....	149,112.86	.....	6,302.00
10,050.00	.....	165,269.02	.....	8,005.00
.....	70,100.00	200,400.00	.....	15,042.20
.....	.....	606,097.08	17,852.13	56,682.30
61,625.00	306.00	541,319.00	881.25	33,298.41
\$761,023.25	\$496,295.39	\$18,682,915.81	\$24,630.99	\$1,086,543.04

## Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1928
<u>GOVERNMENT AND MUNICIPAL BONDS (EASTMAN CONTRACT)</u>				
\$70,000	Chelsea, City of, Tax Notes, Disc. . . . .		1929	.....
115,000	Great Britain & Ireland . . . . .	5½%	1937	\$120,452.00
25,000	Imperial Japanese Govt. Ext. Loan . . . . .	6½%	1954	23,125.00
30,000	Manitoba, Province of . . . . .	4½%	1945	28,650.00
70,000	Manitoba, Province of . . . . .	5%	1944	70,728.00
100,000	Montreal, City of . . . . .	5%	1958	101,484.00
100,000	Montreal, City of . . . . .	5%	1963	101,606.00
150,000	Ontario, Province of . . . . .	5%	1942	151,827.00
50,000	Ontario, Province of . . . . .	5%	1952	50,828.00
11,000	Ontario, Province of . . . . .	5%	1959	.....
40,000	Ottawa, City of . . . . .	5½%	1932	40,739.00
5,000	Ottawa, City of . . . . .	5%	1933	5,028.00
36,000	Ottawa, City of . . . . .	5%	1934	36,228.00
35,000	Ottawa, City of . . . . .	5%	1940	35,367.00
25,000	Ottawa, City of . . . . .	5%	1945	25,269.00
25,000	Ottawa, City of . . . . .	5%	1946	25,279.00
29,000	Ottawa, City of . . . . .	5%	1954	29,603.00
100,000	Quebec, Province of . . . . .	4½%	1950	97,000.00
200,000	Winnipeg, City of . . . . .	4½%	1944	189,000.00
<u>\$1,216,000</u>	<i>Total Government and Municipal Bonds</i>			<u>\$1,132,213.00</u>
<u>INDUSTRIAL BONDS (EASTMAN CONTRACT)</u>				
\$200,000	Armour & Co., Real Estate 1st Mtge. . . . .	4½%	1939	\$175,116.25
50,000	Chile Copper Co., Gold Deb. . . . .	5%	1947	48,500.00
300,000	Consolidation Coal Co., 1st & Ref. S. F. . . . .	5%	1950	268,806.25
98,000	Indiana Steel Co., 1st Mtge. . . . .	5%	1952	100,041.00
50,000	National Tube Co., 1st Mtge. . . . .	5%	1952	51,005.00
32,500	Swift & Co. . . . .	5%	1932	40,649.25
190,000	Western Electric Co., Deb. . . . .	5%	1944	188,288.75
50,000	Woodward Iron Co., 1st & Cons. Mtge. . . . .	5%	1952	42,750.00
<u>\$970,500</u>	<i>Total Industrial Bonds</i>			<u>\$915,156.50</u>
<u>INDUSTRIAL STOCKS (EASTMAN CONTRACT)</u>				
*\$1,875,000	Eastman Kodak Common . . . . .	Div. 8%	Shares 18,750	\$1,875,000.00
180,000	Eastman Kodak Preferred . . . . .	6%	1,800	198,000.00
21,000	International Match Co., Part. Pfd. . . . .	3.20	600	18,711.30
<u>\$2,076,000</u>	<i>Total Industrial Stocks</i>			<u>\$2,091,711.30</u>

\*No par value.

REPORT OF THE PRESIDENT

129

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
\$67,314.34	.....	\$67,314.34	.....	\$1,342.83
.....	\$681.00	119,771.00	.....	6,325.00
.....	.....	23,125.00	.....	1,625.00
.....	.....	28,650.00	.....	1,350.00
.....	49.00	70,679.00	.....	3,500.00
.....	52.00	101,432.00	.....	5,000.00
.....	48.00	101,558.00	.....	5,000.00
.....	141.00	151,686.00	.....	7,500.00
.....	36.00	50,792.00	.....	2,500.00
10,945.00	.....	10,945.00	\$25.97	.....
.....	247.00	40,492.00	.....	2,200.00
.....	7.00	5,021.00	.....	250.00
.....	46.00	36,182.00	.....	1,800.00
.....	34.00	35,333.00	.....	1,750.00
.....	17.00	25,252.00	.....	1,250.00
.....	17.00	25,262.00	.....	1,250.00
.....	25.00	29,578.00	.....	1,450.00
.....	.....	97,000.00	.....	4,500.00
.....	.....	189,000.00	.....	9,000.00
<hr/> \$78,259.34	<hr/> \$1,400.00	<hr/> \$1,209,072.34	<hr/> \$25.97	<hr/> \$57,592.83
.....	.....	\$175,116.25	.....	\$9,000.00
.....	.....	48,500.00	.....	2,500.00
.....	.....	268,806.25	.....	15,000.00
.....	\$89.00	99,952.00	.....	4,900.00
.....	44.00	50,961.00	.....	2,500.00
\$274.50	9,090.00	31,833.75	.....	2,075.00
.....	.....	188,288.75	.....	9,500.00
.....	.....	42,750.00	.....	2,500.00
<hr/> \$274.50	<hr/> \$9,223.00	<hr/> \$906,208.00	<hr/> .....	<hr/> \$47,975.00
.....	.....	\$1,875,000.00	.....	\$150,000.00
.....	.....	198,000.00	.....	10,800.00
.....	.....	18,711.30	.....	1,920.00
<hr/> .....	<hr/> .....	<hr/> \$2,091,711.30	<hr/> .....	<hr/> \$162,720.00

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>PUBLIC UTILITY BONDS (EASTMAN CONTRACT)</u>				
\$200,000	Alabama Power Co., 1st Mtge. "A"	5%	1946	\$191,501.25
200,000	Am. Tel. & Tel. 35-Yr. Deb.	5%	1960	190,000.00
100,000	Cedars Rapids Mfg. & P'r Co., S. F.	5%	1953	99,875.00
50,000	Ch.N.Sh.&Mil.R.R.Co.,1st&Ref.Mt."A"	6%	1955	49,000.00
49,000	Cleveland Elec. Ill. Co., 1st Mtge.	5%	1939	49,329.00
200,000	Consolidated Gas Co. of N. Y.	5½%	1945	202,518.00
100,000	Consolidated Gas & El. Lt. & Pr. Co.	4½%	1935	96,500.00
200,000	Consumers Power Co., 1st & Ref.	5%	1936	199,000.00
55,000	Cumberland County P'r&Lt.Co.,1st Mt.	4½%	1956	51,837.50
500,000	Edison Elec. Ill. Co., Boston Notes	4½%	1930	499,375.00
10,000	Hydraulic Pr. Co. of Niagara Falls	5%	1951	10,056.00
50,000	Illinois Pr.&Lt.Corp., 1st&Ref.Mt."B"	5½%	1954	48,500.00
100,000	Montreal Lt., Heat & Pr., 1st Mtge.	4½%	1932	98,750.00
100,000	Nebraska Power Co., 1st Mtge. "A"	5%	1949	98,750.00
100,000	Pacific Gas & El. Co., 1st Ref. Mt. "B"	6%	1941	103,600.00
50,000	SanJoaquinLt.&Pr.Co.Un.&Ref.Gold"D"	5%	1957	49,125.00
50,000	Sierra Pacific Elec. Co., Gold	5%	1929	49,802.50
50,000	Syracuse Lt. Co., Inc., 1st&Ref. Mtge.	5½%	1954	50,646.00
50,000	Tennessee Pr. Co., 1st Mtge.	5%	1962	46,625.00
100,000	Western Union Tel. Co.	5%	1951	100,000.00
	Sold or matured during the year			124,875.00
<u>\$2,314,000</u>	<i>Total Public Utility Bonds</i>			<u>\$2,409,665.25</u>

PUBLIC UTILITY STOCKS (EASTMAN CONTRACT)

	<i>Div.</i>	<i>Shares</i>	
\$50,000	Central Illinois Pub. Ser. Co., Pref.	500	\$42,937.50
28,600	Edison Electric Ill. Co., Capital.	286	57,802.50
50,000	Knoxville Pr. & Lt. Co., Pref.	500	49,375.00
*50,000	Memphis Pr. & Lt. Co., Pref.	500	49,375.00
50,000	Public Service Elec. & Gas. Co., Pref.	500	47,250.00
<u>\$228,600</u>	<i>Total Public Utility Stocks</i>		<u>\$246,740.00</u>

RAILROAD BONDS (EASTMAN CONTRACT)

	<i>Rate</i>	<i>Maturity</i>	
\$58,000	Chesapeake & Ohio Ry. Co.	4½%	1930
100,000	Chicago & Northwestern R.R.Co.Gen'l	4%	1987
50,000	Chic., Rock Is. & Pacific, 1st & Ref. Mt.	4%	1934
100,000	Delaware & Hudson, 1st & Ref. Mtge.	4%	1943
50,000	East Penn. Ry. Co., 1st Mtge.	5%	1936
100,000	Florida East Coast Ry.Co.,1st&Ref.Mt.	5%	1974

\*No par value.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$191,501.25	.....	\$10,000.00
.....	.....	190,000.00	.....	10,000.00
.....	.....	99,875.00	.....	5,000.00
.....	.....	49,000.00	.....	3,000.00
.....	\$33.00	49,296.00	.....	2,450.00
.....	157.00	202,361.00	.....	11,000.00
.....	.....	96,500.00	.....	4,500.00
.....	.....	199,000.00	.....	10,000.00
.....	.....	51,837.50	.....	2,475.00
.....	.....	499,375.00	.....	22,500.00
.....	3.00	10,053.00	.....	500.00
.....	.....	48,500.00	.....	2,750.00
.....	.....	98,750.00	.....	4,500.00
.....	.....	98,750.00	.....	5,000.00
.....	300.00	103,300.00	.....	6,000.00
.....	.....	49,125.00	.....	2,500.00
.....	.....	49,802.50	.....	2,500.00
.....	26.00	50,620.00	.....	2,750.00
.....	.....	46,625.00	.....	2,500.00
.....	.....	100,000.00	.....	5,000.00
.....	124,875.00	.....	.....	7,000.00
.....	\$125,394.00	\$2,284,271.25	.....	\$121,925.00
.....	.....	\$42,937.50	.....	\$3,000.00
.....	.....	57,802.50	.....	3,432.00
.....	.....	49,375.00	.....	3,500.00
.....	.....	49,375.00	.....	3,500.00
.....	.....	47,250.00	.....	3,000.00
.....	.....	\$246,740.00	.....	\$16,432.00
\$57,782.87	.....	\$57,782.87	\$1,272.44	\$2,610.00
.....	.....	96,500.00	.....	4,000.00
.....	.....	42,406.25	.....	2,000.00
.....	.....	89,500.00	.....	4,000.00
.....	.....	46,875.00	.....	2,500.00
.....	.....	95,633.75	.....	5,000.00

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>RAILROAD BONDS (EASTMAN CONTRACT) Continued</u>				
\$11,000	Illinois Central R. R. Equip. Trust "K"	4½%	1931	\$10,876.51
4,000	Illinois Central R. R. Equip. Trust "K"	4½%	1932	3,948.40
4,000	Illinois Central R. R. Equip. Trust "K"	4½%	1933	3,943.20
5,000	Illinois Central R. R. Equip. Trust "K"	4½%	1934	4,922.50
11,000	Illinois Central R. R. Equip. Trust "K"	4½%	1935	10,818.05
27,000	Illinois Central R. R. Equip. Trust "K"	4½%	1936	26,524.02
21,000	Illinois Central R. R. Equip. Trust "K"	4½%	1937	20,606.71
12,000	Illinois Central R. R. Equip. Trust "K"	4½%	1938	11,762.28
5,000	Illinois Central R. R. Equip. Trust "K"	4½%	1939	4,895.79
25,000	Ill. Cent. & Chic. St. L. & N. O. R.R.	4½%	1963	24,375.00
50,000	Kansas City, Ft. Scott & Memphis Cons.	4%	1936	41,243.75
50,000	Kansas City Terminal Ry., 1st Mtge. .	4%	1960	42,750.00
200,000	Minn., St. Paul & S. St. Marie Ry. Co.,	4%	1938	175,710.00
100,000	Missouri, Pacific Ry. Co. 1st & Ref. Mt. "F"	5%	1977	99,750.00
50,000	New York, Chicago & St. Louis Ry..	5½%	1974	47,350.00
200,000	Northern Pacific Ry. Co., Ref. & Imp. "B"	6%	2047	215,453.00
5,000	Penn. R. R. Equip. Trust "A" . . . .	5%	1932	4,959.00
50,000	St. Louis Iron Mt. & Southern Ry. . . .	4%	1933	42,290.00
50,000	South. Ry. Co., Dev. & Gen. Mtge. . . .	4%	1956	37,492.50
100,000	Terminal R.R. Asso. of St. Louis Gen. Mt.	4%	1953	83,860.00
100,000	Union Term. Co. of Dallas, 1st Mt. S.F.	5%	1942	99,673.75
200,000	Virginian Ry. Co., 1st Mtge. "A" . . . .	5%	1962	191,737.50
	Sold or matured during year . . . . .			47,258.75
<u>\$1,738,000</u>	<i>Total Railroad Bonds</i>			<u>\$1,623,115.71</u>

RAILROAD STOCKS (EASTMAN CONTRACT)

	<i>Div.</i>	<i>Shares</i>	
\$8,000	Bangor & Aroostook R. R. Common . . . .	3.50	80 \$4,800.00
20,000	Bangor & Aroostook R. R., Pref. . . . .	7%	200 19,000.00
133,100	New York Central R. R., Capital . . . .	8%	1,331 118,188.53
100,000	Pere Marquette Ry. Pr., Pref. Cum.. . .	5%	1,000 80,024.40
<u>\$261,100</u>	<i>Total Railroad Stocks</i>		<u>\$222,012.93</u>

MISCELLANEOUS (EASTMAN CONTRACT)

	<i>Div.</i>	<i>Shares</i>	
\$4,000	First National Bank of New York. . . .	100%	40 \$104,328.00
60,000	Old Colony Trust Co. of Boston . . . .	12%	600 131,878.76
300,000	Gannett Co., Inc., Note . . . . .	5%	.. 300,000.00
<u>\$364,000</u>	<i>Total Miscellaneous</i>		<u>\$536,206.76</u>

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$10,876.51	.....	\$495.00
.....	.....	3,948.40	.....	180.00
.....	.....	3,943.20	.....	180.00
.....	.....	4,922.50	.....	225.00
.....	.....	10,818.05	.....	495.00
.....	.....	26,524.02	.....	1,215.00
.....	.....	20,606.71	.....	945.00
.....	.....	11,762.28	.....	540.00
.....	.....	4,895.79	.....	225.00
.....	.....	24,375.00	.....	1,125.00
.....	.....	41,243.75	.....	2,000.00
.....	.....	42,750.00	.....	2,000.00
.....	.....	175,710.00	.....	8,000.00
.....	.....	99,750.00	.....	5,000.00
.....	.....	47,350.00	.....	2,750.00
.....	\$131.00	215,322.00	.....	12,000.00
.....	.....	4,959.00	.....	250.00
.....	.....	42,290.00	.....	2,000.00
.....	.....	37,492.50	.....	2,000.00
.....	.....	83,860.00	.....	4,000.00
.....	.....	99,673.75	.....	5,000.00
.....	.....	191,737.50	.....	10,000.00
.....	47,258.75	.....	.....	1,375.00
<b>\$57,782.87</b>	<b>\$47,389.75</b>	<b>\$1,633,508.83</b>	<b>\$1,272.44</b>	<b>\$82,110.00</b>
.....	.....	\$4,800.00	.....	\$280.00
.....	.....	19,000.00	.....	1,400.00
<b>\$12,100.00</b>	.....	130,288.53	<b>\$153.67</b>	10,406.00
.....	.....	80,024.40	.....	5,000.00
<b>\$12,100.00</b>	.....	<b>\$234,112.93</b>	<b>\$153.67</b>	<b>\$17,086.00</b>
.....	.....	\$104,328.00	.....	\$4,000.00
.....	.....	131,878.76	.....	7,200.00
.....	.....	300,000.00	.....	12,500.00
.....	.....	<b>\$536,206.76</b>	.....	<b>\$23,700.00</b>

Schedule H (Continued)

Par Value	Description of Securities	Per cent of Total 1929	Per cent of Total 1928	Balance June 30, 1928
<b>RECAPITULATION, EASTMAN CONTRACT INVESTMENTS</b>				
\$1,216,000	Government and Municipal Bonds	12.80	12.00	\$1,132,213.00
970,500	Industrial Bonds	9.60	9.70	915,156.50
2,076,000	Industrial Stocks	22.15	22.00	2,091,711.30
2,314,000	Public Utility Bonds	24.20	25.40	2,409,665.25
228,600	Public Utility Stocks	2.60	2.60	246,740.00
1,738,000	Railroad Bonds	17.30	17.10	1,623,115.71
261,100	Railroad Stocks	2.50	2.30	222,012.93
364,000	Miscellaneous	5.70	5.70	536,206.76
300,000	Cash Reserve	3.15	3.20	300,000.00
<b>\$9,468,200</b>	<b>Total Investments (Eastman Contract)</b>	<b>100.00</b>	<b>100.00</b>	<b>\$9,476,821.45</b>

**INVESTMENTS, MALCOLM COTTON BROWN FUND**

		Rate	Maturity	
\$2,000	Chesapeake & Ohio Ry. Co.	4½%	1930	.....
15,000	Metro. West Side Elev. Ry. Co., Mtg.	4%	1938	\$6,750.00
10,000	Metro. West Side Elev. Ry. Co., Mtg.	4%	1938	4,100.00
<b>\$27,000</b>	<b>Total</b>			<b>\$10,850.00</b>

**INVESTMENTS, FRANK HARVEY CILLEY FUND**

\$10,000	New York, City of, Corp. Stock	4¼%	1964	\$10,340.00
5,000	St. Louis Iron Mt.&So.R.R.Mtg.(Reg.)	4%	1933	4,812.50
6,000	Edison Elec. Ill. Co. Boston, Gold	4½%	1930	6,020.00
8,000	Chesapeake & Ohio Ry. Co.	4½%	1930	.....
5,000	Chic. & Northwestern Ry. Co. Equip. Tr.	5%	1938	5,000.00
2,500	Boston Elev. Ry. Co., 2d Pfd.	7%	25†	2,600.00
5,900	Edison Electric Ill. Co., Capital.	12%	59†	12,667.09
7,500	Mass. Gas Companies, Pref.	4%	75†	6,825.00
1,250	Springfield Ry. Companies Pref.	8%	25†	2,125.00
7,800	Boston & Albany R. R. Co., Capital.	8¾%	78†	12,589.50
1,000	Boston & Providence R. R. Corp.	8½%	10†	1,700.00
1,600	Mortgage Notes, Isabella Aznive	6%	..	1,600.00
2,400	Mortgage Note, E. and A. Orlogski	5%	..	2,400.00
<b>\$63,950</b>	<b>Total</b>			<b>\$68,679.09</b>

Shares



Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
\$78,259.34	\$1,400.00	\$1,209,072.34	\$25.97	\$57,592.83
274.50	9,223.00	906,208.00	.....	47,975.00
.....	.....	2,091,711.30	.....	162,720.00
.....	125,394.00	2,284,271.25	.....	121,925.00
.....	.....	246,740.00	.....	16,432.00
57,782.87	47,389.75	1,633,508.83	1,272.44	82,110.00
12,100.00	.....	234,112.93	153.67	17,086.00
.....	.....	536,206.76	.....	23,700.00
.....	.....	300,000.00	.....	9,000.00
<b>\$148,416.71</b>	<b>\$183,406.75</b>	<b>\$9,441,831.41</b>	<b>\$1,452.08</b>	<b>\$538,540.83</b>

\$1,992.51	.....	\$1,992.51	\$43.88	\$90.00
.....	.....	6,750.00	.....	600.00
.....	.....	4,100.00	.....	400.00
<b>\$1,992.51</b>	<b>.....</b>	<b>\$12,842.51</b>	<b>\$43.88</b>	<b>\$1,090.00</b>

.....	\$10.00	\$10,330.00	.....	\$425.00
.....	.....	4,812.50	.....	200.00
.....	10.00	6,010.00	.....	270.00
\$7,970.05	.....	7,970.05	\$175.51	360.00
.....	.....	5,000.00	.....	250.00
.....	.....	2,600.00	.....	175.00
.....	.....	12,667.09	.....	708.00
.....	.....	6,825.00	.....	300.00
.....	.....	2,125.00	.....	137.50
.....	.....	12,589.50	.....	682.50
.....	.....	1,700.00	.....	85.00
.....	.....	1,600.00	.....	96.00
.....	.....	2,400.00	.....	120.00
<b>\$7,970.05</b>	<b>\$20.00</b>	<b>\$76,629.14</b>	<b>\$175.51</b>	<b>\$3,809.00</b>

## Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1928</i>
<u>INVESTMENTS, EBEN S. DRAPER FUND</u>				
\$22,000	Province of Ontario Deb. . . . .	5%	1959	.....
16,000	Georgia Ry. & Elec. Co., 1st Mt. S. F. . . . .	5%	1932	\$16,054.00
20,000	New York Tel. Co., 1st & Gen. Mtge. . . . .	4½%	1939	19,395.00
4,000	Chic. Mil., St. Paul & Pac. R.R. Gold "A" . . . . .	5%	1975	4,068.80
16,000	C. M., St. P. & Pac. R.R. Conv. Gold "A" . . . . .	5%	2000	16,275.20
24,000	Indianapolis Un. Ry. Co., Gen. Mtge. . . . .	5%	1965	23,880.00
	Sold or matured during year . . . . .			19,600.00
<hr/>				<hr/>
\$102,000	<i>Total</i>			\$99,273.00
<u>INVESTMENTS, HENRY C. FRICK FUND</u>				
\$80,000	Chelsea, City of, Tax Notes, Disc. . . . .		1929	.....
20,000	Co. of Hampton, Mass., Tax Notes, Disc. . . . .		1929	.....
50,000	Province of British Columbia . . . . .	4½%	1939	\$48,325.00
50,000	Province of Ontario Deb. . . . .	4½%	1934	48,314.30
50,000	Commonwealth Elec. Co., 1st Mtge. . . . .	5%	1943	47,937.50
51,000	Cumberland Tel. & Tel. Co., 1st Mtge. . . . .	5%	1937	50,305.75
25,000	Puget Sound P.&L. Co. 1st Ref. Mtg. "B" . . . . .	5%	1931	24,812.50
50,000	American Radiator Co. Gold Deb. . . . .	4½%	1947	48,000.00
25,000	U. S. Cold Storage Co., 1st Mtge. R. E. . . . .	6%	1945	25,499.00
25,000	Canadian Natl. Rys. Equip. Tr. Gold "J" . . . . .	4½%	1937	24,605.00
25,000	Ill. Cent & Chic. St. L. & New Orleans R.R. . . . .	4½%	1963	24,312.50
25,000	Lake Shore & Mich. So. R. R. Co. . . . .	4%	1931	.....
100,000	St. Louis, Iron Mt. & Southern Ry. Co. . . . .	5%	1931	.....
25,000	Southern Ry. Co. Dev. & Gen. Mtge. "A" . . . . .	4%	1956	21,425.00
40,000	Union Pacific R. R. Co. . . . .	4½%	1967	38,800.00
*37,000	Cerro de Pasco Copper Corp. . . . .	6%	370†	18,870.00
170,000	Chic. & Northwestern Ry. Co. Com. . . . .	4%	1700†	93,500.00
.....	Taxes Advanced . . . . .		..	.....
<hr/>				<hr/>
\$848,000				\$514,706.55
<u>INVESTMENTS, JOY SCHOLARSHIP FUND</u>				
\$8,000	Chesapeake & Ohio Ry. Co. . . . .	4½%	1930	.....
5,000	Cedar Rapids Mfg. & Pr. Co. 1st Mt. S.F. . . . .	5%	1953	\$4,075.00
5,000	Mass. Hospital Life Insurance Co. . . . .	5%	..	5,000.00
<hr/>				<hr/>
\$18,000	<i>Total</i>			\$9,075.00
<u>INVESTMENTS, RICHARD LEE RUSSEL FELLOWSHIP FUND</u>				
\$1,000	Trinity Build. Corp. of N. Y., 1st Mt. . . . .	5½%	1939	\$2,000.00
<u>INVESTMENTS, SUSAN H. SWETT SCHOLARSHIP FUND</u>				
\$10,000	Mass. Hospital Life Insurance Co. . . . .	5%	..	\$10,000.00

\*No par value.

†Shares.

Schedule H (Continued)				
<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
\$21,890.00	.....	\$21,890.00	\$51.94	.....
.....	\$18.00	16,036.00	.....	\$800.00
.....	.....	19,395.00	.....	900.00
.....	1.80	4,067.00	.....	200.00
.....	4.20	16,271.00	.....	800.00
.....	.....	23,880.00	.....	1,200.00
.....	19,600.00	.....	.....	1,000.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$21,890.00	\$19,624.00	\$101,539.00	\$51.94	\$4,900.00
\$76,930.67	.....	\$76,930.67	.....	*\$1,534.67
19,364.03	.....	19,364.03	.....	*268.72
.....	.....	48,325.00	.....	2,250.00
.....	.....	48,314.30	.....	2,250.00
.....	.....	47,937.50	.....	2,500.00
.....	.....	50,305.75	.....	2,550.00
.....	.....	24,812.50	.....	1,250.00
.....	.....	48,000.00	.....	2,250.00
.....	\$32.00	25,467.00	.....	1,500.00
.....	.....	24,605.00	.....	1,125.00
.....	.....	24,312.50	.....	1,125.00
24,550.00	.....	24,550.00	\$236.11	1,000.00
100,125.00	63.00	100,062.00	1,647.23	5,000.00
.....	.....	21,425.00	.....	1,000.00
.....	.....	38,800.00	.....	1,800.00
.....	.....	18,870.00	.....	1,942.50
.....	.....	93,500.00	.....	7,650.00
.....	.....	.....	595.80	.....
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$220,969.70	\$95.00	\$735,581.25	\$2,479.14	\$36,995.89
\$7,970.05	.....	\$7,970.05	\$175.51	\$360.00
.....	.....	4,075.00	.....	250.00
.....	.....	5,000.00	.....	250.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$7,970.05	.....	\$17,045.05	\$175.51	\$860.00
\$30.00	\$1,030.00	\$1,000.00	.....	\$82.50
.....	.....	\$10,000.00	.....	\$500.00

\*Net for 1928-1929.

## Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1928
<u>INVESTMENTS, JONATHAN WHITNEY FUND</u>				
\$25,000	Chelsea, City of, Tax Notes, Disc. . . . .		1929	.....
25,000	Montreal, City of, Canada . . . . .	5%	1936	\$25,000.00
25,000	New York, City of, Corporate Stock. . . . .	4½%	1964	25,906.00
21,000	Standard Oil Co. of New York . . . . .	4½%	1935	21,088.00
24,000	Swift & Co., 1st Sinking Fund . . . . .	5%	1944	22,625.00
24,000	U. S. Steel Corp., S. F. . . . .	5%	1963	27,248.50
28,000	Western Electric Co., Deb. . . . .	5%	1944	27,720.00
25,000	Detroit Edison Co., 1st Mtge. . . . .	5%	1933	25,120.00
25,000	Georgia Rail. & Elec. Co., 1st Mtge. . . . .	5%	1932	25,126.00
25,000	N. Y. Tel. Co., 1st & Gen. Mtge. . . . .	4½%	1939	24,150.39
25,000	Western Tel. & Tel. Co., Co. Tr. . . . .	5%	1932	25,141.00
25,000	Atch., Top. & S. F., Cal. & Ar. Lines, 1st Mt. . . . .	4½%	1962	24,381.25
7,000	Chesapeake & Ohio Ry. Co. . . . .	4½%	1930	.....
35,000	Chicago Union Station, 1st Mtge. . . . .	4½%	1963	35,195.00
25,000	Illinois Cen. R. R. Co., Sec. Gold . . . . .	4%	1952	22,625.00
50,000	Kansas City Terminal Ry. Co., 1st Mt. . . . .	4%	1960	42,750.00
25,000	Maine Cen. R. R. Co., 1st & Ref. Mt. . . . .	4½%	1935	25,007.00
7,000	New York Central Equip. Tr. . . . .	4½%	1935	7,000.00
9,000	New York Central Lines, Eq. Tr. . . . .	4½%	1936	8,558.10
5,000	Penn. R. R. Eq. Tr. "A" . . . . .	5%	1936	4,950.00
150,000	Mortgage Note, M. I. T. Dormitory. . . . .	5%	..	150,000.00
	Sold or matured during year . . . . .			25,000.00
<hr/>				
\$610,000	Total . . . . .			\$594,591.24
<hr/>				
\$31,152,202.08	Grand Total, All Investments (Schedule D)			\$29,204,184.28
<hr/>				

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1929</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
\$24,040.83	.....	\$24,040.83	.....	*\$479.59
.....	.....	25,000.00	.....	1,250.00
.....	\$26.00	25,880.00	.....	1,062.50
.....	15.00	21,073.00	.....	945.00
120.00	1,025.00	21,720.00	.....	1,225.00
272.40	3,307.90	24,213.00	.....	1,350.00
.....	.....	27,720.00	.....	1,400.00
.....	30.00	25,090.00	.....	1,250.00
.....	42.00	25,084.00	.....	1,250.00
.....	.....	24,150.39	.....	1,125.00
.....	47.00	25,094.00	.....	1,250.00
.....	.....	24,381.25	.....	1,125.00
6,973.79	.....	6,973.79	\$153.57	315.00
.....	6.00	35,189.00	.....	1,575.00
.....	.....	22,625.00	.....	1,000.00
.....	.....	42,750.00	.....	2,000.00
.....	2.00	25,005.00	.....	1,125.00
.....	.....	7,000.00	.....	315.00
.....	.....	8,558.10	.....	405.00
.....	.....	4,950.00	.....	250.00
.....	.....	150,000.00	.....	7,500.00
.....	25,000.00	.....	.....	750.00
<b>\$31,407.02</b>	<b>\$29,500.90</b>	<b>\$596,497.36</b>	<b>\$153.57</b>	<b>\$28,947.09</b>
<b>\$1,201,669.29</b>	<b>\$729,972.04</b>	<b>\$29,675,881.53</b>	<b>\$29,162.62</b>	<b>\$1,702,268.35</b>

\*Net for 1928-1929.

RECAPITULATION, ALL INVESTMENTS

	<i>Per cent of Total 1929</i>	<i>Per cent of Total 1928</i>	<i>Book Value June 30, 1929</i>
Government and Municipal Bonds . . . . .	11.40	10.40	\$3,388,475.20
Industrial Bonds . . . . .	7.80	8.90	2,329,107.63
Industrial Stocks . . . . .	13.60	13.80	4,048,143.96
Public Utility Bonds . . . . .	26.50	27.00	7,830,957.68
Public Utility Stocks . . . . .	2.60	2.70	762,957.66
Railroad Bonds . . . . .	22.20	21.00	6,571,511.83
Railroad Stocks . . . . .	4.70	4.70	1,386,199.11
Real Estate Bonds . . . . .	2.40	2.50	706,123.74
Real Estate Stocks . . . . .	.50	.50	149,112.86
Bank Stocks . . . . .	1.30	1.30	401,475.78
Mortgage Notes . . . . .	2.20	2.50	654,400.00
Real Estate . . . . .	2.00	2.10	606,097.08
Miscellaneous . . . . .	1.80	1.60	541,319.00
Cash Reserve . . . . .	1.00	1.00	300,000.00
	<b>100.00</b>	<b>100.00</b>	<b>\$29,675,881.53</b>

**SCHEDULE J**  
**EDUCATIONAL PLANT**

*Land, Buildings and Equipment*

Land, Boylston, Clarendon and Newbury Streets, Boston . . .	\$1,500,000.00
Rogers Building, Boylston Street, Boston . . . . .	204,534.76
Walker Building, Boylston Street, Boston . . . . .	150,000.00
Land, east of Massachusetts Avenue, Cambridge . . . . .	1,125,766.67
Land, west of Massachusetts Avenue . . . . .	854,014.82
Main Educational Building Group . . . . .	4,071,492.13
Pratt School of Naval Architecture . . . . .	674,971.70
Guggenheim Aeronautical Laboratory . . . . .	293,637.46
Aeronautical Engine Testing Laboratory (New) . . . . .	121,101.92
Mechanic Arts Building . . . . .	83,658.89
Power Plant (inc. Machinery and Equipment) . . . . .	302,569.27
Homberg Memorial Infirmary . . . . .	188,441.60
Educational Equipment, Cambridge . . . . .	2,039,953.60
Steam and Electrical Distribution System, Cambridge . . . . .	155,448.64
Gas Engine Laboratory . . . . .	26,301.88
Automotive Laboratory . . . . .	11,000.00
Compression Laboratory . . . . .	31,000.00
Tractor Garage . . . . .	6,400.00
Service Garage . . . . .	5,981.54
Athletic Field . . . . .	24,815.14
Walker Memorial Building . . . . .	575,111.50
Walker Memorial Building, Equipment . . . . .	139,475.52
Dormitories (1916) (\$331,357.67 less mortgage \$150,000) . . . . .	181,357.67
Dormitories (1916) Equipment . . . . .	26,967.85
Dormitory, Class of '93 . . . . .	185,718.91
Dormitory, Class of '93, Equipment . . . . .	9,518.04
Alumni Dormitories (1928) . . . . .	291,274.49
Alumni Dormitories (1928) Equipment . . . . .	18,971.05
Service Building . . . . .	42,988.20
Boathouse . . . . .	54,244.13
Squash Courts . . . . .	29,042.54
Summer Camp, East Machias, Maine . . . . .	120,558.00
Summer Camp, Dover, New Jersey . . . . .	35,000.00
Miscellaneous . . . . .	301,726.27
Total, June 30, 1929 (Schedule D) . . . . .	<u>\$13,883,044.19</u>

**SCHEDULE K**  
**PRINCIPAL GIFTS AND APPROPRIATIONS FOR**  
**EDUCATIONAL PLANT**

George Eastman, for New Buildings . . . . .	\$3,500,000.00
Maria A. Evans, for Dormitories . . . . .	161,192.55
Class of 1893, for Dormitory . . . . .	100,000.00
Appropriation, Maria A. Evans Fund. . . . .	169,080.60
T. C. du Pont, Donation for Land . . . . .	625,000.00
T. C. du Pont, Donation for Dormitories . . . . .	100,000.00
T. C. and P. S. du Pont, Charles Hayden, for Mining Building	215,000.00
Pratt Fund, for School of Naval Architecture . . . . .	675,150.00
Alumni Fund, Equipment, Dormitories and Walker Memorial	622,119.38
Alumni Dormitory Fund . . . . .	310,245.54
Walker Memorial Fund, for Walker Memorial . . . . .	167,303.96
Improvement Fund for Walker Memorial . . . . .	24,491.04
Appropriation of Emma Rogers Fund, for Equipment . . . . .	528,077.06
Daniel Guggenheim Fund . . . . .	230,000.00
Estate of F. W. Emery, for Equipment . . . . .	126,423.80
Appropriation of Charles C. Drew Fund . . . . .	305,171.52
Appropriation of Lucius Tuttle Fund for Equipment . . . . .	50,000.00
Subscriptions to Homberg Memorial Infirmary . . . . .	110,225.00
A. P. Sloan, Jr., for Aero Engine Laboratory . . . . .	65,000.00
Appropriation of Frank E. Peabody Fund . . . . .	52,238.89
Appropriation of Nathaniel Thayer Fund for Equipment . . . . .	25,000.00
Appropriation of French Fund for Equipment . . . . .	100,843.34
Appropriation of George B. Dorr Fund for Equipment . . . . .	49,573.47
Land in Boston, Grant of Commonwealth (estimated) . . . . .	1,500,000.00
Appropriation of A. F. Estabrook Fund for Land . . . . .	85,000.00
Anonymous for Boat House Additions . . . . .	30,000.00
Appropriation of Ida F. Estabrook Fund for Land . . . . .	20,000.00
Appropriation of Miscel. Unrestricted Funds for Land . . . . .	151,697.89
Subscriptions for Land . . . . .	125,525.00
Sale of Land and Buildings in Boston. . . . .	656,919.45
Equipment from Buildings in Boston (estimated) . . . . .	500,000.00
Other Funds, Donations, Appropriations, etc. . . . .	2,492,552.82
<b>*Total, June 30, 1929 (Schedule D) . . . . .</b>	<b>\$13,873,831.31</b>

\*\$9,212.88 to be appropriated.

SCHEDULE P  
ENDOWMENT FUNDS FOR GENERAL PURPOSES

<i>Restricted Funds</i>	<i>Funds, June 30, 1928</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended or Transferred</i>	<i>Funds, June 30, 1929</i>
George Robert Armstrong	\$5,000.00	\$277.50	.....	\$277.50	\$5,000.00
Charles Choate . . . . .	35,858.15	1,998.00	.....	1,998.00	35,858.15
Eben S. Draper . . . . .	100,000.00	4,848.06	\$2,400.00	4,848.06	102,400.00
*Eastman Contract . . . . .	6,046,053.90	537,088.75	.....	237,088.75	6,346,053.90
George Eastman(Building)	2,500,000.00	138,750.00	.....	138,750.00	2,500,000.00
Educational Endowment	7,570,960.27	420,190.50	938.33	420,190.50	7,571,898.60
Martha Ann Edwards . . . . .	30,000.00	1,665.00	.....	1,665.00	30,000.00
William Endicott . . . . .	25,000.00	1,387.50	.....	1,387.50	25,000.00
Francis Appleton Foster . . . . .	1,000,000.00	55,500.00	.....	55,500.00	1,000,000.00
Jonathan French . . . . .	25,212.48	1,387.50	.....	1,387.50	25,212.48
Henry C. Frick . . . . .	556,710.77	34,516.75	191,208.11	39,516.75	742,918.88
General Endowment. . . . .	1,527,549.00	84,776.25	.....	84,776.25	1,527,549.00
James Fund . . . . .	163,654.21	9,102.00	.....	9,102.00	163,654.21
Katharine B. Lowell. . . . .	5,000.00	277.50	.....	277.50	5,000.00
M. I. T. Alumni Fund (Bal.)	1,311.19	72.15	.....	.....	1,383.34
Kate M. Morse . . . . .	25,000.00	1,387.50	.....	1,387.50	25,000.00
Richard Perkins . . . . .	50,000.00	2,775.00	.....	2,775.00	50,000.00
J. W. and B. L. Randall . . . . .	83,452.36	4,606.50	.....	4,606.50	83,452.36
Wm. Barton Rogers Mem.	250,225.00	13,875.00	.....	13,875.00	250,225.00
†Saltonstall Fund . . . . .	54,831.85	3,052.50	.....	2,289.39	55,594.96
Samuel E. Sawyer. . . . .	4,764.40	260.85	.....	260.85	4,764.40
Andrew Hastings Spring . . . . .	50,000.00	2,775.00	.....	2,775.00	50,000.00
Seth K. Sweetser . . . . .	25,061.62	1,387.50	.....	1,387.50	25,061.62
William J. Walker. . . . .	23,663.59	1,332.00	.....	1,332.00	23,663.59
Albion K. P. Welch . . . . .	5,000.00	277.50	.....	277.50	5,000.00
	<u>\$20,164,308.79</u>	<u>\$1,323,566.81</u>	<u>\$194,546.44</u>	<u>\$1,027,731.55</u>	<u>\$20,654,690.49</u>
<i>Unrestricted Funds</i>					
Edmund D. Barbour . . . . .	\$810,016.10	\$32,356.50	\$16,869.09	\$266,990.68	\$592,251.01
William L. Chase . . . . .	4,090.09	.....	.....	4,090.09	.....
Charles W. Eaton . . . . .	216,180.60	12,765.00	27,288.51	12,765.00	243,469.11
Arthur F. Estabrook (Bal.)	10,000.00	.....	.....	10,000.00	.....
Ida F. Estabrook (Bal.) . . . . .	2,157.51	.....	.....	2,157.51	.....
Walter L. Frisbie . . . . .	7,614.98	.....	.....	7,614.98	.....
Charles Hayden. . . . .	42,700.76	.....	.....	42,700.76	.....
Frederick S. Hodges. . . . .	49,966.26	2,775.00	.....	2,775.00	49,966.26
Industrial Fund. . . . .	108,487.22	4,218.00	19,681.00	45,355.61	87,030.61
Hiram F. Mills . . . . .	10,175.00	555.00	.....	555.00	10,175.00
Albert H. Munsell. . . . .	7,908.28	.....	.....	7,908.28	.....
Margaret A. Munsell . . . . .	1,105.32	.....	.....	1,105.32	.....

\*Income added to Fund. See also Special Deposit Fund.

†One-fourth Income added to Fund.



## Schedule P (Continued)

<i>Unrestricted Funds (Continued)</i>	<i>Funds, June 30, 1928</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended or Transferred</i>	<i>Funds, June 30, 1929</i>
Moses W. Oliver . . . . .	\$11,220.49	\$610.50	.....	\$610.50	\$11,220.49
Frances M. Perkins . . . . .	13,272.68	.....	.....	13,272.68	.....
Russell Robb . . . . .	25,000.00	1,387.50	.....	1,387.50	25,000.00
Robert E. Rogers . . . . .	7,680.77	427.35	.....	427.35	7,680.77
Sturgis H. Thorndike . . . . .	.....	832.50	\$15,000.00	832.50	15,000.00
Horace W. Wadleigh . . . . .	2,143.14	111.00	.....	111.00	2,143.14
Kenneth F. Wood . . . . .	25,000.00	1,387.50	.....	1,387.50	25,000.00
	<u>\$1,354,719.20</u>	<u>\$57,425.85</u>	<u>\$78,838.60</u>	<u>\$422,047.26</u>	<u>\$1,068,936.39</u>

## SCHEDULE Q

## ENDOWMENT FUNDS FOR DESIGNATED PURPOSES

*Special Deposit Funds*

New Dormitory, General . . . . .	.....	\$2,608.50	\$108,344.85	\$21,745.23	\$89,208.12
†Geo. Eastman (due under contract). . . . .	\$3,450,000.00	.....	.....	300,000.00	3,150,000.00
*Endowment Reserve . . . . .	592,002.49	50,596.58	41,861.37	47,585.37	636,875.07
*Anonymous (1924) . . . . .	1,299.70	72.15	.....	.....	1,371.85
1923 Endowment . . . . .	144.99	.....	24.15	.....	169.14
*1923 Endowment Reserve . . . . .	2,535.58	138.75	1,665.63	525.34	3,814.62
*1924 Endowment . . . . .	756.72	55.50	260.68	.....	1,072.90
*1924 Endowment Reserve . . . . .	1,223.24	66.60	1,791.81	692.15	2,389.50
*1925 Endowment . . . . .	1,016.69	55.50	.....	.....	1,072.19
*1925 Endowment Reserve . . . . .	658.47	33.30	1,174.07	656.74	1,209.10
1926 Endowment . . . . .	133.70	.....	121.86	.....	255.56
1926 Endowment Reserve . . . . .	165.21	.....	1,021.88	1,219.23	132.14
1927 Endowment . . . . .	70.00	.....	19.80	.....	89.80
1927 Endowment Reserve . . . . .	9.90	.....	.....	.....	9.90
*1928 Endowment . . . . .	1,200.00	66.60	100.00	.....	1,366.60
1929 Endowment . . . . .	.....	.....	435.00	.....	435.00
M.I.T. Teachers' Insurance . . . . .	2,646.91	.....	21,740.80	22,450.00	1,937.71
*M.I.T. Teachers' Insurance (Special) . . . . .	.....	582.75	14,277.28	.....	14,860.03
*Class of '98 Loan . . . . .	3,476.90	222.00	1,585.00	.....	5,283.90
*Gen. Elec. Co. VI and VIII . . . . .	24,328.50	1,332.00	.....	.....	25,660.50
*Richards Portrait . . . . .	.....	11.10	425.25	.....	436.35
*Elihu Thomson . . . . .	.....	138.75	5,000.00	.....	5,138.75
*Treasurer's Fund . . . . .	.....	138.75	5,000.00	.....	5,138.75
*Undergraduate Dues, Reserve . . . . .	6,596.90	366.30	4,000.00	.....	10,963.20
	<u>\$4,088,265.90</u>	<u>\$56,485.13</u>	<u>\$208,849.43</u>	<u>\$394,874.06</u>	<u>\$3,958,726.40</u>

\*Income added to Fund.

†See also Funds for General Purposes (Eastman Contract)

‡Overdraft.

Schedule Q (Continued)						
	Funds, June 30, 1928	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1929	
<b>FUNDS FOR SALARIES</b>						
<b>Samuel C. Cobb</b>						
For General Salaries. . . .	\$36,526.31	\$1,998.00	\$25.00	\$1,998.00	\$36,551.31	
<b>Sarah H. Forbes</b>						
For General Salaries. . . .	500.00	27.75	.....	27.75	500.00	
<b>George A. Gardner</b>						
For General Salaries. . . .	20,000.00	1,110.00	.....	1,110.00	20,000.00	
<b>Daniel Guggenheim</b>						
Professorship in Meteorology	.....	666.00	12,000.00	4,000.00	8,666.00	
<b>James Hayward</b>						
Professorship of Engineering	18,800.00	1,043.40	.....	1,043.40	18,800.00	
<b>William P. Mason</b>						
Professorship of Geology . .	18,800.00	1,043.40	.....	1,043.40	18,800.00	
<b>Henry B. Rogers</b>						
For General Salaries. . . .	25,000.00	1,387.50	.....	1,387.50	25,000.00	
<b>Nathaniel Thayer</b>						
Professorship of Physics . .	25,000.00	1,387.50	.....	1,387.50	25,000.00	
	<u>\$144,626.31</u>	<u>\$8,663.55</u>	<u>\$12,025.00</u>	<u>\$11,997.55</u>	<u>\$153,317.31</u>	
<b>FUNDS FOR LIBRARY, READING</b>						
<b>ROOMS AND GYMNASIUM</b>						
<b>Walter S. Barker . . . . .</b>						
	\$10,110.16	\$555.00	.....	\$449.26	\$10,215.90	
<b>Ednah Dow Cheney . . . . .</b>						
	15,121.57	832.50	.....	631.12	15,322.95	
<b>Frank Harvey Cilley . . . . .</b>						
	76,122.39	3,633.49	.....	1,921.83	77,834.05	
<b>Charles Lewis Flint . . . . .</b>						
	5,152.40	277.50	.....	221.57	5,208.33	
<b>William Hall Kerr . . . . .</b>						
	2,637.67	144.30	.....	11.08	2,770.89	
<b>George A. Osborne . . . . .</b>						
	.....	333.00	\$10,000.00	160.90	10,172.10	
<b>Arthur Rotch Arch. . . . .</b>						
	5,000.00	277.50	.....	.....	5,277.50	
<b>Technology Matrons' Teas . .</b>						
	6,603.27	366.30	.....	715.95	6,253.62	
<b>John Hume Tod. . . . .</b>						
	2,753.80	149.85	.....	132.24	2,771.41	
<b>Theodore N. Vail . . . . .</b>						
	36,923.50	2,053.50	.....	.....	38,977.00	
	<u>\$160,424.76</u>	<u>\$8,622.94</u>	<u>\$10,000.00</u>	<u>\$4,243.95</u>	<u>\$174,803.75</u>	
<b>FUNDS FOR DEPARTMENTS</b>						
<b>William Parsons Atkinson . .</b>						
	\$13,082.20	\$721.50	.....	\$721.50	\$13,082.20	
<b>Frank Walter Boles Memorial.</b>						
	15,646.02	943.50	\$10,200.00	665.86	26,123.66	
<b>William E. Chamberlain . . .</b>						
	7,309.77	405.15	.....	405.15	7,309.77	
<b>Chemical Engineering Practice</b>						
	257,772.97	14,319.00	.....	14,319.00	257,772.97	
<b>Crosby Honorary Fund . . . .</b>						
	1,611.21	88.80	.....	39.00	1,661.01	
<b>Susan E. Dorr . . . . .</b>						
	95,955.67	5,328.00	.....	5,328.00	95,955.67	
<b>George Eastman . . . . .</b>						
	400,000.00	22,200.00	.....	22,200.00	400,000.00	
<b>Daniel Guggenheim . . . . .</b>						
	.....	555.00	10,000.00	5,000.00	5,555.00	
<b>George Henry May . . . . .</b>						
	5,000.00	277.50	.....	277.50	5,000.00	
<b>Forris Jewett Moore. . . . .</b>						
	32,406.09	1,498.50	.....	7,636.79	26,267.80	
<b>William E. Nickerson . . . . .</b>						
	51,290.00	2,830.50	.....	7,710.43	46,410.07	
<b>Edward D. Peters . . . . .</b>						
	5,442.87	277.50	.....	390.00	5,330.37	
<b>Pratt Naval Architectural . .</b>						
	392,235.81	21,756.00	.....	21,756.00	392,235.81	
<b>Arthur Rotch. . . . .</b>						
	25,000.00	1,387.50	.....	1,387.50	25,000.00	
<b>W. T. Sedgwick. . . . .</b>						
	.....	1,942.50	69,619.34	19.20	71,542.64	
<b>*Edmund K. Turner. . . . .</b>						
	234,113.55	12,987.00	.....	10,250.25	236,850.30	
	<u>\$1,536,866.16</u>	<u>\$87,517.95</u>	<u>\$89,819.34</u>	<u>\$98,106.18</u>	<u>\$1,616,097.27</u>	

\*One-fourth of net income added to fund.

Schedule Q (Continued)

	Funds, June 30, 1928	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1929
<b>FUNDS FOR RESEARCH</b>					
John E. Aldred . . . . .	\$101,850.00	\$5,661.00	.....	\$40,574.23	\$66,936.77
Samuel Cabot. . . . .	72,784.27	4,051.50	.....	3,300.00	73,535.77
Crane Automotive Research . . . . .	.....	222.00	\$20,000.00	7,694.10	12,527.90
Daniel Guggenheim . . . . .	.....	333.00	6,000.00	1,000.00	5,333.00
Ellen H. Richards. . . . .	18,420.44	999.00	.....	725.24	18,694.20
Charlotte B. Richardson . . . . .	40,169.29	2,220.09	.....	1,600.00	40,789.29
Technology Plan Research . . . . .	2,152.32	111.00	.....	.....	2,263.32
Edward Whitney . . . . .	57,469.61	3,163.50	.....	250.00	60,383.11
	<u>\$292,845.93</u>	<u>\$16,761.00</u>	<u>\$26,000.00</u>	<u>\$55,143.57</u>	<u>\$280,463.36</u>
<b>FUNDS FOR FELLOWSHIPS</b>					
Arkwright Club. . . . .	\$2,155.00	\$111.00	.....	.....	\$2,266.00
William Sumner Bolles. . . . .	25,285.09	1,387.50	.....	.....	26,672.59
Malcolm Cotton Brown . . . . .	13,408.00	1,046.12	.....	\$1,000.00	13,454.12
Collamore . . . . .	13,414.61	721.50	.....	.....	14,136.11
H. M. Crane . . . . .	325.00	.....	\$1,000.00	1,325.00	.....
Dalton Graduate Chemical. . . . .	6,682.90	366.30	.....	300.00	6,749.20
du Pont . . . . .	.....	.....	750.00	750.00	.....
Daniel Guggenheim . . . . .	.....	333.00	6,000.00	.....	6,333.00
Rebecca R. Joslin . . . . .	1,941.22	111.00	.....	.....	2,052.22
Moore . . . . .	7,571.37	721.50	5,854.69	.....	14,147.56
Willard B. Perkins. . . . .	7,123.74	388.50	.....	.....	7,512.24
Proprietors Locks & Canals . . . . .	3,083.25	166.50	.....	1,000.00	2,249.75
Henry Bromfield Rogers . . . . .	24,379.45	1,332.00	.....	600.00	25,111.45
Richard Lee Russell . . . . .	2,636.57	82.50	30.00	.....	2,749.07
Henry Saltonstall . . . . .	10,787.09	610.50	.....	550.00	10,847.59
James Savage. . . . .	12,050.36	666.00	.....	600.00	12,116.36
A. P. Sloan, Jr. . . . .	.....	.....	.....	2,000.00	*2,000.00
Susan H. Swett . . . . .	11,595.45	500.00	.....	500.00	11,595.45
Gerard Swope. . . . .	2,638.75	.....	2,500.00	2,500.00	2,638.75
Louis Francisco Verges. . . . .	10,389.76	555.00	.....	500.00	10,444.76
	<u>\$155,467.61</u>	<u>\$9,098.92</u>	<u>\$16,134.69</u>	<u>\$11,625.00</u>	<u>\$169,076.22</u>
<b>FUNDS FOR SCHOLARSHIPS</b>					
Elisha Atkins. . . . .	\$5,323.92	\$294.15	.....	\$300.00	\$5,318.07
Billings Student. . . . .	51,415.16	2,830.50	.....	2,800.00	51,445.66
Jonathan Bourne . . . . .	10,814.43	610.50	.....	600.00	10,824.93
Harriet L. Brown . . . . .	7,298.97	405.15	.....	375.00	7,329.12
Nino Teshler Catlin . . . . .	1,049.50	55.50	.....	50.00	1,055.00
Chandler. . . . .	2,875.75	160.95	\$23.27	.....	3,059.97
Lucius Clapp . . . . .	5,183.86	288.60	.....	300.00	5,172.46
Class of 1896 . . . . .	4,920.72	294.15	630.00	250.00	5,594.87
Lucretia Crocker . . . . .	79,008.90	4,384.50	.....	3,725.00	79,668.40
Isaac W. Danforth . . . . .	5,416.67	299.70	.....	300.00	5,416.37

\*Overdraft.

## Schedule Q (Continued)

	<i>Funds, June 30, 1928</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended or Transferred</i>	<i>Funds, June 30, 1929</i>
Ann White Dickinson . . . . .	\$42,434.06	\$2,331.00	.....	\$2,305.00	\$42,460.06
Thomas M. Drown . . . . .	.....	2,331.00	\$50,000.00	.....	52,331.00
du Pont . . . . .	.....	.....	400.00	400.00	.....
Farnsworth . . . . .	5,541.92	305.25	.....	300.00	5,547.17
Charles Lewis Flint . . . . .	5,539.94	305.25	.....	300.00	5,545.19
Sarah S. Forbes. . . . .	3,678.87	205.35	.....	200.00	3,684.22
Fuel and Gas Scholarship. . . . .	350.00	.....	.....	.....	350.00
George Hollingsworth . . . . .	5,224.22	288.60	.....	300.00	5,212.82
T. Sterry Hunt . . . . .	3,268.21	177.60	.....	180.00	3,265.81
William F. Huntington. . . . .	5,410.68	299.70	.....	300.00	5,410.38
Joy Scholarships . . . . .	17,623.27	684.49	.....	900.00	17,407.76
William Litchfield. . . . .	5,472.45	305.25	.....	300.00	5,477.70
Elisha T. Loring . . . . .	5,482.24	305.25	.....	300.00	5,487.49
Lowell Inst. Scholarship . . . . .	2,610.52	144.30	.....	125.00	2,629.82
George Henry May . . . . .	6,350.58	360.75	300.00	300.00	6,711.33
James H. Mirrlees. . . . .	2,638.67	144.30	.....	140.00	2,642.97
Nichols Scholarship . . . . .	5,420.41	299.70	.....	300.00	5,420.11
Charles C. Nichols. . . . .	5,472.74	305.25	.....	300.00	5,477.99
John Felt Osgood . . . . .	5,391.41	299.70	.....	300.00	5,391.11
George L. Parmelee . . . . .	18,690.78	1,054.50	.....	1,000.00	18,745.28
Richard Perkins . . . . .	54,111.57	2,997.00	.....	3,000.00	54,108.57
John P. Schenkl . . . . .	21,366.46	1,165.50	.....	1,100.00	21,431.96
Thomas Sherwin . . . . .	5,455.95	299.70	.....	300.00	5,455.65
Samuel E. Tinkham . . . . .	2,392.98	133.20	.....	125.00	2,401.18
F. B. Tough . . . . .	458.32	24.98	.....	.....	483.30
Susan Upham . . . . .	1,170.55	66.60	.....	50.00	1,187.15
Vermont Scholarship . . . . .	6,117.87	338.55	2,000.00	300.00	8,156.42
Ann White Vose. . . . .	62,309.56	3,457.65	.....	3,400.00	62,367.21
Arthur M. Waitt . . . . .	10,392.28	577.20	.....	550.00	10,419.48
Louis Weissbein. . . . .	4,327.88	238.65	.....	180.00	4,386.53
Frances Erving Weston . . . . .	1,174.53	66.60	200.00	200.00	1,241.13
Samuel Martin Weston. . . . .	251.03	13.88	200.00	200.00	264.91
Amasa J. Whiting. . . . .	4,721.00	260.85	.....	240.00	4,741.85
	<u>\$494,158.83</u>	<u>\$29,411.30</u>	<u>\$53,753.27</u>	<u>\$26,595.00</u>	<u>\$550,728.40</u>
<b>FUNDS FOR PRIZES</b>					
Robert A. Boit . . . . .	\$5,252.36	\$288.60	.....	\$275.00	\$5,265.96
Class of 1904 . . . . .	463.02	24.98	\$10.00	.....	498.00
Roger D. Hunneman. . . . .	1,005.50	55.50	.....	50.00	1,011.00
James Means . . . . .	2,533.47	138.75	.....	.....	2,672.22
Arthur Rotch. . . . .	5,986.13	333.00	.....	100.00	6,219.13
Arthur Rotch, Special . . . . .	7,539.56	416.25	.....	.....	7,955.81
	<u>\$22,780.04</u>	<u>\$1,257.08</u>	<u>\$10.00</u>	<u>\$425.00</u>	<u>\$23,622.12</u>

## Schedule Q (Continued)

	<i>Funds, June 30, 1928</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended or Transferred</i>	<i>Funds, June 30, 1929</i>
<b>FUNDS FOR RELIEF</b>					
Edward Austin . . .	\$440,844.43	\$24,475.50	\$375.00	\$25,375.00	\$440,319.93
Thomas Wendell Bailey	2,539.40	138.75	.....	130.00	2,548.15
*Charles Tidd Baker	24,623.27	1,387.50	.....	650.00	25,360.77
Levi Boles . . . . .	10,961.42	610.50	.....	600.00	10,971.92
Bursar's Fund . . . .	7,054.06	444.00	6,930.48	7,398.37	7,030.17
Mabel Blake Case. . .	26,922.85	1,498.50	.....	1,500.00	26,921.35
Dean's Fund . . . . .	2,253.94	149.85	1,768.81	1,339.00	2,833.60
Carl P. Dennett. . . .	80.00	.....	.....	.....	80.00
Dormitory Fund . . . .	3,844.61	210.90	.....	200.00	3,855.51
Norman H. George . . .	93,685.39	5,217.00	.....	5,100.00	93,802.39
David L. Jewell. . . . .	.....	693.75	25,000.00	.....	25,693.75
William B. Rogers . . .	.....	111.00	7,633.63	1,330.00	6,414.63
Summer Surveying Camp	578.37	19.43	705.24	400.00	903.04
Teachers' Fund . . . .	117,203.96	6,493.50	.....	3,100.00	120,597.46
Samson R. Urbino . . . .	1,066.50	55.50	.....	50.00	1,072.00
Jonathan Whitney. . . .	600,271.51	23,793.52	392.40	26,481.90	602,975.53
Morrill Wyman . . . . .	71,980.44	3,996.00	40.00	4,095.00	71,921.44
	<u>\$1,403,910.15</u>	<u>\$74,295.20</u>	<u>\$42,845.56</u>	<u>\$77,749.27</u>	<u>\$1,443,301.64</u>

**RECAPITULATION OF FUNDS****FOR GENERAL PURPOSES**

Restricted . . . . .	\$20,164,308.79	\$1,323,566.81	\$194,546.44	\$1,027,731.55	\$20,654,690.49
Unrestricted . . . . .	1,354,719.20	57,425.85	78,838.60	422,047.26	1,068,936.39

**FOR DESIGNATED PURPOSES**

Special Deposit Funds	4,088,265.90	56,485.13	208,849.43	394,874.06	3,958,726.40
Salaries . . . . .	144,626.31	8,663.55	12,025.00	11,997.55	153,317.31
Libraries, etc. . . . .	160,424.76	8,622.94	10,000.00	4,243.95	174,803.75
Departments . . . . .	1,536,866.16	87,517.95	89,819.34	98,106.18	1,616,097.27
Research. . . . .	292,845.93	16,761.00	26,000.00	55,143.57	280,463.36
Fellowships . . . . .	155,467.61	9,098.92	16,134.69	11,625.00	169,076.22
Scholarships . . . . .	494,158.83	29,411.30	53,753.27	26,595.00	550,728.40
Prizes . . . . .	22,780.04	1,257.08	10.00	425.00	23,622.12
Relief . . . . .	1,403,910.15	74,295.20	42,845.56	77,749.27	1,443,301.64
Total (Schedule D)	<u>\$29,818,373.68</u>	<u>\$1,673,105.73</u>	<u>\$732,822.33</u>	<u>\$2,130,538.39</u>	<u>\$30,093,763.35</u>

\*One-half of the income added to the principal.

**SCHEDULE R**  
**MINOR FUNDS**

<i>Name</i>	<i>Balance June 30, 1928</i>	<i>Income</i>	<i>Other Increases</i>	<i>Salaries and Expenses</i>	<i>Balance June 30, 1929</i>
Aero. Eng., Special No. 640. . . . .	.....	.....	<sup>2</sup> \$4,800.00	\$69.97	\$4,730.03
Aero. Eng., Special No. 649. . . . .	.....	.....	<sup>2</sup> 1,844.10	242.77	1,601.33
Aeronautics (Wind Tunnels) . . . . .	\$364.37	\$3,149.22	.....	656.76	2,856.83
Aldred Lectures. . . . .	1,576.97	.....	.....	1,145.67	431.30
Alumni Dormitory Committee . . . . .	3,125.53	32.00	.....	1,888.66	1,268.87
American Petroleum Institute. . . . .	.....	5,519.43	.....	6,012.64	*493.21
Arch. Dept. Special Scholarship. . . . .	.....	1,000.00	.....	1,000.00	.....
Biocinema Research . . . . .	.....	1,430.76	.....	968.63	462.13
Biology, Special (F. and F.) . . . . .	1,077.60	298.44	<sup>1</sup> 1,000.00	1,484.58	891.46
Boat House Equipment, No. 346 . . . . .	2,000.00	2,000.00	.....	2,577.56	1,422.44
Ceramics, Special No. 675 . . . . .	.....	.....	<sup>1</sup> 2,000.00	.....	2,000.00
Carnegie Corp. Music Fund . . . . .	3,729.49	40.00	<sup>1</sup> 600.00	2,470.68	1,898.81
Chem. Eng., Special No. 624 . . . . .	.....	.....	<sup>1</sup> 4,000.00	3,559.24	440.76
Chemistry, Special. . . . .	799.05	.....	.....	170.46	628.59
Civil Eng., Special No. 567. . . . .	221.25	.....	<sup>1</sup> 2675.00	896.25	.....
Civil Eng., Special No. 616. . . . .	.....	.....	<sup>1</sup> 500.00	.....	500.00
Civil Eng., Special No. 632. . . . .	.....	.....	<sup>1</sup> 505.58	141.39	364.19
Civil Eng., Cathetometer No. 641 . . . . .	.....	.....	<sup>1</sup> 925.00	.....	925.00
Civil Eng., Special No. 650. . . . .	.....	.....	<sup>1</sup> 1,000.00	200.00	800.00
Coffee Research Fund . . . . .	.....	5,000.00	.....	1,269.65	3,730.35
Course VI-A Fund. . . . .	5,178.49	50.00	.....	2,172.43	3,056.06
Course VI-A Tax . . . . .	114.70	30.00	<sup>1</sup> 172.00	316.70	.....
Course XV Fund . . . . .	450.90	53.00	.....	95.00	408.90
E. H. Cox Fund . . . . .	129.00	.....	.....	129.00	.....
Danish Warship Model No. 564. . . . .	1,700.00	.....	.....	.....	1,700.00
Dining Service Reserve. . . . .	11,903.18	160.00	<sup>7</sup> 549.64	3,195.14	16,417.68
Division Fund . . . . .	1,654.84	33.00	.....	1,687.84	.....
Div. of M. and Indust. Research . . . . .	*4,225.45	10,451.52	<sup>2</sup> 31,312.72	37,538.79	.....
Division of I. C. and R. No. 2 . . . . .	10,798.86	215.00	<sup>8</sup> 3,352.02	.....	19,365.88
Dormitory Tax . . . . .	231.03	1,321.00	.....	1,186.08	365.95
Dormitory Telephone Acct. . . . .	4,850.03	.....	<sup>2</sup> 2,049.43	6,899.46	.....
Edison Elec. Ill. Co., Com. Res. . . . .	*2,404.53	8,544.64	.....	8,359.91	*2,219.80
Elec. Eng., Special 468. . . . .	13,287.97	2.90	.....	2,422.55	10,868.32
Elec. Eng., Summer Colloquium. . . . .	.....	1,785.25	<sup>1</sup> 1,000.00	1,974.71	810.54
Employees Health & Acc. Ins. Fd. . . . .	.....	4,428.00	.....	4,428.00	.....
Eng. Admn., Special No. 645 . . . . .	.....	.....	<sup>3</sup> 3,560.00	50.00	3,510.00
Frigidaire Research Fund. . . . .	.....	5,580.00	.....	3,041.75	2,538.25
General Library, Special No. 662 . . . . .	.....	.....	<sup>4</sup> 4,893.00	.....	4,893.00
General Library, Special No. 542 . . . . .	221.56	.....	.....	221.56	.....
Hale Spectroscopic . . . . .	3,084.10	61.00	.....	.....	3,145.10
Health Education Research . . . . .	969.76	1,141.69	<sup>1</sup> 500.00	492.21	2,119.24
High Velocity Blower No. 561 . . . . .	357.47	.....	.....	357.47	.....
Historic Memorials Committee . . . . .	74.18	.....	<sup>1</sup> 1,000.00	79.97	994.21
Hydraulic Laboratory No. 241 . . . . .	1,510.11	.....	.....	1,510.11	.....

(Continued)

\*Overdraft.

<sup>1</sup>Appropriation from Current Funds.<sup>2</sup>By transfer.

## Schedule R (Continued)

Name	Balance June 30, 1928	Income	Other Increases	Salaries and Expenses	Balance June 30, 1929
Integrph Account No. 594 . . . . .	\$564.47	\$2.20	<sup>1</sup> \$5,000.00	\$4,951.30	\$615.37
Journal of Mathematics and Physics	2,484.81	297.15	<sup>1</sup> 3,000.00	3,065.52	2,716.44
Letter Shop . . . . .	612.23	26,768.17	.....	26,508.38	872.02
Liquid Soap Account . . . . .	*127.41	.....	<sup>1</sup> 127.41	.....	.....
Mech. Eng. Dept., No. 482. . . . .	1,479.00	.....	.....	.....	1,479.00
Mech. Eng. Dept., No. 568. . . . .	800.00	.....	.....	.....	800.00
Mech. Eng. Dept., Shop Acct. . . . .	.....	.....	<sup>2</sup> 500.00	476.44	23.56
Mech. Eng. Dept., Special No. 634 . . . . .	.....	.....	<sup>1</sup> 4,300.00	3,664.80	635.20
Mech. Eng. Dept., Special No. 643 . . . . .	.....	.....	<sup>1</sup> 4,950.00	.....	4,950.00
Medical Department, Special . . . . .	926.35	99.55	.....	126.25	899.65
Metallography, 590 . . . . .	1,597.00	.....	.....	1,597.00	.....
Met. Life Ins. Co. Public Health . . . . .	2,006.66	2,017.50	.....	2,006.66	2,017.50
Mining Eng. Dept., Special No. 651 . . . . .	.....	.....	<sup>1</sup> 750.00	500.00	250.00
National Res. Com. on Indus. Ltg. . . . .	150.29	.....	.....	63.80	86.49
New Dormitory Plan, No. 551 . . . . .	4,000.00	.....	.....	4,000.00	.....
Ore Dressing Laboratory. . . . .	1,333.80	.....	<sup>2</sup> 842.07	497.28	1,678.59
Pabst Research . . . . .	4,833.33	.....	.....	4,833.33	.....
Paper Ins. Cable Research . . . . .	1,003.50	2,000.00	.....	1,381.68	1,621.82
Photographic Service . . . . .	*3,598.49	6,569.58	<sup>1</sup> 1,000.00	6,479.66	*2,508.57
Photostat Service . . . . .	420.76	5,536.45	.....	5,363.07	594.14
Physics Dept., Special No. 658 . . . . .	.....	.....	<sup>2</sup> 2,200.00	500.00	1,700.00
Public Health . . . . .	772.52	15.00	.....	.....	787.52
R. O. T. C. Uniform Accts. . . . .	301.52	7,869.20	.....	8,303.22	*132.50
Research Lab. Applied Chemistry . . . . .	.....	94,640.25	<sup>1</sup> 11,242.45	106,489.22	*606.52
Res. Lab. App. Chem. (Cont. Acct.) . . . . .	6,342.45	.....	.....	6,342.45	.....
Research Lab. Industrial Physics . . . . .	4,268.50	2,215.30	.....	2,776.88	3,706.92
Res. Lab. Phys. Chem. (Royalties). . . . .	744.56	420.71	.....	105.65	1,059.62
Roentgen Ray . . . . .	1,811.42	36.00	.....	.....	1,847.42
Sargent Fund. . . . .	220.35	.....	.....	220.35	.....
Short Wave Research . . . . .	19,858.90	2,425.62	<sup>2</sup> 1,684.00	20,897.00	4,071.52
Simms Co. Research. . . . .	907.25	5,000.00	.....	3,519.25	2,388.00
Special, F. L. Foster, No. 598. . . . .	400.00	210.21	.....	610.21	.....
Special Research No. 13101 . . . . .	1,344.92	.....	.....	.....	1,344.92
Special (N. E. P. C. Co.) No. 633 . . . . .	.....	25,000.00	<sup>1</sup> 5,000.00	49,369.33	*19,369.33
Steam Table Research . . . . .	*610.11	2,666.85	.....	2,483.34	*426.60
Supercharger, Aero. Eng., No. 560 . . . . .	44.27	.....	.....	44.27	.....
Summer School of Physics (1928) . . . . .	2,500.00	.....	.....	2,500.00	.....
Suspense Accounts. . . . .	5,287.02	.....	<sup>2</sup> 928.50	5,287.02	928.50
Special, C. F. Taylor, No. 601 . . . . .	310.50	8.85	<sup>1</sup> 182.65	502.00	.....
Travel Scholarship in Architecture . . . . .	1,500.00	.....	<sup>1</sup> 1,500.00	1,500.00	1,500.00
W. M. (Library) . . . . .	817.52	.....	<sup>1</sup> 1,901.83	2,433.76	285.59
Total . . . . .	<u>\$128,088.35</u>	<u>\$236,125.44</u>	<u>\$124,347.40</u>	<u>\$380,312.71</u>	<u>\$108,248.48</u>
		(Schedule B)		(Schedule C)	(Schedule D)

\*Overdraft.

<sup>1</sup>Appropriation from Current Funds.<sup>2</sup>Transfer.

SCHEDULE S

CURRENT SURPLUS

Balance, June 30, 1928 . . . . .	\$40,771.72
Net Increase (Schedule A) . . . . .	4,683.96
	<hr/>
Balance, June 30, 1929 (Schedule D) . . . . .	<u>\$45,455.68</u>

DETAIL OF PROFIT AND LOSS ACCOUNT

LOSSES AND CHARGES:

Students' Accounts (previous years), charged off . . . . .	\$474.41
Miscellaneous Charges . . . . .	1,103.48
	<hr/>
Total Losses. . . . .	<u>\$1,577.89</u>

GAINS AND CREDITS:

Students' Fees and Deposits (previous years) . . . . .	\$280.41
Balance of Hydraulic Laboratory Apparatus. . . . .	1,510.11
Premium Refund Account Employees' Insurance. . . . .	1,345.42
Miscellaneous Credits. . . . .	265.86
	<hr/>
Total Gains . . . . .	<u>\$3,401.80</u>
Profit and Loss. Net Profit (Schedule A). . . . .	<u><u>\$1,823.91</u></u>



**AUDITORS' CERTIFICATE**

We have examined the books and accounts of the Treasurer and the Bursar of the Massachusetts Institute of Technology for the year ended June 30, 1929, and we report upon our verification of the accompanying financial statements of the Treasurer, as follows:

We agreed the investment accounts in detail with certified lists of Securities obtained from the Old Colony Trust Company of Boston, Massachusetts, and from the Security Trust Company of Rochester, New York, and verified the several other assets and liabilities shown in the Treasurer's Balance Sheet, Schedule D.

We satisfied ourselves by extensive tests of the recorded transactions for the year that income receivable had been duly accounted for and expenditures properly controlled and authorized.

WE HEREBY CERTIFY that the accompanying Balance Sheet and Statements of Income and Expenditures correctly set forth respectively the financial condition of the Institute at June 30, 1929, and the financial results for the year ended at that date, and that the financial statements are in accordance with the books of the Institute.

We extended our examination to include the transactions relating to the accounts of the Wyeth and Hewett Funds of which the Massachusetts Institute of Technology acts as Trustee, and satisfied ourselves that the provisions of the Trust Agreements had been fulfilled.

Our examination embraced also the accounts of the Massachusetts Institute of Technology Pension Association which we found to be correctly stated.

Respectfully submitted,

PATTERSON, TEELE & DENNIS,  
*Accountants and Auditors.*

1 Federal Street, Boston, Mass.  
August 21, 1929  
B-5848

