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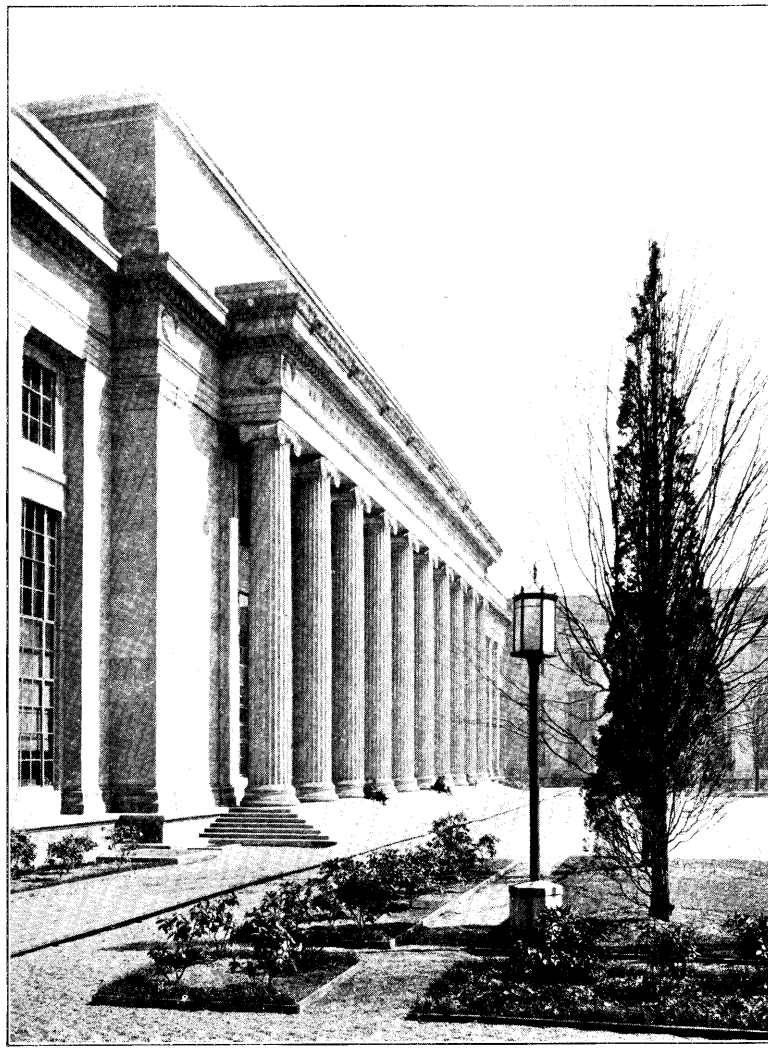
Massachusetts Institute of Technology

PRESIDENT'S REPORT
OCTOBER, 1923

Cambridge, Massachusetts
1923



MAIN ENTRANCE FROM EASTMAN COURT

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

REPORTS OF THE PRESIDENT AND TREASURER

FOR THE YEAR ENDING JUNE 30, 1923

THE TECHNOLOGY PRESS
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1923

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[1]Address correspondence to Massachusetts Institute of Technology.

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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 upon the work of the Institute during the preceding year, appending, as usual, reports from other administrative officers with reference to the work of their special departments.

The Corporation. The term for which Messrs. Paul W. Litchfield, Arthur D. Little and Eben S. Stevens were elected expired in June. In place of the retiring Term Members, the Corporation has elected Messrs. Willis R. Whitney, Walter Humphreys and Charles R. Main, upon nomination by the Alumni Association.

An event of interest during the year was the election and inauguration of the new President, who was appointed by the Executive Committee on September 19, 1922, the appointment being confirmed by the Corporation at its meeting on October 11, 1922, the new President to take office January 1, 1923. The inaugural ceremonies were held on June 11, 1923. Credit for the arrangements was due to the Committee appointed to take charge of the event — Messrs. E. Morss, J. P. Munroe, A. D. Little, F. W. Fabyan, J. F. McElwain and L. Metcalf on the part of the Corporation; Messrs. H. W. Tyler, E. F. Miller, A. L. Merrill, C. L. Norton, W. Emerson, H. P. Talbot and D. R. Dewey on the part of the Faculty; H. J. Carlson, G. L. Gilmore, W. Humphreys and A. T. Hopkins on the part of the Alumni Association.

The Faculty. During the year the Faculty has lost the services of Prof. Louis Derr, who died on May 11, 1923. He was graduated from the Institute in 1892, and began service at the Institute as Assistant in the fall of 1892. Since that time he has held the positions of Assistant, Instructor, Assistant Professor, Associate Professor and Professor up

to the time of his death — a period of thirty-one years, all of which was spent in the Department of Physics.

Col. John B. Christian, Professor of Military Science and Tactics and Head of the Department, resigned on October 3, 1922, and Col. F. W. Phisterer was appointed to that position.

Prof. F. G. Keyes, who has served during the year as Acting Head of the Department of Chemistry, has been appointed Head of that Department, from July 1, 1923.

The following appointments have been made:

Mr. R. G. Tyler, Associate Professor of Sanitary Engineering;

Mr. James A. Beattie, Assistant Professor of Physico-Chemical Research;

Mr. W. G. Brown, Assistant Professor of Aeronautics;

Mr. C. P. Burgess, Assistant Professor of Airship Design;

Mr. John T. Ward, Assistant Professor of Chemical Engineering;

Mr. J. C. MacKinnon, Registrar, and Mr. G. T. Welch, Assistant Registrar.

Registration. The registration is now 2,954, of which 560 are freshmen. The corresponding figures last year were 3,166 and 607. The incoming class appears to be quite up to the standard and every effort will be made to assist them in the selection of courses and in many matters of the utmost importance to young men entering college. Generally too little is done to assist the freshmen in anticipating the work before them, and we could do much more than we do along these lines.

Aldred Lectures. We are greatly indebted to Mr. J. E. Aldred for the provision of funds for a series of lectures by prominent men — men who have made a success in the various fields of engineering and who can, in describing their work, give to the students not only technical information, but a picture of the problems to be met in practice, and especially the necessity for common sense in engineering. The sum provided for these lectures is $5,000 per year for a period of five years. The lectures are primarily for

seniors but will be open to graduate students and members of the instructing staff.

Dormitories. The question of dormitories has become very acute since the rise in the cost of living and the shortage of housing facilities. Furthermore, it is believed by those most interested in the Institute and its students that dormitories will tend to bring the students more closely together and develop more of a college spirit than heretofore. Many of the graduates have expressed themselves very strongly as to the necessity for dormitories. The Class of '93 showed its interest in a very practical way at the thirtieth anniversary of its graduation by providing for the first of a small group of dormitories which can be built on the present site without materially reducing the area reserved for educational buildings. Other classes will no doubt be inspired to take similar action. In fact, one class has the question of a dormitory now under consideration.

This gift on the part of the Class of '93 is greatly appreciated by the Faculty and the friends of the Institute who are concerned in the welfare of its students. The building was begun during the month of September. The foundations are now in, and construction is being pushed as rapidly as consistent with weather conditions.

The Executive Committee has under consideration the purchase of additional land to provide for future extension of the dormitory buildings, the athletic field, drill grounds, or other activities, which will be necessary as the future development of the academic buildings is carried out on the present site. The acquisition of additional land is exceedingly desirable, but will depend upon the terms submitted and the funds available.

Treatment of the Court. The question of the improvement of the Great Court has received much attention on the part of the Executive Committee and was brought up at the last meeting of the Corporation. Those interested are of the opinion that it should be done as soon as funds are available, in accordance with a simple and dignified plan in keeping with the architecture and location of the buildings. A study of the problem has been made and will be exhibited later.

Summer Mining Camp. During the past year plans were worked out by the Department of Mining, Metallurgy and Geology for the establishment of a separate summer school for ordinary and mine surveying which would offer opportunities for study in mining, metallurgy and geology. The sum of $15,000 was allotted by the Corporation, and after a very careful study of different plans and sites the Replogle Mine, in Dover, New Jersey, was selected. The plans as drawn up are for a permanent camp at an estimated cost of $35,000. The money appropriated was expended in accordance with this plan and not on temporary provisions, which would in the end be a loss. The site which has been generously leased to the Institute by the Replogle Steel Company is extremely well suited for the purpose, as mines and smelters equipped with modern machinery are in the immediate vicinity. The district is, also, located in a region of exceptional geological interest.

The first school at the Camp was held in August and September, 1923. Besides the instruction in surveying, excursions were undertaken, as opportunity presented, to neighboring properties and localities interesting for geological exposures. The attendance at the Camp this first summer was twenty students, which is very good considering the short time available for preparation and announcements.

A school of Mining Practice is planned for coming years as well as courses of practical instruction in geological mapping. It is hoped to make this new summer camp most serviceable and, in fact, indispensable to the three sections of the department.

Conferences of Visiting Committees. The plan of inviting experts to visit the various departments of the Institute in connection with the Visiting Committees of the Corporation has been of great assistance to the Instructing Staff in keeping it in touch with the needs of the day, and what is equally important, in the establishing of live working contact between successful men and the activities of the Institute. I trust that it has also been of assistance in helping the Visiting Committees of the Corporation to keep in touch with the work of the various departments. Since the last

meeting of the Corporation a meeting of this sort has been held in connection with the Department of Biology and Public Health which I hope will be reported by the Visiting Committee for the department. The scientific side of those things which pertain to Public Health through sanitation or the preservation of food supply is one of the most important questions of the day, and we should continue to take the lead in the preparation of men for such work, especially the branches of biological science and of engineering upon which this work depends.

Other conferences of this kind will be held during the year in connection with those departments which have not as yet held them.

Experimental Tank. The establishment of the Pratt School of Naval Architecture has placed the Institute in the foremost rank in this field of instruction. Hence, every effort should be made by the Institute to maintain its personnel and equipment second to none. Tentative plans have been prepared for a model testing tank and it should be provided at the earliest opportunity. There is an urgent need for an experimental tank in connection with the study of the flow of rivers and similar hydraulic work. However, it has been suggested that the latter work should be provided for by the Government and a bill has been introduced to that effect. If this is not done in the near future it might be well to consider the establishment of such an experimental tank at the Institute.

Division of Industrial Coöperation and Research. The method of operating the division has been, as heretofore, to serve as the point of contact between the contractors and the members of the staff, and to assist in every way in bringing about prompt and efficient use of the Institute's facilities for the benefit of industry.

The practice of the larger industrial companies of sending their representatives to the various educational institutions in search of suitable young men to enter their employ has been constantly increasing, and in such cases, as frequently arise, where numbers of men of different types of training, graduates of different courses are sought, the

division assist in the selection of the men and in affording the representatives of the industrial companies opportunities to meet various groups of students. In every case the division has worked in close coöperation with the heads of other departments.

This plan of coöperation has now been in operation for four or five years and sufficient experience has been secured to enable those directly interested to make a careful study of the subject which will be done during the coming year with a view to placing it on a more definite basis in its relations to the Staff of the Institute and to the public.

Exchange Professors. The question of Exchange Professors is receiving considerable attention on the part of American universities. The plan has many excellent features and serves to bring the education of various countries in closer contact.

During a recent trip abroad many favorable comments were heard concerning the plan and two institutions proposed the interchange of students. This would, of course, be limited to graduate students. The Scandinavian Foundation has already arranged for the exchange of students between those countries and the United States according to a plan which would apply admirably to other countries. The question of securing prominent men in this country or from abroad to deliver short courses of lectures on important subjects should receive our attention. The giving of such courses inspires many students to do graduate work and is of the greatest assistance in keeping our instruction up to date, especially in the newer fields of science and engineering.

Society of Arts. The original provision for the establishment of the Institute included the Society of Arts. I understand that this provision has been complied with in the past in several ways. No doubt the modern engineering societies and industrial organizations have to a large extent met the conditions which were in the minds of the founders. The last method was that of my predecessor, which included a series of popular lectures before high-school students and the public. These lectures have been very well attended, especially by high-school students in Boston and vicinity.

The success of the plan depends, of course, upon the selection of subjects, and particularly upon the lecturer. Few men have the patience and skill to present a technical subject in a way that the layman may understand, but when properly done it is one of the most useful services the Institute can render to the public, especially to young people contemplating college work in science or technology. There is also a growing interest on the part of the public in such work and scientific men should be able to write and talk in language that all can understand. I am pleased to say that the Executive Committee has authorized the continuance of these popular lectures for the coming year.

Lowell Institute School. Another activity at the Institute which is fulfilling an exceedingly important need on the part of industry is the Lowell Institute School for Industrial Foremen, which is carried on under the auspices of the Massachusetts Institute of Technology. This school has just completed its twentieth year and the name has been changed to the Lowell Institute School. Classroom and laboratory facilities are provided for by the Institute, and the expense in connection with janitor service, heating, lighting, laboratory supplies and other service is borne by the school. Instructors are also provided from the Institute's staff, also at the expense of the school. For a number of years the registration of students has been about five hundred. For the present year it is five hundred and sixty. In the last three years the school has graduated more than one hundred and fifteen men each year. The class of 1923 numbered one hundred and thirty-two men. It was my privilege to be present when these men received their diplomas from President Lowell and I was impressed by the character of the men. Many of them would be a credit to our Institute classes and I understand that quite a number of them do enter our regular courses after graduation from the school.

It was also my privilege to attend a meeting of the graduate body of this school, which includes among its numbers many men prominent in industry as foremen, managers and even owners. I am thoroughly convinced of

the practicability of the school. I believe that its success is due very largely to the fact that it has maintained a high standard which is rarely done in the case of night schools. The thorough and sincere interest taken in the school by the members of the Institute's staff who have served as instructors has also contributed largely to its success.

The graduates of this school appreciate highly the interest that the Institute has taken in it, many of whom could never have secured a technical education otherwise. At the meeting of the graduates referred to the Institute was presented with a check for approximately $2,500 to be used in any manner it sees fit. It has been proposed to use this as the nucleus of a fund which will provide scholarships at the Institute of Technology for graduates of the Lowell Institute School.

Steps have been taken to strengthen the work of various departments in some of the newer fields of engineering and science. In the Civil Engineering Department a new Associate Professor of Sanitary Engineering has been provided with the hope that through the coöperation of the Departments of Civil Engineering and Public Health the work of the Institute in this field may be kept abreast of the modern requirements.

The Mechanical Engineering Department has taken steps to strengthen its work in automotive engineering. The internal combustion engine has become the most important source of power. Engines of the Diesel type are rapidly coming into use, the development of which is of the greatest importance in the conservation of our fuel supply.

There are a number of fields of industrial science that should be strengthened at the Institute by the addition of experts in the fundamental fields involved, and those familiar with the problems as they arise in connection with the production of industrial products such as rubber, paper, textiles, paints, protective coatings, metals and their alloys, building materials and many others.

We are doing very little as to investigation or instruction

in fire prevention and yet it is probably the source of the greatest waste in the country.

The Electrical Engineering Department has provided for advanced work in electrical communications, including radio telegraphy, telephony and ordinary telephony.

There is a growing tendency toward a sane and sensible regulation of the public utilities that is fair alike to the producer and to the public. Public service commissions and municipal authorities are depending as never before upon technical advice in the adjustment of such relations. This has brought about a new class of expert, namely, the public service engineer familiar with the problems involved in the distribution of power, water, gas and other public utilities.

These and similar new fields will be recognized in the organizing of courses as funds and facilities are available.

S. W. STRATTON.

REPORT OF THE DEAN OF STUDENTS

The Dean of Students has for a long time been charged with the general oversight of the work of the students of the first-year class. This has, however, been restricted to his responsibilities as chairman of the Faculty Committee on First-Year Students, which has considered all records, and to general conferences with students and the giving of personal advice. It seemed desirable that there should be some more general effort to coördinate the instruction given to first-year students in the several departments, and to consider questions of policy affecting all such students. For these purposes the former Committee, composed of all members of the Instructing Staff giving instruction to first-year students, did not function effectively. On the recommendation of a temporary committee the Faculty substituted for the former Committee on First-Year Students a Standing Committee on First-Year Instruction, made up of the heads of the departments concerned in such instruction (or some one designated by them), the Dean, Assistant Dean, the Secretary of the Faculty, and the Registrar, with the Dean as chairman. This committee has held several meetings since its appointment and, while it has not as yet had time to make noteworthy changes in general policies, gives promise of a broader and more effective consideration of the many problems involved in the treatment of the entering classes than has heretofore been possible. Mental alertness tests were attempted for the first time with the students entering in October, 1922 and January, 1923. These tests were given under the direction of Prof. C. L. Stone, of Dartmouth, and have been of some value in advising students during the past year; but, as has been recognized in all institutions, it is necessary to have the results of a series of such tests before valuable general conclusions can be drawn.

During the past year the Dean has for the first time been made chairman of the Committee on Provisional Students. The most important duties of this committee concern themselves with the consideration of petitions for readmission to the Institute of students who have been required to discontinue their work (or have accepted Faculty advice to do so), and the following up of the records of such students after readmission, and of all students placed on probation. The committee has made a serious effort

to scrutinize the petitions for readmission with greater care and to limit its favorable recommendations to those cases in which there appeared to be reasonable ground for an assumption that the student thus reinstated would carry his work successfully. While some improvement in procedure has been made, an examination of the records of the readmitted students still shows too large a proportion of repeated failures, and it is evident that the future policy calls for further careful consideration.

Readmitted students and students on probation have been required to obtain a statement of standing from the individual instructors and report to the Dean's office twice each term, until they have demonstrated their ability to do satisfactory work, or until probation has been removed.

Student activities and class affairs have been almost uniformly directed by capable leaders during the past year and there has been cordial coöperation on their part with the Dean and Assistant Dean. A difficulty arose in the middle of the year with respect to student government in the dormitories. After conference in a joint committee made up of representatives of the Institute Committee, dormitory students, alumni, and the Dormitory Board, the students presented and adopted a modified form of control under which a Dormitory Committee, having essentially the same relation to the Institute Committee as that of the Walker Memorial Committee, is immediately responsible for the social relations and general discipline in the dormitory buildings.

During the third term of the academic year the Dean was granted a leave of absence and took advantage of this opportunity to visit a number of educational institutions in the South and West, and to confer with the officers of those institutions who are in charge of student welfare. These conferences have made it clear that there is almost everywhere an increasing tendency to turn over to the students the immediate and, in some cases, the ultimate responsibility for student behavior, in both academic and social relations. The honor system, in some of its variants, is to be found in operation in most institutions, and the general sentiment seems to be in its favor. The student control is naturally in its best estate in institutions which are so located that the college community is somewhat isolated and self-contained, but it is in operation in even as large an institution as the University of

California, which is also almost without dormitories. It is of much importance that our own students are showing an increased interest in a broadening of their responsibilities with respect to their fellow students.

Much gratitude is due to the helpful activities of the Student Hospitality Committee under the capable chairmanship of Mrs. Robert P. Bigelow. Their coöperation in supplying chaperones for the dances, the entertainment of foreign students, and the care of convalescents, has been most valuable.

It is a matter for great congratulation that the generosity of the class of 1893 has made possible an addition to the dormitories. The experiences of the past year have only emphasized the vital need of more housing facilities on Institute grounds.

Assistant Dean Lobdell has carried on the entire work of the office during the absence of the Dean with marked success. I desire to record my appreciation of this service which rendered possible my respite from active duty.

H. P. TALBOT.

REPORT OF THE SECRETARY OF THE FACULTY

The Faculty has held fourteen meetings during the year, and transacted the usual routine business.

Only slight changes have been made in the schedules of studies of the Professional Courses.

The admission of a Junior First-Year Class at the opening of the second term, with entrance examinations in December, has been discontinued beginning with the year 1923-24. The demand for such a class is so small that the Faculty does not feel warranted in planning to repeat the entire year's work in three regular terms. Most of the subjects are repeated either in the summer session or by repeat sections during the second and third terms, so that in many cases first-year students who enter in October, and who, on account of low standing, would have dropped back into the Junior First-Year Class, may still regain their regular standing.

A reorganization of the Faculty in regard to its committees and the conduct of routine business has been made. The Standing

Committees are to be as follows: Committees on Admissions, Undergraduate Courses, Graduate Courses and Scholarships, Undergraduate Scholarships, Petitions, Provisional Students, First-Year Instruction, Second-Year Students and Third-Year Students. A Faculty Council, consisting of the President, Chairman of the Faculty, Dean, Secretary of the Faculty, Director of the Summer Session and the Heads of Departments, and Professional Courses is to act with power on ordinary business, bringing before the Faculty questions of educational policy and other business of sufficient importance for the consideration of the entire Faculty. Sub-committees of the Council are to coöperate with the administrative officers in dealing with such matters as Tabular View and Room Scheme, Conduct of Examinations, Publications, Registration and Periodicals and Libraries.

The degree of Doctor of Public Health has been added to the degrees offered by the Institute. This degree is to be awarded to properly qualified medical officers of the Army.

During the year there have been recommended for the degrees of the Institute six candidates for the degree of Doctor of Philosophy, five for the degree of Doctor of Science, one hundred and seventy for the degree of Master of Science, seven for the degree of Master in Architecture and six hundred and fifty-one for the degree of Bachelor of Science.

ALLYNE L. MERRILL.

SUMMER SESSION

The work of the Summer Session for 1922 was covered by the report submitted by Prof. Charles F. Park, and included in the President's Report of last year.

This report outlines briefly what has been done since the Summer Session came under my direction on October 1, 1923.

On June 30 the registration was greater than at the corresponding period in any previous year, and the number of student subjects taken, as indicated by the fees received at that date, was some ten per cent larger than ever before. It is too early to give accurate figures, but I estimate that the registration will approximate sixteen hundred, and the student subjects, five thousand. About one

hundred and twenty-five members of the staff are engaged upon this work.

The summer session bulletin was issued about the first of March. Many new subjects were added, especially those considered of interest to advanced students and to men from the industries who might care to attend short courses of advanced studies on technical subjects and in research. Required subjects for regular courses were given in the early part of the summer; the elective courses were divided into two five-week periods: the first from June 25 to July 28, and the second from July 30 to September 1. Entrance subjects were given in English and History, Chemistry, Physics and Mathematics. Teachers' courses were offered, but these did not prove very successful.

Considerable difficulty has always been experienced in arranging hours so that conflicts will not occur in desirable combinations of subjects. Obviously it is impossible to avoid all such conflicts, but the question was studied very carefully, and a new schedule was adopted which seems to have resulted in some improvement. It is thought that possibly a part of the increased registration of students anticipating work is due to the flexibility of the new schedule which thus allowed them to get a larger number of subjects without conflict.

The matter of setting fees for summer work was also considerably simplified by making a flat reduction of five dollars for each additional subject after the first, instead of reductions for specific combinations of subjects. However, upon comparing established fees of the various departments, it is noticeable that considerable inequality exists. This question is being studied and changes will be made where necessary. In general, it appears that the tuition charged in the summer school is none too high, for the receipts should not only cover the salaries of the instructing staff. but should pay the cost of running the Institute over and above the cost if no classes were held. Briefly, this session should be run without drawing on regular Institute funds.

The question of salaries for the instructing staff has been subject to considerable difference of opinion. This trouble was largely eliminated this year by the adoption of a definite rule for fixing salaries, based on the general scale of annual salaries, whereby each instructor is paid for summer work at the same rate

he receives for a like amount of work during the regular academic year, plus a fixed bonus of fifty dollars. In certain subjects where the registration is uncertain, the salary of the instructor was fixed, as heretofore, at fees received up to an amount determined by the above rule. This is not entirely satisfactory. The instructors feel that the Institute should take the risk. There is much justice in this feeling, and I shall recommend definite salaries in nearly all cases for next year. The Institute will be protected by reserving the right to cancel subjects in which less than six students have registered at date of beginning of the subject. This will also greatly simplify the work in the Bursar's office.

The summer session was advertised more widely than ever before. The circular letter sent to all alumni brought good results. Next year circulars will be prepared for wide distribution, to be followed upon request by the usual summer school bulletin.

Among the points which will be given special attention in planning next summer's work are the considerations of teachers' and special courses; dates of starting; schedule of hours to avoid conflicts and fees.

At the present time the registration is made up largely of our own students, and of those who expect to become regular students in the fall. This enrollment alone places the summer session on a useful and stable basis. Full development, however, has nearly been reached in this direction, and little further growth can be expected except through an increase in regular Institute registration. Any further increase will therefore depend upon the addition of subjects of more general application. The various plans which are under consideration to widen the scope of the summer session will be made the subject of special reports at the proper time.

T. H. DILLON, *Director.*

REPORT OF THE LIBRARIAN

The new arrangement of the books mentioned in the previous Report has now stood the test of a year, and on the whole has proved to be satisfactory.

At the request of the department, the books formerly in the reading room of the Department of Physics were transferred to the Central Library. This transfer adds very much to the usefulness of the collection, as it will now be under proper control and can be used in connection with important reference work of the Library. The considerable amount of work required of the Library staff, involving as it does the changing of the catalogue cards and rearranging of the shelf list, is well worth the effort.

With the introduction of the new rule restricting the use of the book stacks, there was a considerable falling off in the number of books borrowed for home use; but as our readers are becoming accustomed to the present system, the circulation is increasing. The number of books borrowed for home use from the Central Library and some of the departmental libraries is shown in the following table:

Central Library		18,311
Library of Economics and Civil Engineering		1,203
Mining and Metallurgy		1,583
Mathematics		1,072
Naval Architecture		780
Architecture	(Books)	3,917
	(Photographs)	7,372
Geology		1,035

During the year we have borrowed from other libraries seventy-seven volumes, and in return we have loaned one hundred and forty-four.

The attendance in the reading room in the evening from October to July was 8,784.

Soon after the beginning of the first term cards were sent to 333 members of the instructing staff with inquiries as to their special interests. One hundred and twenty-six persons replied, mentioning 362 subjects. Guided by these answers the Reference Assistant has examined a large number of periodicals and has sent

out altogether 1,769 references to those who have requested this service. A number of men who are now living elsewhere have asked to have this service continued, although they are not now officially connected with the Institute. Forty-six references were sent out to eleven individuals in this class.

For the subscribers to the Technology Plan, twenty-seven researches were carried out, and bibliographical lists compiled; and in reply to twenty requests, articles were looked up and photostat copies made of the significant pages.

The assistant in the Vail Library is doing similar work with special regard to the needs of the Department of Electrical Engineering. She has reviewed about two hundred current periodicals regularly and noted references in a general index of topics which come in the scope of the Electrical Engineering Department. She has also begun a very interesting permanent bibliography of references which have proven of permanent value. In addition to her work in the Library she has met the students in Course VI in their lecture rooms and given them instruction on how to use the Library.

Heretofore trade catalogues have been collected only in the offices of some of the teaching departments, but now a collection of trade catalogues is being made to be kept in the Central Library, where they will be readily accessible to all readers. The Reference Assistant and the Vail Library Assistant are coöperating in this work.

The growth of the Library has been steady, the number of books added from year to year not being very different from those in other years. During the year 1922–23 the total accessions have been 7,641 pieces, of which 1,949 were received by purchase, 1,900 by the binding of periodicals or books that came in parts, and 3,714 were gifts. After deducting the books and pamphlets that have been counted twice, and those which have been lost or worn out, the net increase amounts to 5,233 volumes, and 1,877 pamphlets and maps. These were distributed as indicated by the following table:

NET ACCESSIONS, 1922–23

	Volumes	*Pamphlets and Maps*
Central Library	3,307	1,546
Department Libraries	1,380	331
Walker Memorial	546	....
Totals	5,233	1,877

Adding these to the contents of the Library at the end of the previous year brings the total for the year ending June 30, to 155,609 volumes, and 57,830 pamphlets and maps.

During the year the total number of periodicals currently received was 957, of which 644 were obtained by subscription, and 313 by gift. The total cost of subscriptions, including several that are charged to department appropriations, was $3,372.51. The total number of books bound during the year was 2,393 volumes. There were also 1,742 orders sent for the purchase of new books. The number of cards added to the General Catalogue was 12,702. After deducting obsolete cards removed, the total contents of the catalogue is 183,761 cards.

The expenditures of the Library, other than salaries, were $11,909.81 divided as follows:

Purchase of Books	$4,518.46
Binding	3,705.48
Periodicals	2,788.20
Other Library Expenses	897.67
Total	$11,909.81

Mr. Nathan Van Patten, who for two years has been an Assistant Librarian, has resigned to take the position of Librarian at Queen's University, Kingston, Ontario. Mr. Van Patten, while here, was in close touch with the work of the Division of Industrial Coöperation and Research and helped greatly to aid the subscribers of the Technology Plan. During the past year he has prepared a "Bibliography on Corrosion," which was published and had so warm a reception that the edition was nearly exhausted within a few months.

In place of Mrs. Nickerson who resigned early in the year,

we were fortunate in obtaining for the position of assistant in the Vail Library, Mrs. Ruth McGlashan Lane, B.A., S.B., who had had several years experience as assistant to the editor of Dewey's "Decimal Classification," and later as organizer of the Library of the National Association of Wool Manufacturers.

Gifts

Among the important gifts received during the year was a set of the *Photographic Journal* from 1916–1923, presented by the heirs of Prof. Louis Derr.

The Right Honorable, the Earl of Camperdown has continued his gifts, presenting to the Institute eight volumes of Transactions of English Technical Societies.

In continuation of his former gift, Samuel S. Dale has presented the Library with two hundred and seven volumes of books on textiles.

Through the generosity of Miss Mabel Davison we received eleven volumes on architecture.

From Miss Emma O. Conro there was received a sum of money which was given to the Institute as a tribute to Professor Sedgwick in whose department she was a student at the time when the Department of Biology was being organized. This money was used to purchase a copy of "Histoire naturelle des Poissons d'eau douce de L'Europe Centrale" by Louis Agassiz, which was added to the Sedgwick collection.

Mrs. Francis A. Walker has made a gift of great interest in the history of the Institute, consisting of manuscript and other documents of President Walker. These were a part of the material used by Mr. Munroe in the biography which has recently been published.

Through the generosity of Mr. Robert D. Andrews of the class of '77, the Institute has acquired the Aeronautical Library of Samuel Cabot, class of 1870, together with a large number of aeronautical journals.

Our foreign students have made a number of important gifts to the Library. From the Chinese Club we have received twenty volumes of Chinese literature, and thirty lantern slides.

From the Latin American Club, thirty-seven volumes; from Russian students, seventeen volumes Russian literature. Also,

the class in General Studies (42) gave to the Institute thirty-two volumes of Modern European Literature. Other gifts that were especially noteworthy are listed below.

Donors and Gifts

Prof. H. W. Tyler. — Ford: Brief Course in College Algebra; Analytic Geometry.
Prof. F. S. Woods. — Woods: Higher Geometry.
The Hon. Chauncey M. Depew. — Depew: Speeches and Literary Contributions at Fourscore and Four; Addresses and Literary Contributions.
Mr. Harry Vissering. — Vissering: Zeppelin — The Story of a Great Achievement.
Prof. Edward S. Morse. — Morse: Additional Notes on Arrow Release.
Prof. O. E. Westin of Sweden. — Westin: Mechanical Questions.
Prof. A. H. Gill. — Gill: Engine-Room Chemistry.
Mr. Percival H. Lombard. — Five Volumes.
Prof. W. Emerson. — Significance of the Fine Arts; Lewis: Planning of the Modern City; Robinson: City Planning; Nolen: City Planning; Adams: Rural Planning and Development; Patte, Monumenseriges en France a la Gloire de Louis XV; Good Practice in Construction.
Metcalf & Eddy. — Metcalf: Improved Financial Condition of Water Works in United States.
Sir Oswald Stoll. — More broadsheets on National Finance. Ed. 2, 1922.
Prof. C. E. Locke. — Eager: Longroall Coal Cutting Machinery.
Prof. R. H. Richards. — Mining and Metallurgical Society of America, Proceedings. V. 13 and 14.
James Phinney Munroe. — Passport of W. B. Rogers: sixteen autographed letters referring to Technology Alumni Association
Prof. E. P. Warner. — Structural Analysis and Design of Airplanes: Handbook of Instructions for Airplane Designers, third edition.
Edwin F. Greene, Esq. — La Revue Petrolifere: Subscription to La Revue Petrolifere.
Lieut. G. B. McReynolds. — Norris: Brass.
Prof. C. H. Peabody. — Society of Naval Architects and Marine Engineers Transactions, vol. 29.
Albert E. Pillsbury, Esq. — Pillsbury: Lincoln and Slavery, vol. 30.
M. M. Green (Assistant, Chemical Department) — Green: Determination of Potash in Acid Insoluble Silicates.
Prof. Robert H. Richards. — Clippings reproposed Harvard Technology Alliance.
Charles Janet. — Janet: Le Volvox; Janet: Considerations sur L'etre Vivant.
George L. Myrick, Esq. — Fleming: The Intercolonial.
Knights of Columbus Historical Comm.: Benson, the Merchant Marine.
Thomas E. Murray. — Murray: Power Stations.
Prof. A. H. Gill. — Gill: Automobile Gasoline.
J. Alfred Anderson. — Trade and Industry of Finland.
A. L. Guerrero, '23. — Endara: José Ingenieros.
Comite Cultura Catala. — Two volumes.
A Friend of the Library. — Walters: The Bethlehem Bach Choir.
Prof. R. R. Lawrence. — Three volumes, History of the Great War: Massachusetts Institute of Technology Catalogue Class of '95.
Thomas S. Derr '19. — Six volumes, The Photographic Journal.
George Calingaert. — Three volumes, Jean-Servais Stas: Oevres Completes.
John Kremer '24. — Swinburne: Entropy.
Prof. E. F. Langley. — Sandeau: Mademoiselle de la Seigliere.

Robert P. Bigelow.

DIVISION OF INDUSTRIAL COÖPERATION AND RESEARCH

The Division of Industrial Coöperation and Research has now been in existence for four years in fulfillment of the obligations entered into by the Institute under the Technology Plan. In general the relations with the contractors have been much as in earlier years, but there has been a noticeable increase in the number of serious and lengthy problems which have been worked on by the members of the instructing staff under the guidance of the division. Some of the contracts have expired, a few have been renewed, and a small number of additional contracts have been secured. There has been as yet no systematic campaign to secure the renewal of contracts, many of which expire at the end of next year, but the renewal of some of the shorter contracts and the execution of new contracts as well as the expressions of satisfaction for the service rendered received from many of the larger contractors indicate that practically all the original contracts will be renewed.

The method of operating the division has been as heretofore, to serve as the point of contact between the contractors and the members of the staff, and to assist in every way in bringing about prompt and efficient use of the Institute's facilities for the benefit of industry. The division has attempted to avoid, however, interference with the personal freedom of the staff to conduct their researches and investigations in their own way. It appears to be unavoidable that the relations between the contracting companies and the Institute should assume a more and more definitely personal nature, and individual members of the staff who have rendered valuable services to the contracting companies are sought again and again for further advice and expert service. By far the greatest portion of the service rendered to the contractors by the division has been the stimulation of research and development work on their part, first in the laboratories of the Institute and frequently later in laboratories of their own planned by the members of our staff and patterned after our own laboratories. For the contractors who have kept closely in contact with

us along such lines as these, we have been able to render the greatest service.

During the year a systematic study has been made of the handling of industrial problems by the various educational institutions of the country, in the hope of obtaining suggestions that might be of assistance in the possible readjustment of the contracts at the close of the five-year period in 1924. With the same object in view, the director and his two associates, Professor Hayward and Doctor Millard, have visited a large number of the plants of the contracting companies.

It seems clear that the reaction of the division toward the general teaching efficiency of the Institute is good, and the bringing of industrial problems to members of the staff through the division has been helpful to them in the matter of experience, in material additions to the laboratory equipments, and also of some financial assistance to the staff. It is perhaps worth noting that a great mass of minor questions, and some of considerable importance, are passed upon by members of the staff without expense to the contractors.

There have been a number of instances this year where the division has been able to serve materially individual alumni who are consulting engineers, through the existence of our great equipment or because of the wide variety of expert knowledge which is available to the division through its close relations with the members of the instructing staff. It has been clearly demonstrated that the division can be of great assistance to such of its alumni as are consultants, in this manner, and that the belief that there might be competition from members of the staff, acting through the division, was unfounded.

The practice of the larger industrial companies of sending their personnel representatives to the various educational institutions in search of suitable young men to enter their employ has been constantly increasing, and in such cases,as frequently arise, where numbers of men of different types of training, graduates of different courses, are sought, it has proved effective to have the Division assist in the selection of the men and in affording the representatives of the industrial companies opportunities to meet various groups of students. In every case the division has worked in close coöperation with the heads of the departments.

The usual questionnaire has been sent out to the alumni and the replies have enabled the division to aid a considerable number of the alumni to place themselves in more satisfactory positions, and to furnish to the contractors an unusually large number of the alumni.

C. L. NORTON.

REPORT OF THE REGISTRAR

After twenty years of service as Registrar, Mr. Humphreys resigned, July 1, 1922. The work of the Registrar's Office has been carried on under my direction, as Acting Registrar, with the assistance of Mr. J. C. MacKinnon, of the Physics Department, who has recently been appointed Registrar.

The most significant change in the registration system was the appointment of Registration Officers. The student body was divided into groups, according to year and course, and a Faculty member assigned as Registration Officer for each group, the students in a given group being under the direct supervision of a member of the department in which they were registered. The Registration Officer is responsible for the members of his group, and has complete control over their program of study. By this method, not only is the routine of registration expedited, but a larger opportunity is afforded for personal contact between students and Faculty.

The following brief statements compare the statistics for the year 1922-23 with those of 1921-22. All statistics are as of November 1.

The total registration was 3180, a decrease of 325, or 9.3%. In the "Analysis of the Attendance of Engineering Schools" by the Department of the Interior, Bureau of Education, Washington, D. C., the average decrease in students in Engineering Schools this year, throughout the United States, was 8%.

The fourth-year class was still the largest, and the enrollment in the Electrical Engineering Course (including the Coöperative Course) was larger than that of any other, numbering 658 students.

The number of the instructing staff remained practically the same as last year. The ratio of the number of students to that of the staff was 8.1%, while last year the ratio was 8.9%.

There is usually a decrease in the total enrollment during the year. Since 1916, the number of students at the end of a school year has been from 3.3% to 6% less than the number of students as of November 1 (except in the year 1918-1919 when there was an increase of 2.3% due to students returning after the war).

The decrease this year was larger than the average for the past few years. The number of students fell from 3,180, November 1, to 2,862 at the end of the year, a decrease of 10%.

The per cent of foreign students remained the same as last year, China still leading with a total of 57 students.

The number of students entering from other colleges was about the same. Four hundred and seven students, or 12.8% of the total enrollment, were graduates of other colleges or universities Students who had attended other colleges, but had not graduated, numbered 659, or 20%, making the per cent of students who had attended other colleges or universities before coming to Technology 33.5%.

The total number of students receiving degrees was not the largest in the history of the Institute, but the total number receiving advanced degrees exceeded that of previous years. Two hundred and seventy-seven students pursued courses leading to advanced degrees, as compared with 208, or an increase of 33%. Of the 697 degrees awarded, in the class of 1923, 172 were advanced degrees, or 24.7%.

The members of the instructing staff contributed greatly to the success of the present system of registration and records, by their helpful suggestions, constructive criticism, and their cordial coöperation.

The usual tables of statistics as of November 1, 1922 follow.

ALLYNE L. MERRILL.

TABLE NUMBER 1

The Corps of Instructors

November 1	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22
Professors: Emeriti	1	1	1	1	1	1	3	3	3	4	4	4	5	5	5	6	5	8
Retired	—	—	1	1	1	1	3	3	3	4	5	7	7	6	6	6	7	6
Non-Resident	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2
Research (Not counted elsewhere)	—	—	—	—	—	—	4	3	1	1	—	—	—	—	—	—	—	—
Total	4	4	5	5	5	5	13	12	10	12	12	13	14	13	13	14	14	16
Professors	32	36	39	39	43	43	40	47	46	59	63	61	59	58	52	56	56	56
Associate Professors	14	17	17	17	14	18	17	16	23	23	23	30	32	29	33	34	35	40
Assistant Professors	24	21	24	32	31	30	33	35	33	36	31	36	38	33	39	49	54	48
Instructors (Members of Faculty)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25	30
Active Faculty	69	74	80	88	88	91	90	98	102	118	117	127	129	120	124	139	170	174
Instructors (Not members of Faculty)	72	69	72	62	69	66	64	67	74	70	79	90	70	67	99	109	84	80
Assistants	53	52	52	50	51	55	50	49	54	52	58	54	38	35	39	79	93	87
Faculty, Instructors and Assistants	184	215	204	200	208	212	204	214	230	240	254	271	237	222	262	327	347	341
Research Associates	6	8	8	6	12	8	5	3	1	3	3	5	4	1	8	19	19	19
Research Assistants	4	3	3	1	1	5	6	7	8	15	11	14	7	5	10	15	13	16
Lecturers	39	31	32	31	18	21	25	16	19	23	28	31	29	13	13	14	15	15
Total Active Members	332	257	247	238	239	246	240	240	258	281	296	321	277	241	293	375	394	391

TABLE NUMBER 2

Yearly Registration Since the Foundation of the Institute

Year	Number of Students	Year	Number of Students	Year	Number of Students
1865–66	72	1884–85	579	1903–04	1,528
1866–67	137	1885–86	609	1904–05	1,561
1867–68	167	1886–87	637	1905–06	1,466
1868–69	172	1887–88	720	1906–07	1,397
1869–70	206	1888–89	827	1907–08	1,415
1870–71	224	1889–90	909	1908–09	1,462
1871–72	261	1890–91	937	1909–10	1,481
1872–73	348	1891–92	1,011	1910–11	1,509
1873–74	276	1892–93	1,060	1911–12	1,566
1874–75	248	1893–94	1,157	1912–13	1,611
1875–76	255	1894–95	1,183	1913–14	1,685
1876–77	215	1895–96	1,187	1914–15	1,816
1877–78	194	1896–97	1,198	1915–16	1,900
1878–79	188	1897–98	1,198	1916–17	1,957
1879–80	203	1898–99	1,171	1917–18	1,689
1880–81	253	1899–00	1,178	1918–19	1,819
1881–82	302	1900–01	1,277	1919–20	3,078
1882–83	368	1901–02	1,415	1920–21	3,436
1883–84	443	1902–03	1,608	1921–22	3,505
				1922–23	3,180

TABLE NUMBER 3

THE STUDENTS, 1922–1923

Registration by Classes	Total
Graduate year	314
Fourth year	833
Third year	678
Second year	698
First year	592
Special	65
Total	3,180

TABLE NUMBER 4

STUDENTS BY COURSES FOR THE YEAR, 1922–1923

	YEAR						
	Graduate	Fourth	Third	Second	First	Special	Total
Civil Engineering	12	83	81	75	68	—	319
Mechanical Engineering	13	143	119	120	76	—	471
Mining Engineering and Metallurgy	3	26	33	19	13	—	94
Architecture	6	50	26	34	39	—	155
Chemistry	46	19	15	27	21	—	128
Electrical Engineering	44	89	112	89	152	—	486
Electrical Engineering VI-A	37	31	34	70	—	—	172
Biology and Public Health	1	14	7	3	1	—	26
Physics	16	13	3	4	2	—	38
General Science	—	3	6	2	1	—	11
General Engineering	—	32	22	13	8	—	75
Mathematics	1	3	2	1	1	—	8
Chemical Engineering	30	92	83	78	83	—	366
Chemical Engineering Practice X-A	48	—	—	—	—	—	48
Chemical Engineering Practice X-B	—	16	—	—	—	—	16
Sanitary Engineering	—	3	2	2	2	—	9
Geology	7	9	2	1	1	—	20
Naval Architecture	3	19	19	10	8	—	59
Naval Construction	29	12	—	—	—	—	41
Electrochemical Engineering	3	22	17	15	17	—	74
Engineering Administration	—	154	95	135	100	—	484
Aeronautical Engineering	15	—	—	—	—	—	15
Total	314	833	678	698	592	65	3180

TABLE NUMBER 5

TOTALS OF THE SAME CLASSIFICATION* SINCE 1912

	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23
Engineering Courses:											
Civil Engineering	212	209	197	188	172	160	111	255	377	312	319
Mechanical Engineering	243	279	271	279	270	210	172	472	651	580	471
Mining Engineering	50	37	34	46	55	40	40	103	140	121	94
Electrical Engineering (Inc. VI-A)	201	196	205	235	233	186	135	305	561	657	658
Chemical Engineering (Inc. X-A and X-B)	149	141	146	157	173	164	155	381	526	492	430
Sanitary Engineering	55	65	61	60	31	21	9	24	15	16	9
Naval Architecture	29	31	25	28	38	40	75	66	95	78	59
Naval Construction	6	7	16	23	26	—	6	18	30	32	41
Electrochemical Engineering	42	38	46	50	42	37	16	74	105	98	74
Engineering Administration	—	—	57	99	139	119	67	375	529	572	484
Aeronautical Engineering	—	—	—	—	—	6	81	2	7	10	15
General Engineering	—	—	—	—	—	—	—	33	34	47	75
Total Engineering Courses	987	1,003	1,057	1,165	1,179	983	867	2,108	3,070	3,015	2,729
Architecture	127	130	157	163	142	80	27	119	130	141	155
Science Courses:											
Chemistry	60	78	66	59	60	45	33	66	93	106	128
Biology	33	36	44	48	61	37	49	56	24	30	26
Physics	5	12	10	14	11	10	6	15	42	41	38
Geology	2	3	3	4	9	3	1	15	19	22	20
General Science	4	3	5	4	4	1	—	—	8	8	11
Mathematics	—	—	—	—	—	1	1	1	2	1	8
Total Science Courses	104	132	128	129	145	97	116	153	188	208	231
School of Public Health	—	—	—	—	—	—	—	—	25	20	—
Special	—	—	—	—	—	—	—	—	33	121	65

*Previous to 1920–1921 the election of Courses by first-year students was not recorded.

TABLE NUMBER 6

STUDENTS AT THE END OF THE SCHOOL YEAR FOR THE PAST SEVEN YEARS

	1917	1918	1919	1920	1921	1922	1923
Engineering Courses							
Civil	225	212	240	310	343	290	295
Mechanical	340	270	400	573	605	586	434
Mining	67	63	78	133	130	110	83
Electrical	290	224	252	406	496	635	575
Chemical	267	258	350	428	491	431	382
Sanitary	40	22	16	26	18	13	6
Naval Architecture	74	83	78	96	104	97	90
Electrochemical	55	44	43	108	101	90	70
Engineering Administration	199	150	228	467	511	541	413
Aeronautical	—	—	2	2	6	14	15
General Engineering	—	—	—	29	43	51	95
Total Engineering	1,557	1,326	1,687	2,578	2,848	2,858	2,458
Architecture	163	74	67	144	136	149	149
Science Courses							
Chemistry	66	52	58	72	96	102	116
Biology	63	35	19	47	24	38	27
Physics	11	12	15	23	41	41	29
Geology	7	3	4	14	20	28	24
General Science	5	2	2	—	5	8	8
Mathematics	—	—	—	—	—	—	11
Total Science Courses	152	104	98	156	186	217	215
Special and No Course Classification	20	130	8	6	61	105	40
School of Public Health	—	—	—	—	18	—	—
Grand Total	1,892	1,634	1,860	2,884	3,249	3,329	2,862

TABLE NUMBER 7

NUMBER OF STUDENTS IN EACH YEAR, FROM 1912, COMING FROM EACH STATE OR TERRITORY

States and Territories	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
North Atlantic:	1,212	1,279	1,394	1,434	1,502	1,316	1,436	2,261	2,415	2,460	2,237
Connecticut	44	45	55	61	69	49	59	101	104	102	88
Maine	24	25	32	23	32	26	34	58	66	62	49
Massachusetts	890	954	1,032	1,060	1,110	1,005	1,020	1,517	1,516	1,544	1,449
New Hampshire	28	34	34	27	30	26	28	48	41	45	41
New Jersey	34	38	48	54	53	47	58	113	123	122	100
New York	108	102	113	121	122	101	140	264	341	346	314
Pennsylvania	43	42	42	46	57	31	58	113	143	160	134
Rhode Island	33	34	31	35	17	19	26	42	54	49	35
Vermont	8	5	7	7	12	12	11	15	27	30	27
South Atlantic:	45	66	66	72	81	43	50	129	160	166	149
Delaware	2	2	3	5	4	7	3	14	15	12	10
District of Columbia	12	21	18	19	27	10	14	37	37	38	38
Florida	3	5	2	5	7	1	6	10	14	14	13
Georgia	3	4	3	5	5	3	2	8	8	11	11
Maryland	8	16	18	13	9	4	7	13	18	33	29
North Carolina	2	4	2	4	5	4	2	9	11	7	11
South Carolina	—	5	6	9	9	4	3	5	8	7	6
Virginia	13	8	11	8	8	6	9	24	36	35	28
West Virginia	2	1	3	4	7	4	4	9	13	9	3
South Central:	46	43	50	54	49	42	41	79	91	115	113
Alabama	3	5	5	5	5	6	5	12	4	8	8
Arkansas	2	1	2	1	1	—	—	1	6	7	9
Kentucky	7	10	10	8	9	6	5	14	20	22	25
Louisiana	4	5	5	7	7	5	5	10	9	6	10
Mississippi	7	5	6	5	2	4	2	6	5	10	4
Tennessee	2	2	5	5	8	3	3	10	12	20	18
Texas	21	15	17	23	17	18	21	26	35	42	39
North Central:	137	115	115	152	146	124	118	271	337	314	279
Illinois	25	15	27	37	31	27	19	49	67	66	63
Indiana	10	9	7	12	5	9	10	18	27	27	21
Iowa	8	11	10	12	6	1	5	15	18	18	14
Kansas	8	3	4	2	3	1	3	7	6	5	4
Michigan	7	12	14	15	16	14	19	26	29	26	26
Minnesota	14	15	6	5	6	4	5	18	24	31	28
Missouri	13	3	5	10	18	15	14	37	35	33	32
Nebraska	8	8	5	5	5	3	1	4	11	11	6
North Dakota	3	2	3	3	1	—	—	2	4	5	1
Ohio	32	25	28	44	43	42	34	68	85	67	60
South Dakota	2	2	1	3	1	1	—	2	2	5	2
Wisconsin	7	10	5	4	11	7	8	25	29	20	22
Western:	65	63	72	59	52	46	42	120	139	150	130
Alaska	1	1	—	—	—	1	—	—	—	1	1
Arizona	1	—	—	—	1	—	1	2	5	3	5
California	22	23	30	25	22	16	14	41	47	51	47
Colorado	14	13	14	11	8	7	7	26	23	28	16
Idaho	—	1	2	1	2	1	—	1	4	4	3
Montana	4	4	3	2	1	3	6	8	8	9	9
Nevada	—	—	—	—	—	—	—	1	1	—	—
New Mexico	1	1	1	1	—	—	—	4	4	4	4
Oklahoma	1	2	—	—	1	—	2	3	2	5	4
Oregon	14	11	10	5	6	6	7	9	11	14	17
Utah	2	2	—	5	5	5	—	5	10	8	5
Washington	6	5	10	7	4	4	5	15	20	21	15
Wyoming	—	—	—	2	2	3	—	5	4	2	4

Districts	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
	6	6	5	4	5	4	5	13	27	29	25
Canal Zone	—	—	—	—	—	—	1	1	2	2	2
Hawaii	2	1	2	1	—	1	1	—	3	4	6
Philippine Islands	1	2	1	1	2	—	—	7	11	14	9
Porto Rico	3	3	2	2	3	3	3	5	11	9	8
Total for United States	1,511	1,572	1,702	1,775	1,835	1,575	1,692	2,873	3,169	3,234	2,933

NUMBER OF STUDENTS IN EACH YEAR, FROM 1912, COMING FROM EACH FOREIGN COUNTRY

Foreign Countries	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
	100	113	114	125	122	123	127	205	267	271	247
Abyssinia	—	—	—	—	—	—	—	—	—	—	1
Albania	—	—	—	—	—	1	—	—	—	1	—
Argentine Republic	1	—	—	1	1	1	—	3	5	7	8
Armenia	—	—	—	—	—	—	2	3	2	—	—
Australia	—	—	—	—	—	—	—	2	1	—	2
Austria-Hungary	2	1	2	1	1	1	—	—	—	—	1
Belgium	—	—	—	—	—	—	—	—	2	5	10
Bolivia	—	—	—	—	—	—	—	—	—	1	1
Brazil	5	7	4	1	1	4	2	4	7	5	3
Bulgaria	—	—	—	1	—	—	—	—	1	1	1
Canada	13	14	15	14	16	10	10	38	41	42	29
Cape Colony	—	—	1	—	—	—	—	—	—	—	—
Chile	—	1	—	—	8	10	6	7	8	6	3
China	37	42	46	49	40	42	38	40	58	60	57
Colombia	—	1	3	4	3	2	4	6	2	1	2
Costa Rica	—	1	—	—	1	1	1	1	1	—	—
Cuba	6	7	3	2	8	6	5	4	8	8	11
Cyprus, Island of	—	—	—	1	—	—	—	—	—	—	—
Czechoslovakia	—	—	—	—	—	—	—	—	3	1	1
Denmark	—	2	1	1	1	3	1	1	3	4	2
Dominican Republic	—	—	—	—	—	—	—	—	—	—	1
Dutch West Indies	—	—	—	—	—	—	—	—	1	2	—
Ecuador	1	1	—	—	1	1	4	2	1	—	—
Egypt	1	1	1	1	1	1	—	1	—	—	1
England	—	—	1	1	1	—	—	1	3	8	4
France	3	4	2	—	—	—	—	2	2	3	3
Germany	3	2	2	3	1	—	—	—	—	—	—
Greece	1	1	1	—	—	2	3	2	4	3	2
Guatemala	1	1	2	1	—	1	—	—	1	—	—
Honduras	—	1	1	2	3	3	—	1	—	—	—
India	2	1	2	2	1	—	—	2	6	5	6
Ireland	—	—	—	—	—	—	—	1	1	1	1
Italy	—	—	—	1	2	—	—	1	—	1	1
Jamaica	—	—	—	—	—	—	—	—	—	1	—
Japan	—	1	1	6	8	11	15	10	12	6	6
Korea	2	—	—	—	—	—	—	—	1	1	1
Mexico	4	7	7	10	9	5	5	9	18	15	12
Newfoundland	1	1	—	—	—	—	—	—	—	—	—
New Zealand	1	—	—	—	—	—	—	—	—	—	1
Nicaragua	—	—	—	2	—	—	—	—	—	1	—
Norway	—	—	—	2	3	6	12	38	30	21	15
Palestine	—	—	—	—	—	—	—	—	1	1	1
Paraguay	1	1	1	—	—	—	—	—	—	1	1
Peru	—	2	3	3	—	2	—	3	3	3	2
Portugal	—	1	—	1	—	—	—	—	—	—	—
Roumania	—	—	—	—	—	—	—	—	—	1	1
Russia	4	4	5	2	2	1	10	8	12	15	16
Salvador	1	1	1	3	1	—	—	—	—	—	—
Scotland	—	1	1	—	—	—	—	1	1	1	1
Serbia	—	—	—	—	—	—	—	—	—	1	1
Siam	—	—	—	1	1	—	—	5	8	8	8
Smyrna	—	—	—	—	—	—	—	—	1	1	1
South Africa, Union of	1	1	—	1	—	—	1	2	4	5	3
Spain	—	—	—	—	—	2	4	2	5	4	6
Straits Settlements	—	—	—	—	—	—	1	—	1	—	—
Sweden	—	—	—	—	—	2	—	—	2	1	—
Switzerland	—	—	—	—	—	—	—	1	—	6	2
Syria	3	2	2	—	1	—	—	—	—	2	4
Tahiti	—	—	—	—	—	—	—	—	—	1	1
Turkey	5	3	6	8	6	5	1	1	1	2	1
Uruguay	—	—	—	—	—	5	2	3	6	9	12
Total in School	1,611	1,685	1,816	1,900	1,957	1,698	1,819	3,078	3,436	3,505	3,180

TABLE NUMBER 8

Women Students, 1922–1923

Year	COURSE											
	Civil Engineering	Mining Engineering	Architecture	Chemistry	Electrical Engineering	Biology and Pub. Health	Physics	Mathematics	Chemical Engineering	Engineering Admin.	Special	Total
First . . .	1	—	2	1	—	—	—	—	—	—	—	4
Second . .	—	1	2	—	—	1	—	—	—	1	—	5
Third . . .	—	—	3	2	1	—	1	1	—	1	—	9
Fourth . .	—	—	4	1	—	6	—	—	1	—	—	12
Graduate .	—	—	1	6	—	2	3	—	—	—	—	12
Special . .	—	—	—	—	—	1	—	—	—	—	2	3
Total . .	1	1	12	10	1	10	4	1	1	2	2	45

TABLE NUMBER 9

Total Registration and Number of New Students

Year	(1) Total Number of Students	(2) Number of Students of the previous year who remain in the Institute	(3) Number of New Students	(4) Number of New Students Entering from Other Colleges
1922–1923	3,505	2,151	1,354	476
1921–1922	3,180	2,024	1,156	455

TABLE NUMBER 10

GRADUATE STUDENTS, 1922–1923

American Colleges and Universities Represented

	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23
Adelphi	—	—	—	—	1	1
Akron	3	—	1	1	2	1
Alabama	2	—	—	—	6	—
Alabama Polytechnic Inst.	1	—	2	1	—	4
Alfred	1	—	1	—	—	1
Allegheny	1	—	1	1	1	4
Amherst	3	1	5	1	1	2
Arizona	1	—	2	—	—	—
Arkansas	—	—	—	2	—	—
Armour Institute of Tech.	1	—	—	—	1	1
Assumption	—	—	1	—	—	—
Austin	—	—	1	—	1	—
Baker	—	—	2	2	—	—
Barnard	—	—	—	—	—	2
Bates	3	—	2	3	4	—
Baylor	—	—	—	—	1	—
Beloit	2	—	1	1	1	1
Bethany	1	—	—	—	1	—
Biddle	—	—	—	—	1	1
Birmingham-Southern	—	—	—	1	1	1
Boston College	1	1	6	8	10	9
Boston University	2	1	2	—	4	2
Bowdoin	—	1	3	3	4	3
Brooklyn Polytechnic Inst.	1	—	1	—	—	—
Brown	2	—	3	8	7	5
Bryn Mawr	—	—	4	3	5	1
Bucknell	—	—	2	—	—	1
Buffalo	1	—	1	1	1	—
Butler	—	—	—	—	1	1
California	4	—	1	3	5	5
Campion	—	—	2	1	—	—
Canisius	—	1	1	1	1	1
Carleton	—	—	1	3	3	1
Carnegie Institute of Technology	1	—	1	1	—	—
Case School of App. Science	1	—	—	—	—	2
Catholic University of Am.	3	1	—	—	—	1
Central (Fayette, Mo.)	—	—	—	1	—	—
Centre	—	—	1	1	—	—
Chicago	1	—	1	1	2	2
Cincinnati	1	1	1	—	1	1
Citadel	—	—	—	—	—	2
City of New York	7	—	5	9	9	6
Clark	1	2	3	4	3	1
Clarkson	—	—	1	—	—	—
Clemson Agricultural	—	—	—	1	1	—
Colby	2	—	2	4	2	—
Colgate	3	1	—	4	5	2
Colorado College	—	—	—	1	2	1
Colorado School of Mines	1	—	—	—	—	1
Colorado University	1	—	3	2	2	1
Columbia	3	4	4	5	7	6
Cooper Union	—	—	—	1	1	1
Cornell University	8	5	4	5	5	3
Cornell (Iowa)	1	—	—	—	—	—
Cotner	—	—	—	1	1	—
Dartmouth	15	1	11	12	12	7
Davidson	1	1	1	2	1	2
Davis and Elkins	1	—	—	—	—	—
Dayton	—	—	—	—	—	1
Delaware	1	—	3	4	—	1
Denison	2	—	—	—	1	1
Denver	1	—	—	—	—	—
Detroit	—	—	—	—	—	1
Dickinson	—	—	—	—	1	1
Drake	—	—	1	1	—	1
Drexel Institute	—	—	—	—	—	1
Earlham	—	—	—	—	1	—
Fairmount	—	—	—	—	—	1
Fordham	—	—	—	1	1	2
Franklin and Marshall	—	—	—	2	1	1
Friends	—	—	—	—	—	1
Furman	1	—	—	—	—	—
Georgetown	1	—	—	—	—	1
George Washington	1	—	—	1	1	—
Georgia	—	—	—	1	1	—
Georgia School of Tech.	2	—	—	1	1	2
Gettysburg	—	—	—	—	—	1
Goucher	—	—	1	—	—	—
Grinnell	—	—	—	2	5	3
Hahnemann Medical	—	—	—	—	1	—
Hamilton	2	—	—	3	3	3
Hanover	—	—	—	—	1	—
Harvard	27	4	21	19	14	12
Haverford	—	—	—	1	4	7
Hilladale	—	—	—	—	1	1
Hobart	—	—	—	2	1	—
Holy Cross	3	—	—	3	3	2
Howard	—	—	—	—	—	2
Idaho	—	—	—	—	1	1
Illinois	4	1	1	4	3	4
Indiana Medical	1	—	—	—	—	—
Indiana University	—	—	—	1	2	4
Iowa State	—	1	1	1	1	1
Jefferson Medical	—	—	—	—	2	—
Johns Hopkins	—	—	—	1	1	3
Kalamazoo	2	—	—	1	1	1
Kansas	4	—	3	2	2	2
Kentucky	1	1	1	—	—	1
Kenyon	—	—	—	—	—	1
Lafayette	—	—	—	—	—	—
Lake Forest	2	—	—	—	—	—
Lassell	—	—	—	—	—	1
Lawrence	1	—	1	3	2	—
Lehigh	5	—	—	2	—	4
Leland Stanford Junior	1	—	2	1	3	1
Lewis Institute	—	—	1	—	—	—
Lombard	1	—	—	—	—	—
Louisiana State	1	—	1	1	1	—
Loyola	1	—	1	3	2	2
McMaster University	1	—	—	—	—	—
Maine	2	1	1	1	2	1
Manhattan	1	1	1	1	1	—
Marion Institute	—	—	1	—	1	—
Maryville	1	—	—	—	—	—
Massachusetts Agricultural	3	—	2	—	—	1
Mass. Institute of Tech.	14	8	16	47	68	78
Mercer	1	—	—	—	1	1
Miami	3	—	—	1	—	2
Michigan	2	2	3	1	6	8
Michigan Agricultural	—	—	1	1	—	1
Michigan College of Mines	—	1	—	—	—	—
Middlebury	—	1	1	2	2	—
Millsaps	1	—	—	—	—	—
Minnesota	2	1	1	3	6	4
Mississippi	1	—	2	2	2	—
Mississippi Agricultural and Mechanical	—	—	—	1	1	—
Missouri	2	—	1	2	3	—
Missouri Wesleyan	—	—	—	—	1	—
Montana	1	—	—	—	—	1
Montana School of Mines	1	—	—	—	—	2
Moore's Hill	1	—	—	—	—	—
Mount Holyoke	—	1	1	3	2	2

GRADUATE STUDENTS, 1922–1923 — *Continued*

American Colleges and Universities Represented

	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23
Nebraska	1	—	2	1	1	1
Nebraska Wesleyan	—	—	—	2	—	—
New Hampshire Agricultural and Mechanical	1	—	—	1	2	3
New Mexico	—	—	—	1	1	1
New York University	1	—	—	—	—	—
North Carolina	4	—	3	3	1	4
North Dakota Agricultural	—	—	1	2	1	—
Northeastern	—	—	—	—	2	1
Northwestern	1	—	2	4	6	3
Norwich	1	—	—	—	1	2
Notre Dame	4	1	—	—	—	—
Oberlin	—	—	1	3	2	2
Occidental	2	—	—	—	—	—
Ohio Northern	—	—	—	—	—	3
Ohio State	—	—	1	2	1	2
Ohio Wesleyan	1	—	1	—	—	1
Oklahoma Agr. and Mech.	—	1	—	—	—	—
Oklahoma University	—	—	—	1	—	1
Oregon	1	1	3	5	2	2
Oregon Agricultural	3	2	3	—	2	1
Ottawa University (Kansas)	—	—	—	—	—	1
Pacific	—	—	—	—	1	1
Pennsylvana (Gettysburg)	—	—	—	2	3	—
Pennsylvania Military	—	—	—	—	—	3
Pennsylvania State	—	2	3	1	5	4
Penn ylvania University	5	—	4	2	4	3
Pittsbsurgh	1	1	—	1	2	—
Pomona	1	—	—	2	1	1
Pratt Institute	—	—	—	—	1	—
Princeton	4	2	4	11	16	11
Purdue	2	1	—	1	1	—
Radcliffe	4	7	1	1	2	1
Randolph-Macon	—	—	—	1	—	—
Reed	—	—	—	1	2	2
Rensselaer Polytechnic Ins.	1	1	—	—	—	1
Rhode Island State	1	—	—	—	1	1
Rice Institute	1	—	—	4	2	1
Roanoke	—	—	—	—	—	1
Rochester	4	—	—	1	3	5
Roger Williams	—	—	—	—	1	1
Rose Polytechnic Institute	4	1	1	1	—	—
Rutgers	—	—	1	—	—	—
Rush Medical College	1	—	—	—	—	—
Sacred Heart	—	—	—	—	1	1
St. Anselm	1	—	—	—	—	—
St. Elizabeth	—	—	1	—	—	—
Saint Francis Xavier	1	—	—	—	—	—
St. Joseph's (Philadelphia)	—	1	—	—	—	—
St. Louis	—	—	—	1	1	—
Saint Mary's	—	—	2	2	—	—
Saint Olaf	—	—	2	—	—	—
Simmons	—	1	—	—	—	—
Simpson	—	—	—	—	1	1
Smith	1	1	—	—	—	—
South Carolina	—	—	1	1	—	—
South Carolina Military	3	—	1	1	1	—
So. Dakota School of Mines	—	—	—	—	1	1
South Dakota	—	—	—	—	2	—
Southwestern	—	1	—	—	—	—
Spring Hill	—	2	2	2	3	2
Stanford	—	—	—	—	—	1
Stevens Institute of Tech.	3	1	—	—	—	—
Swarthmore	—	—	—	—	2	—
Syracuse	1	—	—	2	1	3
Tennessee	1	—	—	—	—	—
Texas	4	1	1	5	4	7
Texas, Agr.& Mech. Coll. of	2	—	1	—	1	—
Texas Military	—	—	—	—	1	—
Throop	—	—	1	1	1	—
Transylvania	—	—	—	3	1	1
Trinity (Hartford, Conn.)	1	—	1	—	2	—
Trinity (Washington, D.C.)	1	—	—	—	—	1
Tri State	—	—	—	—	1	—
Tufts	7	—	3	3	4	4
Tulane	1	—	1	2	—	—
Union	3	—	—	—	—	—
U. S. Military Academy	1	—	5	45	32	22
U. S. Naval Academy	1	6	6	32	39	46
Ursinus	—	—	—	1	1	1
Utah	3	—	1	1	1	1
Valparaiso	1	—	—	—	—	1
Vanderbilt	1	1	1	2	1	1
Vassar	—	—	—	1	2	—
Vermont	3	—	—	2	1	1
Virginia	3	—	5	6	6	6
Virginia Military	4	1	3	9	8	10
Virginia Polytechnic Inst.	—	—	1	2	—	2
Virginia Union	—	—	—	—	—	1
Wabash	—	—	1	2	3	—
Washburn	—	—	2	2	—	—
Washington	2	—	1	4	2	4
Washington (St. Louis)	1	—	—	—	—	—
Washington and Jefferson	1	—	2	2	1	2
Washington and Lee	3	6	3	2	1	1
Washington State	—	—	1	—	—	1
Wellesley	2	2	1	2	3	5
Wesleyan	5	2	1	—	—	6
Western Maryland	—	—	—	1	2	—
Western Reserve	1	—	—	1	1	2
Westminster (Colo.)	—	—	—	1	2	2
Whitman	1	—	—	2	1	—
Willamette (Oregon)	—	—	—	—	—	1
William Jewell	1	—	—	—	1	—
William and Mary	—	—	—	—	—	1
Williams	5	—	4	5	5	7
Wisconsin	4	1	—	—	1	4
Wittenberg	—	—	—	1	1	1
Wofford	—	1	—	1	—	—
Wooster	1	—	1	1	—	—
Worcester Polytechnic	11	2	—	—	—	1
Wyoming	4	—	—	1	—	—
Yale	10	1	13	15	13	9

NUMBER OF COLLEGES

American	141
Foreign	63
Total	204

NUMBER OF GRADUATE STUDENTS

Candidates for Advanced Degrees	277
Pursuing Undergraduate Work	130
Total	407

TABLE NUMBER 11

NEW STUDENTS FROM OTHER COLLEGES BY YEARS, 1922–1923

Class Joined at Institute	Years Spent at College				Total
	One	Two	Three	Four or more	
First year	58	23	4	8	93
Second year	29	40	10	19	98
Third year	5	31	17	45	98
Fourth year	—	3	3	48	54
Graduate year	—	—	—	112	112
Total	92	97	34	232	455

TABLE NUMBER 12

COLLEGE STUDENTS AMONG THE COURSES, 1922–1923

Graduates and Students from Colleges, 33.5% of the Total Student Body	Civil Engineering	Mechanical Engineering	Mining Engineering	Architecture	Chemistry	Electrical Eng., Inc., VI-A	Biology and Public Health	Physics	General Science	General Engineering	Mathematics	Chemical Engineering	Chem. Eng. Practice X-A	Chem. Eng. Practice X-B	Sanitary Engineering	Geology	Naval Architecture	Naval Construction	Electrochemical Eng.	Engineering Administration	Aeronautical Engineering	Special	Total	Per cent of Student Body
Graduates	30	38	10	26	44	77	6	6	—	7	3	34	23	1	—	8	12	18	4	24	10	26	407	12.8
Non-graduates	70	104	18	51	23	138	—	3	2	21	2	67	—	5	1	6	11	—	9	119	—	9	659	20.7
Total	100	142	28	77	67	215	6	9	2	28	5	101	23	6	1	14	23	18	13	143	10	35	1066	33.5

TABLE NUMBER 13

AGES OF FIRST YEAR STUDENTS, OCTOBER, 1922

Under 17	19
17 to 17½	59
17½ to 18	81
18 to 18½	91
18½ to 19	80
19 to 19½	78
19½ to 20	57
20 to 20½	46
20½ to 21	14
21 to 22	24
22 to 23	9
23 to 24	12
Total	570

Over twenty-four, 22.

Omitting those under 17, and over 24, on October 1, the average age was 18 years and 9 months.

TABLE NUMBER 14

STATISTICS OF THE SUMMER SESSION

	1922	1923
Total number of students	1,419	1419
Number of Institute students enrolled	1,139	1160
Number not previously connected with the Institute	280	259
Registrations to make up failures or deficiencies	791	867
Registrations to anticipate work	3,698	3648
Registrations at Summer Surveying Camp	92	84
Summer School students who did not register for the school year following	319	296

TABLE NUMBER 15

GRADUATES BY YEARS AND COURSES

Year	Civil Engineering	Mechanical Engineering	Mining Eng. and Metallurgy	Architecture	Chemistry	Electrical Engineering VI and VI-A	Natural History or Biology	Physics	General Course or General Science	General Eng.	Mathematics	Chemical Eng.	Chemical Eng. Practice X-B	Sanitary Eng.	Geology	Naval Arch.	Electrochemical Engineering	Engineering Adm.	Total	Total by Decades
1868	6	1	6	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	14	
1869	2	2	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	5	
1870	4	2	2	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	10	29
1871	8	2	5	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	17	
1872	3	1	5	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	12	
1873	12	2	3	1	7	—	—	—	1	—	—	—	—	—	—	—	—	—	26	
1874	10	4	1	1	—	—	—	—	2	—	—	—	—	—	—	—	—	—	18	
1875	10	7	6	1	1	—	—	1	2	—	—	—	—	—	—	—	—	—	28	
1876	12	8	8	1	5	—	2	3	4	—	—	—	—	—	—	—	—	—	43	
1877	12	6	8	4	2	—	—	—	—	—	—	—	—	—	—	—	—	—	32	
1878	8	2	2	3	3	—	—	—	1	—	—	—	—	—	—	—	—	—	19	
1879	6	8	3	1	3	—	1	1	—	—	—	—	—	—	—	—	—	—	23	
1880	3	—	3	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	8	226
1881	3	5	6	3	8	—	1	—	2	—	—	—	—	—	—	—	—	—	28	
1882	2	5	5	3	6	—	1	1	1	—	—	—	—	—	—	—	—	—	24	
1883	3	7	5	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	19	
1884	5	6	13	—	12	—	—	—	1	—	—	—	—	—	—	—	—	—	36	
1885	4	7	8	2	4	2	—	—	1	—	—	—	—	—	—	—	—	—	28	
1886	9	23	7	1	7	10	1	—	1	—	—	—	—	—	—	—	—	—	59	
1887	10	17	8	1	9	8	1	1	3	—	—	—	—	—	—	—	—	—	58	
1888	11	25	4	5	10	17	3	1	1	—	—	—	—	—	—	—	—	—	77	
1889	14	24	5	3	8	17	1	1	2	—	—	—	—	—	—	—	—	—	75	
1890	25	28	3	5	13	18	3	2	6	—	—	—	—	—	—	—	—	—	103	507
1891	18	26	4	6	11	23	3	3	1	—	—	7	—	—	1	—	—	—	103	
1892	22	26	4	13	7	36	6	1	7	—	—	4	—	6	1	—	—	—	133	
1893	25	30	5	2	8	41	2	—	6	—	—	8	—	—	2	—	—	—	129	
1894	21	31	4	14	11	33	1	3	5	—	—	12	—	3	—	—	—	—	138	
1895	25	30	3	15	14	33	—	2	4	—	—	11	—	4	—	5	—	—	144*	
1896	26	34	10	24	17	48	3	3	7	—	—	7	—	4	3	5	—	—	190*	
1897	25	40	7	16	20	33	2	3	7	—	—	12	—	4	1	9	—	—	179	
1898	32	41	7	29	25	33	3	4	6	—	—	9	—	3	—	7	—	—	199	
1899	30	37	9	22	22	32	2	2	1	—	—	10	—	1	—	8	—	—	173*	
1900	32	34	21	21	19	23	3	3	5	—	—	11	—	4	—	9	—	—	185	1,573
1901	37	39	18	21	17	25	1	1	6	—	—	14	—	4	1	16	—	—	200	
1902	24	46	14	18	14	35	5	3	3	—	—	9	—	7	—	14	—	—	192	
1903	26	37	27	15	13	39	1	3	1	—	—	10	—	4	1	12	1†	—	190	
1904	34	45	32	24	15	34	3	5	5	—	—	7	—	2	1	17	8	—	232	
1905	46	54	26	12	23	31	3	—	3	—	—	13	—	5	1	24	3	—	244	
1906	47	69	38	22	21	37	2	4	—	—	—	10	—	6	—	19	3	—	278	
1907	37	52	22	21	10	32	—	—	—	—	—	14	—	3	2	10	5	—	208	
1908	48	61	19	19	16	38	4	—	—	—	—	15	—	2	—	5	2	—	229	
1909	51	41	30	18	12	42	5	3	—	—	—	13	—	9	—	5	3	—	232	
1910	57	57	24	18	10	36	3	—	2	—	—	18	—	12	—	11	3	—	251	2,256
1911	46	49	17	10	12	49	1	1	2	—	—	19	—	15	—	6	5	—	231*	
1912	55	47	21	21	7	52	4	2	1	—	—	31	—	14	—	3	3	—	260*	
1913	58	50	20	26	12	43	2	1	—	—	—	30	—	15	—	4	8	—	269	
1914	60	65	17	19	9	51	6	1	4	—	—	37	—	19	—	8	8	—	301*	
1915	49	69	5	30	23	42	3	3	2	—	—	33	—	12	—	7	10	—	286*	
1916	45	84	5	37	11	56	5	3	2	—	—	32	—	18	—	9‡	14	—	318*	
1917	49	63	14	27	12	45	10	1	5	—	—	43	—	17	2	9‡	10	37	343*	
1918	45	75	10	28	10	50	7	3	4	2	—	40	—	5	1	4	11	29	322*	
1919	45	65	7	16	8	49	9	4	1	3	—	44	—	6	—	7	6	28	296*	
1920	52	55	13	19	6	30	2	2	4	1	—	62	—	2	—	12	9	48	317*	2,943
1921	98	127	24	11	9	75	3	1	—	15	—	91	—	3	3	18	15	70	562	
1922	63	55	27	31	11	109	8	8	1	24	—	96	15	7	8	16	25	125	729	
1923	54	87	20	28	15	67	6	8	1	18	3	56	19	2	7	12	16	107	525*	
Total	1,564	2,019	640	689	559	1,474	132	91	126	63	3	828	34	218	35	291	168	444	9,350	
Names counted twice, students graduating in two different years																			27	
Bachelors of Science																			9,323	
Masters of Science																			813	
Master in Architecture																			12	
Doctors of Philosophy, of Engineering, and of Science																			78	
Total																			10,226*	

*Deducting names counted twice (students graduating in two courses) or receiving an advanced degree in addition to an S.B.

†Prior to 1909 this Course was designated as Option 3 (Electrochemistry) of Course VIII.

‡Two received the degree in XIII-B in 1916 and three in 1917.

TABLE NUMBER 16

Doctor of Philosophy

Year	Biology	Chemistry	Geology	Physics	Physical Chemistry	Total
1907	—	—	—	—	3	3
1908	—	1	—	—	2	3
1909	—	—	—	—	—	—
1910	—	—	1	—	1	2
1911	1	—	—	—	—	1
1912	—	3	3	—	—	6
1913	—	1	—	—	—	1
1914	—	2	—	—	—	2
1915	—	2	—	—	—	2
1916	—	1	1	1	—	3
1917	—	3	1	—	—	4
1918	—	3	1	—	—	4
1919	—	—	—	1	—	1
1920	—	4	1	—	—	5
1921	1	3	—	3	—	7
1922	—	4	1	—	—	5
1923	—	5	1	—	—	6
Total	2	32	10	5	6	55

TABLE NUMBER 17

DOCTOR OF ENGINEERING (*Discontinued after 1918*)

Year	Aeronautical Engineering	Electrical Engineering	Electrochemical Engineering	Total
1910	—	1	—	1
1911	—	—	—	—
1912	—	—	—	—
1913	—	—	—	—
1914	—	1	—	1
1915	—	—	—	—
1916	—	1	—	1
1917	—	—	1	1
1918	—	—	—	—
Total	—	3	1	4

TABLE NUMBER 18

DOCTOR OF SCIENCE

Year	Aeronautical Engineering	Chemistry	Electrical Engineering	Geology	Metallurgy	Mining Engineering	Physics	Total
1911	—	—	1	—	—	—	—	1
1912	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—
1914	—	—	—	—	—	—	—	—
1915	—	—	1	—	—	—	—	1
1916	1	—	—	—	—	—	—	1
1917	—	—	1	—	—	—	—	1
1918	—	—	—	—	—	—	—	—
1919	—	—	—	—	—	—	—	—
1920	1	—	—	1	—	1	—	3
1921	—	—	—	—	—	—	—	—
1922	1	1	1	—	—	—	1	4
1923	1	—	—	1	1	—	1	4
Total	4	1	4	2	1	1	2	15

TABLE NUMBER 19

MASTER IN ARCHITECTURE

Year		Total
1921		3
1922		2
1923		7
Total		12

TABLE NUMBER 20

Master of Science

	Civil Engineering	Mechanical Engineering	Mining Engineering	Metallurgy	Architecture	Chemistry	Electrical Engineering Inc. VI-A	Biology and Pub. Health	Physics	General Science	Chemical Engineering	Chem. Eng. Practice	Sanitary Engineering	Geology	Naval Architecture	Naval Constr'n, U. S. N.	Naval Construction, Foreign Students	Electrochemical Eng.	Aeronautical Engineering	Mathematics	No Course	Total
1886	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1887	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1888	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1889	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1890	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
1891	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1892	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1893	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1894	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1895	—	—	—	—	1	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	3
1896	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
1897	—	—	—	—	2	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	4
1898	—	1	—	—	1	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—	—	5
1899	—	—	—	—	1	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	3
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1901	—	2	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
1902	—	2	—	—	3	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8
1903	—	1	—	—	5	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	7
1904	—	1	—	—	4	1	2	—	1	—	—	—	—	—	—	3	—	—	—	—	—	12
1905	—	—	—	—	9	—	—	—	—	—	—	—	1	—	—	8	—	—	—	—	—	18
1906	—	—	—	—	3	1	—	—	—	—	—	—	—	—	2	3	—	—	—	—	—	9
1907	—	—	—	—	6	—	—	—	—	—	1	—	—	—	—	8	—	—	—	—	—	15
1908	—	—	—	—	1	1	3	—	—	—	—	—	—	—	—	7	—	—	—	—	—	12
1909	2	1	2	—	6	1	1	—	1	—	1	—	—	1	—	3	—	—	—	—	—	19
1910	2	1	—	—	6	1	1	1	—	—	—	—	—	—	—	7	—	—	—	—	—	19
1911	2	2	—	—	5	2	4	2	—	—	—	—	—	—	—	3	—	—	—	—	—	20
1912	3	—	2	—	4	3	2	2	—	—	—	—	2	—	—	4	—	—	—	—	—	22
1913	1	2	1	—	4	—	1	1	—	—	7	—	—	1	—	2	—	—	—	—	—	20
1914	3	1	—	—	3	5	2	2	—	—	3	—	3	1	—	2	—	—	—	—	—	25
1915	1	4	1	—	4	2	10	—	—	—	2	—	—	—	1	2	—	1	1	—	—	29
1916	5	4	—	—	7	3	6	1	—	—	1	—	1	—	—	2	5	1	5	—	—	41
1917	3	1	1	—	3	1	5	—	1	—	1	—	2	—	—	9	—	—	4	—	—	31
1918	1	2	1	—	1	1	2	1	—	—	1	—	—	—	—	—	—	—	5	—	1	16
1919	4	1	—	—	—	3	4	—	—	—	—	—	—	—	—	—	—	1	2	1	—	16
1920	4	5	1	—	—	2	7	1	1	—	3	—	—	3	—	19	—	1	—	1	4	52
1921	2	10	—	—	1	6	4	—	—	—	29	—	—	2	—	20	—	—	3	—	17	94
1922	5	9	3	—	1	4	40	—	1	—	6	33	—	2	—	10	—	1	6	2	23	146
1923	5	10	—	1	—	1	42	—	3	—	3	33	—	2	4	21	—	—	9	—	21	155
Total	44	60	12	1	86	46	136	12	11	1	61	66	10	12	7	133	5	5	35	4	66	813

COMMITTEE ON ADVANCED DEGREES AND FELLOWSHIPS

With the present large number of students working for higher degrees the work devolving upon this committee has greatly increased, but with the coöperation of the departmental committees on graduate students entrusted with the oversight of each student's course of study and records, and the admirably organized and efficient work of the office of the secretary of the committee, the business has been expeditiously handled.

The procedure inaugurated the past year of having the record of every candidate for an advanced degree reviewed by this committee prior to presenting recommendations to the faculty, has greatly expedited the business of the latter body in recommending advanced degrees, it being the policy of the committee to recommend no student for a higher degree who has not completed with a perfectly clear record an approved course of study.

Upon the request of several alumni to whom the now discontinued Degree of Doctor of Engineering was previously awarded, to have this degree changed to the equivalent degree of Doctor of Science now conferred, the committee recommended to the Faculty that this change be allowed to those holders of the former degree who desired the change. The Faculty approved the recommendation, and at present four out of the total eight holders of the engineering degree have requested the change.

During the past year the total registration for the entire year in the graduate school was the largest in the history of the Institute in spite of the falling off in the total registration. The distribution of the three hundred and forty-nine students working toward higher degrees was as follows:

For the Degree of Doctor of Philosophy	42
For the Degree of Doctor of Science	24
For the Degree of Master of Science	275
For the Degree of Master in Architecture	8

Of these, one hundred and eighty-eight completed their course during the year, the degrees awarded being:

Doctor of Philosophy	6
Doctor of Science	5
Master of Science in specified departments	144
Master in Architecture	7
Master of Science without specification of department	26

The committee considered one hundred and twelve applications for graduate scholarship aid, over $31,000 being applied for. It was possible with the total available funds placed at the disposal of the committee, namely $12,250, to make only fifty-five awards. Additional funds for graduate scholarships are most urgently needed, particularly fellowships carrying specified sums from $500 to $1,000 to aid men working for the doctorate. Other institutions are offering very attractive financial inducements to obtain the best graduate students, while the Institute is able to offer, in general, no larger grants than free tuition.

Grants were made to ten junior members of the instructing staff from the appropriation of $6,000 placed at the disposal of the committee for the purpose of encouraging research by relieving the men from a certain amount of their teaching duties. Sixteen papers were published during the year, and thirteen others are reported to be in preparation for publication by the gentlemen thus aided. This method of encouraging research thus continues to be productive of excellent results, and should be continued.

Reprints of original papers published by the staff and submitted to the committee for binding, numbered sixty-nine, an increase of four over the previous year.

The *Journal of Mathematics and Physics* under the direction of Prof. C. L. E. Moore completed its second year. Three numbers were published during the year, containing ten articles. There appears to be no lack of excellent material offered for publication in this journal, and its circulation is increasing.

H. M. Goodwin, *Chairman.*

SOCIETY OF ARTS

The activity of the Society of Arts during the past year has been confined to giving the course of popular experimental science lectures inaugurated in 1917 by President Maclaurin for the school children of Boston and neighboring cities, and extended in 1921 to the general public. Mr. Walter Humphreys, under whose able direction the lectures were given during the past six years, having resigned as secretary of the Society of Arts in June, 1922, Prof. H. M. Goodwin was appointed Secretary, and authorized to arrange for a series of lectures in 1923 along the previously established lines. Four lectures were therefore offered in January, February, March and April on Friday and Saturday afternoons for school children, and on Sunday afternoons for the general public.

The excellent attendance of past years of school children at the Friday and Saturday afternoon lectures was well maintained, although the demand for seats was not quite as great as it has been some years. The interest of the public in the Sunday afternoon lectures, judged from the demand for tickets, was not as keen as it was the first year these lectures were offered; the attendance was good however, in general between two and three hundred persons being present. The appreciation expressed by many of those attending was gratifying. Suggestions have reached the secretary that Sunday lectures on Recent Developments in Science or similar topics, of a somewhat more advanced character than those given at present, would find an eager audience among those who have some scientific knowledge. On the other hand, others, to whom the present popular exposition appeals, urge that much greater publicity be given to the lectures in the daily papers in order that they may be brought to the attention of a wider public. Both suggestions involve considerable additional expense to the Institute but deserve consideration.

The course of lectures offered during the past year was as follows:

On January 19, 20 and 21 a lecture by Edward P. Warner, Professor of Aeronautical Engineering, on "Gliders and Other Aircraft." This lecture was illustrated by numerous experiments, by models, some of them full size, and by motion pictures of various types of air craft and gliders in flight. At the conclusion

of the lecture many of the audience availed themselves of the opportunity to visit the aeronautical laboratory or wind tunnel.

On February 16, 17 and 18, a lecture by Prof. William J. Drisko of the Department of Physics on "Illuminants and Illumination." This lecture was brilliantly illustrated by many beautiful experiments in optics, and attracted the largest Sunday audience of the season.

On March 16, 17 and 18, a lecture by Prof. H. Monmouth Smith of the Department of Chemistry on "Some Common Gases." The lecturer demonstrated in a very striking manner the principal properties of oxygen, hydrogen, nitrogen, air (including liquid air) and carbon dioxide. Like all lectures in chemistry, this was highly appreciated by girls as well as boys from the high schools and preparatory schools.

On April 13, 14 and 15, a lecture by Prof. Samuel C. Prescott, in charge of the Department of Biology and Public Health, on "Microbes in the Service of Man." Although from the nature of the subject, this lecture could be illustrated only by specimens, lantern slides and moving pictures instead of actual experiments, it proved to be one of the most interesting of the series. The success of this lecture indicated that other lectures in the future might well be included in the series on subjects which do not permit of elaborate experimental illustration.

H. M. Goodwin,
Secretary of the Society of Arts.

DEPARTMENT OF CIVIL AND SANITARY ENGINEERING

The efforts of the department during the last year have been concentrated upon the development and extension of work along lines already established — in some cases quite recently — rather than upon its extension into new fields. New courses have, however, been offered in the fields of hydraulic and structural engineering as noted elsewhere in this report.

The popularity which the recently established option in hydro-electric engineering has attained is worthy of note, the number of students registered for this option in the class of 1924 exceeding that in the two other and older options combined. This change has apparently been due to the transfer of students who, except for the establishment of this option, would have taken the hydraulic or general option in which special attention is given to water supply and sewerage problems. This transfer of students has been fortunate, in a way, in view of the fact that since Professor Porter's resignation, two years ago, the work in sanitary engineering, public water supplies, and allied subjects has been given by lecturers instead of by a permanent member of the staff, a condition which it is hoped will not continue.

The department has continued during the year to give considerable attention to graduate courses, as it is believed that such courses, involving as an accompaniment mathematical and sometimes experimental research, are of great importance not only to the students taking them but also, because of their stimulating influence, to the instructing staff and thereby to the entire undergraduate body. At the present time well developed graduate courses are offered in structural engineering and in water power engineering, but in the transportation option lack of staff has made it difficult to give graduate work. It is hoped that the resources of the Institute will, at an early date, permit the broadening of the work in this direction also by the addition to the staff of someone to give advanced work in highway engineering, a subject of vital importance to the country, and in the development of which the Institute should take a prominent part.

Another extension in the transportation option which has been previously recommended for adoption is the addition of a graduate course in river and harbor engineering. So far as the

writer is aware, no such course has ever been offered in the United States and the increasing importance of the subject makes it seem a desirable field for us to develop. Such a course would include such matters as the design of piers, wharves, dry docks, warehouses and similar waterfront structures, a study of the equipment necessary for handling freight to and from ships and into storage, the layout of railroad supporting yards and connections, and the improvement of harbors and rivers. As a part of such a course, a stream flow laboratory should be established. Such laboratories have been in use for years in certain of the German technical schools where the problems of river control have been intensively studied, but none has as yet been established in this country. To give such a course would require the addition of one man to the staff and, at the outset, while the course is being developed, lectures by various experts on special phases of the subject.

A certain amount of research of value has been carried on during the year under the direction of the staff, two subjects of particular importance being an experimental determination of the flow of water through a circular spillway, and the determination of the contour of water flowing over a masonry dam. Both of these are subjects about which little is known and it is believed that the work done here will furnish valuable data for the use of hydraulic engineers.

A slight change in the curriculum of the undergraduate civil engineering course was made during the year by the withdrawal of the course in stereotomy which has been given almost continuously since 1872, but which, through the general replacement of stone by concrete in engineering construction, has become of less and less importance, and by the substitution of a course in graphic statics. Two new graduate courses have also been offered for the first time this year; one by Professor Russell in theoretical hydraulics and one by Professor Bowman in the theory of structures.

Resignations at the end of the year include that of Lawrence G. Ropes, Instructor in Structural Engineering, who served during the past year and now returns to professional practice. The entire corps of assistants also resigned in June in order to enter professional work. In this connection it may be added that it is not the

policy of the department to keep assistants chosen from recent graduates longer than two years unless they have had engineering experience of more or less importance before appointment, and to appoint to the permanent staff only those who have had a sufficient amount of professional practice to enable them to present their particular subjects with the authority which comes from experience. In the more recent appointments of assistant professors, we have been fortunate in securing men who not only conform to the above requirement but who also have had undergraduate training in other schools and graduate work at the Institute.

Additions at the Summer Surveying Camp not previously mentioned in the reports of the department include the construction of permanent buildings to take the place of tents. Three of these, housing twelve students each, were built and equipped during the last session of the camp, and at the time of writing, four more are under construction. In addition, through the kindness of Mr. Charles W. Eaton, who has in the past been a generous benefactor of the Camp, a building is being erected for housing the instructing staff, which will add materially to its comfort. The effect of the establishment of the new camp for mining engineers at Dover, New Jersey, which goes into operation this summer, will be to decrease the attendance at the Surveying Camp in East Machias, thereby increasing somewhat the cost per student at this camp, owing to the increase per student in overhead costs.

Individual members of the staff have, during the year, been engaged to a reasonable extent in outside activities requiring engineering services. These have included such matters as valuation, expert testimony upon railroad problems, and the design and engineering supervision during construction of public water supplies, sewerage systems, water power works, bridges and other structures of steel and concrete, ocean piers, terminals and harbor improvements. In addition, members of the staff have participated in the activities of national and local engineering societies, and one member of the staff, J. B. Babcock, 3d, has acted as Executive Secretary of the recently formed Affiliation of Engineering Societies of Boston and vicinity, which duties include those of Secretary of the Boston Society of Civil Engineers, Professor Babcock having

been the first man to fill this important position. It is believed that such activities by the members of the department are of importance in keeping the staff fully abreast of the developments taking place in professional practice and in enabling them to teach with authority the subjects in which they are interested.

Applications for recent graduates during the last year have been unusually numerous. This demand is easily accounted for by the unprecedented amount of highway building now being done; by the numerous water power and electric power development projects now under way; and by the considerable activity in general building construction. As usual, the supply of sanitary engineers has also been inadequate to fill the demand for men with such training.

The United States Army Engineer Corps again sent this year a group of Engineer officers to the Institute for civil engineering training, consisting of six men from the classes of 1915 to 1917, inclusive. Two of these men stood at the head of their respective classes at West Point, and the others held grades from three to seven, inclusive. All of these officers have had active service and four have served on the instructing staff at West Point. A total of fifty-one officers in the Engineer Corps, all chosen from men of highest standing in their respective classes at West Point, have received degrees in civil engineering from the Institute during the last three years.

The thanks of the department are due to the proprietors of locks and canals at Lowell for permission to occupy their stream gaging station; to the Holyoke Water Power Company and the New England Power Company for courtesies extended in connection with the course in water power engineering; to Mr. George L. Mirick for a collection of photographs of foreign bridges which were presented by him to the department; to Mr. W. E. Parker, Chief of the Division of Hydrography, United States Coast and Geodetic Survey, for a set of framed photographs of Superintendents of the United States Coast and Geodetic Survey, and to Mr. Eaton for his previously mentioned gift to the Surveying Camp. Additional courtesies have been received in connection with the course in highway engineering.

CHARLES M. SPOFFORD.

DEPARTMENT OF MECHANICAL ENGINEERING

Students in the senior class in Mechanical Engineering had this year the choice of one of four options in addition to the so-called General Course.

The enrollment of Course II seniors in these options was as follows:

Automotive Engineering	40
Engine Design	10
Textile Engineering	10
Ordnance Reserve Officers' Training Corps Unit	13
General Course	58

In addition to the above the men from other departments who took these courses increased the enrollment. In Automotive Engineering fifteen men from other departments were registered

It was evident that many of the seniors felt that the general. course was the one which gave them the broadest training.

Many of the men who finally decided on one of the options were convinced, after interviewing members of the staff, that the options were to treat on important points and not on minor details and that the line of work a man might choose after graduation would not necessarily be determined by the option he might select.

The development of a more complete course in Automotive Engineering, with opportunity for extended research in this line, was discussed by an advisory board of eminent engineers, Dr. D. S. Jacobus, Mr. C. P. Wetherbee, Dr. H. C. Dickinson, Mr. K. Moller, Mr. David Van Alstyne, Commander J. C. Hunsaker and Mr. I. E. Moultrop who were invited by the President to sit with the Department Committee of the Corporation and with the Faculty members of the Course in Mechanical Engineering.

As a result of this conference it seemed that the place where more specific training than that now given in the option properly belonged was in a fifth or possibly in a fifth and sixth year, that to carry out advanced work along these lines, additional space would be needed and that at least two specialists would have to be added to the staff.

During the past year a fireproof building 150 feet by 35 feet has been erected on the north side of Vassar Street near the

Boston and Albany Railroad tracks. This building is to contain high pressure air compressors and ammonia machines which are now being moved over from the main group. The ammonia equipment will consist of a six-ton Carbondale absorption machine and a one-ton Brunswick which we secured from one of the vessels of the United States Shipping Board, and a small ammonia compression machine. The building will contain also two compressors capable of delivering air at 3,000 pounds pressure per square inch. Two bays of this building, making a room approximately 30 x 35 feet have been set apart for the special use of naval officers who are detailed here by the United States Navy for research on torpedoes. A steam-driven compressor located in this room furnishes air for charging at 3,000 pounds pressure. As the research work carried on in this space is somewhat dangerous in character, this room has been separated from the rest of the laboratory by a reinforced concrete wall.

A number of the theses submitted this year were of exceptional merit and it is probable that abstracts of some of these will be published by the American Society of Mechanical Engineers.

Although the total enrollment in the Institute has been somewhat less this year than that of the year previous, the number of students receiving instruction in subjects taught by the staff of the department was about the same as in the year 1921–1922.

The department has been asked to give about five hundred hours of instruction in connection with a course in Aeronautical Engineering to be given to naval officers who have been ordered to Technology for this work. The department is now arranging for the installation of airplane engines sent here by the Navy for the special use of these officers. The department has just purchased a Sprague electric dynamometer of a capacity of 500 h.p. to be used in measuring the power of any one of these engines when under full load. Two Sprague dynamometers of smaller power have also been added to the equipment.

Two interferometers, capable of detecting variations of one millionth of an inch, have been added to the equipment of the Machine Tool Laboratory. An electric arc welding machine has also been added to the equipment of the Machine Tool Laboratory. The welding equipment which we now have consists of an electric arc, a butt and a spot welding.

The department was fortunate in securing from the Crosby Steam Gage Company a number of new steam engine indicators which were needed to replace old equipment.

Asst. Prof. Walter H. James has been made an Associate Professor and Asst. Prof. Dean Fales, who was appointed on a half-time basis, has been placed on full time. Messrs. Cheney, Forbes, Hedberg, Hysom and Hardy have been made instructors.

The gifts made to the department during the year amount to over $5,000 in value and are listed as follows:

Automatic Psychrostat Control for Moistening System.— Parks Cramer Co.
Crank Shaper.— Hendey Machine Co.
Tools and Instruments. — The L. S. Starrett Co.
Screw Plates. — Butterfield & Co., Inc.
Hand Tachometer. — The Schaeffer & Budenberg Manufacturing Co.
"Autor" Lift Truck. — S. M. Ryder & Son.
Reamers. — Cronin-Waddell Co.
Electric Furnace. — The Dyer Co.
Endless Steel Belts. — The Power Engineering Co.
Bolt Clippers. — H. K. Porter.
Ammunite Discs. — American Glue Co.
Wheel Fork for Truck. — Lewis-Shepard Co.
Oak Cutting Oil. — The Alden Speare's Sons Co.
Graphite Paint. — Joseph Dixon Crucible Co.
Pin Reamers. — F. O. Wells.
Exchange of Crowfoot Puller for a New Model. — Crane Puller Co.
Exchange of Pressure Lubricator Guns and Equipment for new Models. — Car Fastener Co.

EDWARD F. MILLER.

DEPARTMENT OF MINING, METALLURGY AND GEOLOGY

The department with its three branches consisting of the Mining, Metallurgical, and Geological courses has had a successful year with an increasing number of students, and has a bright outlook for the future.

Prof. H. O. Hofman retired in October, 1922, thus closing a long period of active service at the Institute during which he has contributed greatly to the high standing of the Department in the art of metallurgy. Not only has Professor Hofman served as teacher at the Institute for thirty-six years, but he has found time to prepare and publish with infinite care a number of textbooks on metallurgy, which are considered as classics in their line. Professor Hofman was retired with the title of Professor Emeritus.

Prof. Charles H. Warren resigned in June, 1922, as was mentioned in the last report, to accept the position of Dean of the Sheffield Scientific School at Yale. The eminence of Professor Warren in his field, and his great ability as an administrator, make his loss severely felt in the Department.

Prof. G. B. Waterhouse, formerly of the Lackawanna Steel Company, appointed as Professor of Metallurgy, entered upon his duties on October 1, 1922.

Prof. W. Spencer Hutchinson, appointed Professor of Mining, entered upon his duties on January 1, 1923.

These two men have charge, respectively, of the Metallurgical and Mining options.

Mr. J. L. Gillson was appointed Instructor in Mineralogy and Petrology, and has given the courses formerly offered by Professor Warren.

Several lectures have been given in the department by men of note in Mining, Metallurgy and Geology. Foremost among these should be mentioned Prof. Emile de Margerie, who as exchange professor delivered twelve hours of lectures in the Geological Section on the geology of France and adjacent countries.

Dr. Walter Rosenhain gave three very well attended and successful lectures on the structure and properties of metals and alloys.

The Secretary of the Committee of Milling Processes of the American Institute of Mining and Metallurgical Engineers, Prof. E. A. Hersam, has been permitted to make his headquarters in this department, and his presence and activity have been beneficial to the department.

The extensive changes in the Mining and Metallurgical courses outlined last year were put into effect with necessary minor adjustments. The students are now given opportunity to choose between non-ferrous and ferrous metallurgy. In the Mining Option the original plan proposed to concentrate the instruction in mining in the fourth year. It was found necessary to change this and distribute the lectures over the third and fourth year.

During the year thirty-seven men were graduated with the degree of Bachelor of Science from the department. Of these

twenty-one obtained the degree in Mining Engineering, eight in Metallurgy, and eight in Geology.

Two men received the degree of Master of Science in Geology; two received the degree of Doctor of Science, one in Metallurgy, the other in Geology; and one man received the degree of Doctor of Philosophy in Geology.

The following table shows the distribution of students for 1922–1923:

DISTRIBUTION OF STUDENTS 1922–1923

	III_1	III_2	III_3	XII	
Second Year	10	8	—	4	
Third Year	21	10	—	2	
Fourth Year	21	7	1	8	
Graduate Candidate S.M.	—	3	—	2	
Graduate Candidate Ph.D.	—	—	—	1	
Graduate Candidate Sc.D.	—	1	—	2	
Graduate Special	—	—	—	4	
	52	29	1	23	= 105

In discussing the above table, it should be stated that Option 3 has been discontinued. The number of students compared with last year shows a decrease, which no doubt is caused by the difficult years through which the mining industry has had to pass. Such a decrease is common to practically all of the mining schools at the present time, and is merely a temporary fluxation, and a general increase is confidently expected for the future.

No difficulty was experienced in securing places for the men who graduated in this department in the spring of 1923. Most of the men were placed in technical positions without much delay.

Additions to the equipment in the sections of Mining and Metallurgy included a Davis Magnetic Log Washer for the Ore Dressing Laboratory contributed by Mr. Charles Hayden, and a supply of standard zinc muffles for the Metallurgical Laboratory from the New Jersey Zinc Company.

Continual and large additions have been made to the collections, but it is not possible to enumerate them in detail. Dr. C. J. Muller presented a large collection of lithological specimens and fossils from type localities in New York and Oklahoma; Mr. P. C. Benedict contributed fossils from Colorado; a collection of upper Devonian fossils from Iowa was acquired by purchase. A considerable number of mineralogical specimens were obtained by exchange from the Department of Geology at Harvard University.

The plans were worked out for establishing a separate Summer School for ordinary and mine surveying at some place which would offer opportunities for study in mining, metallurgy and geology. The sum of $15,000 was allotted by the Corporation, to be used for the construction of a permanent camp at the Replogle Mine, Dover, New Jersey. The total estimated cost is $35,000. Temporary arrangements will be made for certain of the buildings during the present year.

The site, which has been generously leased to the Institute by the Replogle Steel Company, is extremely well suited for the purpose as mines and smelters equipped with modern machinery are in the immediate vicinity. The district is, also, located in a region of exceptional geological interest.

The first Summer School at the camp will be held in August. and September, 1923. Besides the instruction in Surveying excursions will be undertaken, as opportunity offers, to neighboring properties and localities interesting for geological exposures.

A School of Mining Practice is planned for coming years as well as courses of practical instruction in geological mapping. It is hoped to make this new summer camp most serviceable, and, in fact, indispensable to the three sections of the Department. The Department owes much to Prof. W. Spencer Hutchinson, who has been indefatigable in promoting the plan.

The accessions to the Mining Library number 158, and the circulation was 1,583; the accessions to the Geological Library number 52, and the circulation was 1,035.

During the year Professor Lindgren made three short visits to Butte, Montana, and to Eureka, Nevada.

Professor Locke made professional trips in connection with non-metallic deposits in New England, and has conducted concentration tests on ores. He is also engaged, with Professor Richards, in a revision and condensation of the textbook of Ore Dressing.

Professor C. R. Hayward is engaged in a revision of Hofman's volume on the metallurgy of copper. He also conducted a research on the effect of fluorspars on slags.

W. LINDGREN.

DEPARTMENT OF ARCHITECTURE

Each year brings the Department of Architecture nearer to the fulfillment of some of its most cherished hopes. Of these the past year saw the completion of the first stage under the new curriculum. Its advantages have been recognized by the profession as well as the department; the presence of the freshmen beside the upper classmen, the appearance of Architectural History and Theory of Architecture in the first-year schedule, have all contributed to give the beginner a better understanding of the essentials of his profession at the very threshold of his college career.

Hand in hand with this attention to the early stages of the Course has gone the development of the fifth or graduate year. Eight students followed this advanced work with profit and enthusiasm. In order to still further extend the benefit of our teaching to ambitious and promising students, three cash prizes of one hundred and twenty-five dollars or more each were offered by the Boston Society of Architects and the department for the best projet submitted in a selected problem in each one of the three terms, these prizes being especially opened to former students of Technology, Harvard, and the Boston Architectural Club who had completed their work within the past five years; the only condition being that the work presented by these former students should be performed at the school where they had previously studied. Technology students were awarded two of these three prizes.

The coöperation between Harvard, Technology, and the Club was more thoroughly organized and more effective in its results than ever before, and the advantage of comparing work on the same programs carried out under different instructors is both stimulating and instructive.

The Option in Architectural Engineering has been considerably modified during the past year. The most important change, one which has really been under consideration in a general way for two or three years, has now been brought about through the modification of the course in second-year Design and in the increased requirements for admission to the subject. The character of second-year Design is now decidedly less suited to the needs of the student in Architectural Engineering than was formerly

the case, and the increased time required for its preparatory courses cannot be spared from the freshman year of the Engineering students. Consequently the Faculty has approved a new course, to be known as the Theory of Planning, which will be substituted for the work in Architectural Design. The new course will extend through the third year, will teach the principles of good planning in connection with single buildings and groups of buildings, and aim to give the students a conception of the difference between good and bad architecture through lectures and discussion of the classroom work, but will not attempt to teach formal presentation and academic rendering.

Another greatly needed improvement which will take effect next year is the increase in time devoted to Concrete Design, a subject in which the instruction has been altogether too meagre in relation to its importance

A short course in Photo-Elasticity has been added in order to acquaint the students with the possibilities in the study of stress distribution by these methods.

A course in Estimating will give an insight into the methods of determining unit prices, taking off quantities, and arriving at estimates of probable costs.

Last year's graduating class (16) was the largest in the history of the Option.

The number of students electing the Option will naturally never be very great as the young man whose main interests lie along engineering lines and who at the same time is interested in the required courses in Design, in History of Art and Architecture, is the exception rather than the rule.

The department has appreciated the interest shown by the President in increasing the personnel of its Visiting Committee, and hopes that similar official recognition will be taken of the value of the Special Student Scholarships that the department offered last year for the third time. These have drawn to the department draughtsmen of long and varied practical experience who have so valued their first year's work that they have all managed to return for an additional year. No other scholarships are at this time available in the Institute for this class of our students.

A further step toward making the classification of our new

students more effective is being taken this year by determining the Design grade of each student on the basis of the first projet turned in.

The summer months are being put to increasing use through the emphasis placed on summer sketching and the required summer course in Office Practice. The latter, under Messrs. Jenney and Norton, has resulted in giving a definite and practical understanding of office procedure.

The following gifts have been made to the department during the year: Decorative studies in water-color and pastel by Janin, a Walcot water-color, and about one hundred photographs from "A Friend"; a copy of "Edifices Anciens and Moderns" by Durand from Mr. Francis H. Bacon, '76; a loan for an indefinite period of fourteen water-colors from the Boston Museum of Fine Arts.

The prize winners of the year are as follows:

The Traveling Fellowship in Architecture, J. F. G. Gunther.
The Rotch Prize, regular student, A. C. Schweizer.
The Rotch Prize, special student, L. H. Skidmore.
Boston Society of Architects' Prizes, W. V. Cash and J. W. Ogg.
The D. Despradelle Prize, E. J. Shields, '19.
The William R. Ware Prize, Mr. Hull, Harvard.
The F. W. Chandler Prizes, Miss I. B. Adelberg, A. C. Schweizer, Y. Y. Wong.
The H. W. Chamberlain Prize, I. M. Georgevitch.
"Class of 1904" Prizes, S. E. Davidson and J. H. Raftery.
Triglyph Fraternity Prizes, W. Muschenheim and Y. Y. Wong.
Scarab Fraternity Prize, H. Perrin.
Summer Sketching Prizes, G. R. Wiren and H. Perrin.
Freehand Drawing Prize, R. E. Winslow.
Special Prize in Course IV, J. H. Raftery.
Department Medals, J. A. Frank and W. R. Amon.

The report from Prof. William H. Lawrence in charge of the Division of Drawing follows.

WILLIAM EMERSON.

DIVISION OF DRAWING

While the Division of Drawing is not caring for the maximum number of students which it could instruct under ideal conditions, yet the arrangement of hours imposed by the present complex and inflexible tabular view necessarily makes the load distribution uneven, and on certain days during the week, especially in the first term of the past year, the division has worked at practically capacity load. Notwithstanding this we were able to continue

the exchange of instructors with the Mechanical Engineering Department, which was started three years ago, and which has proved a source of inspiration to our instructors, and provided a closer touch with the professional work for which the division of Drawing aims to prepare the first-year students. In addition to our relations with the Mechanical Engineering Department one of our staff assisted in the instruction of two Architectural courses, thus making a certain contact with the professional work in Architecture.

Associations of this sort are most helpful and do much to prevent stagnation in a group of men who would otherwise, in the main, be confined to teaching the first-year students the science of Descriptive Geometry, a science considered of fundamental importance in the training of the technical student, and one which in its full development offers ample and fascinating opportunity for imagination and study, but which, when its instruction is confined to the elementary course which can be included in the time allowed by the Faculty, eventually becomes a dry and uninspiring routine.

The hope has been held that the practice of exchange could be further developed until each member of the drawing staff might have some slight personal contact with the instruction in one of the professional departments, if not every year at least once every two or three years. It is a source of disappointment therefore to find that for the coming year this principle of exchange must be abandoned on account of the reduction by one member in the size of the Drawing staff.

In accordance with a request made last year by the Department of Architecture it has been arranged to give instruction in Drawing and Descriptive Geometry at the Rogers Building to accommodate the students of Course IV, Option 1.

The course in Elementary Architectural Drawing which has been in charge of the Division of Drawing up to the close of last year is now, through recent action of the Faculty, called Design, and has been changed in character and made so dependent upon certain professional work that it can be adequately handled only in the professional department. The Division of Drawing has therefore turned this course over to the charge of the Architectural Department. The work in Architectural Freehand Drawing

was relinquished in favor of the Department of Architecture last year so that no instruction except in Descriptive Geometry is now given by the Division of Drawing to the students of Course IV, Option 1. The courses in Drawing and Descriptive Geometry given to all other students of the first year including Course IV, Option 2, are now uniform. It is to be regretted that no time is allowed by the courses, other than General Architecture, for practice in freehand sketching. The only opportunity at present to give the student any experience in making freehand sketches is in connection with a few problems in Elementary Machine Drawing, and this is too meagre to give any real facility.

The propriety of the name Division of Drawing might logically be questioned as applied to a department where over fifty per cent of the time is devoted to instruction in the science of Descriptive Geometry where drawing is only used as a means of expression and graphical solution, and where the name of Drawing is no more applicable than it would be to a course in Applied Mechanics studied by graphical methods. It would seem that "Division of Drawing and Descriptive Geometry" would much more nearly express the truth.

W. H. LAWRENCE.

DEPARTMENT OF CHEMISTRY

The department suffered a great loss this year due to the resignation on June 20, 1922, of Prof. Henry Paul Talbot. Professor Talbot, after carrying the added duties of Acting Dean for the previous academic year, was appointed Dean in the spring of 1922. The loyal, devoted and constructive service which Professor Talbot gave to the department since his appointment as its head in 1901 has been of incomparable value, leaving a lasting imprint not alone upon the department and its traditions, but also upon the large body of students in chemistry who have passed through the department. The members of the staff deeply regret the loss to the department at the same time recognizing the larger service that will be rendered the Institute that Professor Talbot has served so devotedly.

The general introductory course in chemistry was given to over seven hundred students of the freshman class. In the

report for 1922 attention was called to the lack of space for giving efficient laboratory instruction to this large number of students. During this year, for example, five hundred and sixty desks have had to suffice for approximately seven hundred students. The pedagogical undesirability of this situation is evident, and if there is any considerable increase in the registration it is doubtful if the "doubling up" procedure with the laboratory desks will continue to be feasible. Thus the number of students that can be supervised in the laboratory is not greater than twenty-five and further "doubling up" will require an increased number of sections which is, however, precluded because of the finite number of working periods per week. At the present time, there are days when successive sections occupy the laboratories from nine to five without intermission and only a few periods remain for more sections on the other days of the week. The escape from the dilemma would seem to be found only in providing more laboratory desk space.

The facilities available for qualitative analysis, elementary and advanced quantitative analysis as well as the special courses in the analysis of the rarer elements and electro analysis are sufficient. Certain changes in the arrangement of the offices and special laboratories will make research on the part of the students as well as the members of the staff of the Analytical Division more readily possible. There is an instructional problem due to the uneven distribution of students in the laboratories during the working hours. Analytical chemistry is, however, a required subject in a number of professional courses, and no very obvious escape from the difficulty suggests itself. The waste of instructor's time would be much lessened if the time assigned to analytical chemistry could be made uniform in the various professional courses as has already been done in the case of second-year physics.

Through the coöperation of the Department of Mechanical Engineering, instruction in metallography has been greatly facilitated by the addition of two rooms during the past year, and laboratory facilities appear generally adequate for the immediate future. A highly desirable improvement, however, would be a small room which could be exclusively used for grinding specimens. The work is now carried on in the polishing room causing much loss of time and annoyance due to the carrying of abrasive particles from the rough grinders to the polishing wheels. With the develop-

ment of metallographic research, space will be required where graduate students may carry on investigations without interruption incident to working in the presence of a large undergraduate group pursuing the instructional courses.

In addition to the regular instructional work in organic chemistry, Professor Davis has given special courses to Ordnance Officers which have been much valued by the Government. In addition, some graduate courses relating to explosives have been developed. Professor Davis has also continued his researches for the Ordnance Department and the Government has renewed its plans for investigations to be continued during the next year by Professor Davis and his assistants.

The number of graduate students in the department has grown rapidly, there being fifty-three registered for advanced degrees during the past year. The greater number of graduate students are specializing in organic chemistry and the added space made available last year has been fully occupied. A continued increase in the number of students applying for graduate work is expected, and, in fact, twenty-one applications were made toward the close of the academic year.

The graduate work in organic chemistry has grown so rapidly that it has been somewhat of a problem to provide adequate and necessary facilities. A conference room has for some time been most urgently needed and a small lecture room will be arranged to serve the purpose during the coming year.

The clerical work incident to keeping the records relating to the large number of graduate students has been most difficult to provide with the limited secretarial assistance available in the department. Moreover, an increasing number of papers are being prepared based on the organic investigations, while many of the researches of the past three years require typing for publication. Request has already been made for the permission to add an additional stenographer to assist Professor Norris who is in charge not only of the graduate work in organic chemistry, but who also serves as chairman of the graduate student committee in charge of all graduate students in the department.

Prof. Henry Fay, after a year's leave of absence, returns to the department on active duty. Prof. Frederick R. Kneeland, who has faithfully and loyally served in the department since

1902, resigned. Professor Kneeland's resignation is accepted with much regret. Professor Gill received in June from the Rhode Island State College the degree of Doctor of Science, *honoris causa*.

The du Pont Fellowship was renewed for the present year, and has been held by Mr. F. B. Stewart. Miss Helen Gill has been appointed as Research Assistant for the coming year under a grant from the Ellen H. Richards Research Fund. She will work under the direction of Prof. H. M. Smith.

The Grasselli Chemical Company has authorized a fellowship in chemistry to yield annually seven hundred fifty dollars and a scholarship to yield annually five hundred dollars. It is understood that the Grasselli Company will bear the expense of this fellowship and scholarship for a term of years.

There have been received as gifts by the department the following:

Sample of grey tin from the American Sheet and Tin Plate Company through Mr. R. E. Zimmerman.

Two specimens of Stellite from the Haynes Company.

A Vitrosil concentrating dish used in the manufacture of sulphuric acid from The Thermal Syndicate, Ltd.

Specimens of Willemite and Carnatite ores and zinc sulfide used in radium luminous paints, and a spintharoscope from the Radium Chemical Company.

A melting pot used in the manufacture of crucible steel from Mr. E. L. French of the Crucible Steel Company.

Thirty specimens illustrating the crucible steel industry from Dr. J. A. Mathews of the Crucible Steel Company.

Ten specimens illustrating the rubber industry from Mr. W. E. Glancy of the Hood Rubber Company.

Specimens of coke production and tar distillation from the Bethlehem Steel Company.

FREDERICK G. KEYES.

RESEARCH LABORATORY OF PHYSICAL CHEMISTRY

The number of graduate students applying for advanced work in Physical Chemistry has increased to the point where serious crowding, due to lack of space, is beginning to interfere with good work. Temporary relief will be provided by the equip-

ping of a research room, formerly used by the organic division of the department.

The Torpedo research for the United States Navy has progressed much better than had been hoped for at the beginning of the year. While it is not permissible to divulge the nature of the work, it may be stated that a large number of dangerous and difficult experiments have been persisted with, leading to results of signal importance to the Government.

The investigations for the Bureau of Mines have progressed favorably and while, due to the governmental economies, the Bureau will be unable to continue its generous allotment of funds, it is hoped to carry the investigation to completion. The most difficult part of this work involves calorimetry at the temperature of liquid air, and Doctor Townshend and Mr. Young, who have been engaged in this work, will, it is hoped, finish a considerable portion of it before Doctor Townshend leaves to take up new duties at Yale University.

Doctor Bates, during his leave of absence from the California Institute of Technology, has been pursuing with signal success the study of the intensity of X-Ray reflection from crystals. Doctor Bates' presence in the laboratory, because of his high scientific ideals and persistent effort, has been an inspiration for the graduate students.

Among other exacting pieces of investigation, it is satisfying to report the successfully continued investigation of the hydrogen-calomel cell to something over one thousand atomspheres. The results are about ready for publication and plans are under discussion relative to redesigned apparatus permitting the study to be extended to pressures of five and six thousand atmospheres.

Doctor Beattie, who spent the year as National Research Fellow in Professor Onnes' laboratory in Leiden has resigned the fellowship to become Assistant Professor of Physico-Chemical Research at this Institute. Doctor Beattie has completed, with special apparatus constructed in the shop of the Research Laboratory of Physical Chemistry, a very fundamental investigation of the indications of the hydrogen and helium gas thermometers from the melting point of ice to the boiling point of hydrogen. The results of the work will appear in a scientific communication from the Physical Laboratory of the University of Leiden.

Doctor Beattie, through the courtesy of Professor Onnes, will return with drawings and full information regarding the production of liquid hydrogen and liquid helium, as carried on at Leiden. The liquid air compressor and equipment will be moved to the new building provided for high pressure apparatus, and all low temperature investigations will henceforth be carried out in this building.

During the year a pamphlet descriptive of the activities and facilities of the laboratory was compiled by Professor MacInnes. Copies of the pamphlet have been sent to the leading universities in the United States and abroad. It is believed that the pamphlet will be of much assistance to those advising graduate students in other colleges and universities.

The Research Committee of the American Society of Mechanical Engineers has allotted generous funds for carrying forward an investigation of the properties of steam. The program of the committee envisages the entire redetermination of the properties of steam to temperatures exceeding the critical temperature. The United States Bureau of Standards is to undertake the calorimetric investigations, and the Harvard Engineering Department the throttling experiments, while the Research Laboratory of Physical Chemistry will measure the specific volumes of the liquid phase together with the pressure-temperature relation and the pressure-volume-temperature relation for the superheat. The investigations have been arranged to provide a triple check of the thermodynamic properties of steam and the material will provide the basis for authoritative tables sufficient for all time. Doctors L. B. Smith and R. S. Taylor, Research Associates of the Laboratory, are engaged with the portion of the work being carried out in the laboratory.

FREDERICK G. KEYES.

DEPARTMENT OF ELECTRICAL ENGINEERING

The calls for well trained young men for industrial positions and teaching posts elsewhere have resulted in an unusual number of resignations amongst our instructors and assistants. This results in more than the usual number of untried appointees in

our younger staff for next year, and a correspondingly heavier responsibility will rest on the older staff to insure success in carrying forward the work of the department.

One of our research assistants has been appointed to one of the newly established and distinguished Coffin Research Fellowships.

Two promotions in the faculty rank have been made. Assoc. Prof. V. Bush, notable for his lectures on and experimental investigations of power transmission phenomena, and direction of graduate work in the department, has been promoted to the rank of Professor. Assoc. Prof. W. H. Timbie, internationally known as a writer of text-books on electrical engineering subjects, and in active charge of our coöperative relations with industrial and public utility companies, also has been promoted to the rank of Professor.

As a consequence of war conditions the proportion of our staff holding faculty rank fell behind the pre-war standard and this fault has not yet been rectified. The consequence is that certain promotions from instructors' rank to faculty rank are earnestly needed. This situation was commented on this year by the visiting committee of the department, associated with the recommendation that the younger men be encouraged by promotion as rapidly as their abilities and the demand for their services allow. Unless the fault can be rectified, it will seriously curtail the development of our graduate work which has become a notable part of electrical engineering education.

The number of students claiming admission to our electrical engineering studies has continued to increase, and the electrical engineering course is the first large course of the Institute to recover the pre-war condition in which the number of students in each class is successively larger from fourth year to first year. Moreover the electrical communication option will be well under way during the next year, and an addition to the facilities of the Coöperative Course has been secured through the association of Stone & Webster, Inc.

Through the coöperation with the works of the General Electric Company, the systems of the Edison Electric Illuminating Company of Boston and the Boston Elevated Railway Company, and the engineering, contracting and management offices and

plants of Stone & Webster, the students following our coöperative course secure a sound experience in manufacturing, construction, or the public utility field along with their rigorous scientific training in the fundamentals of electrical engineering. The coöperative plan has worked well, and fully sustains the anticipations for the project as laid out.

The researches of the department continue to yield serviceable results besides contributing vitally to the training of our large number of graduate students and seniors. The research division has been loaded unusually heavily during the year, as we have had eighty graduate students registered. This has required much attention from the professors most directly concerned in graduate instruction and research, and has thereby curtailed for the year the number of publications issued by the staff. This is another result of the inadequate proportion of men of faculty rank in the staff, already referred to.

An addition to our notable artificial power transmission lines was completed during the year, in a three-phase structure representing a line four hundred miles long, with distributed constants; and experimental investigations are being carried on with it. An artificial power cable, as distinguished from aerial open-wire lines, has been designed, and some work has been done toward producing artificial representatives of electrical generators and electric loads. Our laboratory is therefore gradually approaching the most complete equipment for the study of electric power transmission and distribution phenomena experimentally as well as mathematically, thereby enabling us to greatly improve our advanced instruction and at the same time make contributions to the advancement of this important branch of electrical engineering.

The fuller development of our electric communication laboratory will equally contribute to the value of our instruction to students in the electric communication option, but this development cannot be secured until more laboratory space is made available to the department. The need of this additional space and adequate development of the electric communication laboratory was dwelt on by our visiting committee.

The Corporation Visiting Committee assigned to the department was reduced to two active members this year through the

absence from the country of one of the members and the illness of another. The two remaining members (Messrs. Van Rensselaer Lansingh, '98, and Franklin T. Miller, '95), associated with themselves a group of notable men interested in research and practice in electrical engineering, namely, Dr. W. D. Coolidge, '96, of Schenectady, Dr. E. P. Hyde, of Cleveland, Dr. F. B. Jewett, '03, of New York, Mr. Alexander Macomber, '07 of Boston, and Mr. Russell Robb, '88, of Boston. After spending two separate days at the department the committee made a notable report which was transmitted to the Corporation through the President. Certain features of the report have been referred to above. Other features will be acted upon by the department staff during the ensuing year, and others cannot be put into effect until more laboratory space is made available for the department.

The following subjects were discussed at Research Division colloquiums during the year: Some comparisons between French and American electrical engineering practice. Progress and specific problems of the Research Divisions. The current surge in an induction alternator upon short circuit. Preliminary results of our paper insulated cable research. Transients on electric power transmission lines. Characteristics of telephones and acoustic impedance. Proposed investigations of dielectric strength. Certain of these subjects already have been given publication.

DUGALD C. JACKSON.

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH

During the past year the work of this department has been continued along the lines indicated in the previous report. Two well defined options are now available, one, for those students who wish to specialize in the field of public health, the second, for those who propose to enter the industrial field as exemplified in the fisheries, the technology of food products or the industries utilizing microörganisms as agencies of technical fermentations.

Considerable extension of the work in the field of public health has taken place. Courses mostly of graduate character, are now open to properly equipped students who desire to secure advanced training for Public Health administrative positions, and

lead to the Certificate of Public Health, in accordance with recommendations which have been made by a committee of the American Public Health Association especially appointed to consider the training of health executives. Two students, one a graduate of Course VII and the other a graduate of Columbia University, completed the work and were awarded the Certificate in June, 1923.

By request of the Surgeon-General of the Army, the department has also submitted a general program leading to the Doctorate in Public Health (Dr. P.H.) for medical officers of the Army who have already completed intensive basic and practical courses of specified character, and who will devote a final year to academic studies and research. This program has received the approval of the Faculty and the Executive Committee of the Corporation.

A field of Public Health work which is rapidly assuming importance is that of supervising the instruction given in the public and private schools, social settlements, health centers and gymnasia. To meet the demand for properly trained supervisors a coördinated course has been developed in coöperation with the Graduate School of Education of Harvard University and the University Extension Division of the State Department of Health, which has agreed to give a certificate in Health Education to students who have satisfactorily completed the studies prescribed and are recommended by the Department of Biology and Public Health. Two students have during the past year fulfilled the requirements for the State certificate. In addition to these, five students from Belgium were sent to the Institute by the Commission for Relief in Belgium to receive instruction in this field. While unable to meet all the requirements, because of inadequate training and difficulty with the language, they have taken the lectures in Health Education and in certain other courses, and have had extensive training and observational experience and practice teaching in the schools of Cambridge. The development of the work in Health Education has been largely due to the assiduous work of Professor Turner.

In the option in Industrial Biology two subdivisions, Fisheries Technology and Food Technology, have been established. With these as basic programs a wide range of practical engineering and

professional studies is now open and should serve to attract larger numbers of regular students to the department, which has always suffered in this respect.

The usefulness of the department to the school as a whole has been enhanced by an increase in the number of General Studies open to men in their third and fourth years. A course on Biology and Heredity was given for the first time by Professor Bigelow in the first term, which attracted over eighty students. Professor Prescott gave a course on Industrial Aspects of Bacteriology in the second term with an attendance of twenty-two, while a new course on Physiology and Embryology of Reproduction was given by Professor Bunker in the third term with an attendance of about two hundred. These courses have made knowledge in important phases of Biology accessible to students from other departments, who otherwise would have left the Institute without an opportunity to secure information in fields of large importance in general education and citizenship. The year has also been notable because of the extension of research into new lines under the direction of Professor Bunker. Studies on certain phases of nutrition have been undertaken and are still in progress with much promise.

The extension of the work of the department has thrown an additional teaching load upon all members of the staff which has been met with splendid spirit. This overloading of the staff should not be allowed to endure. While recognizing that teaching is the primary function of the staff, the importance of research in original lines is also deeply appreciated and in a small department may be the best means of extending influence and securing recognition.

The physical condition of the department is probably better than for several years past. New equipment for biochemical and bacteriological work has been added, and a special microscope and camera for motion picture research with microörganisms has been purchased. One instructional film has already been produced. Through the kindness of Mr. S. Barbour of the Linen Thread Company, the department has received an excellent set of models of traps, nets and seines. A small model trout hatchery was presented by Mr. A. H. Dinsmore of the United States Division of Fisheries. This equipment is of great service in teaching the

introductory courses in Fisheries Technology. The Commissioner of Fisheries has rendered valuable coöperation with the department by detailing Mr. Dinsmore of the St. Johnsbury Station and Mr. Corliss of the Gloucester Station to give illustrated lectures on the practical operation of fish propagation stations. To all these gentlemen the thanks of the department are extended.

A small special appropriation made it possible for Doctor Sawyer, special lecturer in Fisheries Technology, to secure a large amount of data, photographs, lantern slides and other equipment for teaching use during the summer of 1922 and this work is being extended in 1923.

The changes in rank and personnel for the year are as follows: Professor Turner has been advanced to Associate Professor, and Doctor Horwood to Assistant Professor. Mr. R. S. Hunt, candidate for Ph.D., has been appointed half-time assistant and Mr. P. L. Riley, a graduate in 1923, as assistant in biology.

Probably the greatest need of the department at this time is better publicity as to the advantages and importance of applied biology. This would undoubtedly bring in larger numbers of students. Funds for research fellowships or assistantships and for graduate students are also much to be desired. Productive work in numerous fields of research, sanitary, industrial, or in pure science could at once be undertaken if funds were available to subsidize trained students. The department looks forward to constantly increasing usefulness as the many technical applications of microbiology and biochemistry are recognized in sanitation and industry.

SAMUEL C. PRESCOTT.

DEPARTMENT OF PHYSICS

The department has suffered during the year from the loss of Prof. Louis Derr who for thirty years has been a member of the staff, teaching general physics, photography, and optics. His wide experience in historical and general physics and his skill and enthusiasm as a teacher makes his loss to the department very great.

The equipment of the department has been materially improved by the completion of the large wind tunnel and its equipment with many accessories.

The Acoustics Laboratory has been moved to the basement of Building 2 where it now has adequate quarters.

The Elementary Heat Laboratory has been moved to the old Acoustics Laboratory, materially increasing the effectiveness of the instruction in elementary work.

The research work in photo-elasticity has grown so rapidly that it has been necessary to duplicate the equipment and to provide several other rooms for it. The number of graduate students electing this work has materially increased, and it seems likely to require even further equipment and space in the near future.

The department has purchased from the General Electric Company an extensive modern equipment for instruction and research in X-rays, including a multiple difraction unit and a powerful penetration unit, which are expected to be installed before the beginning of the coming school year.

The amount of work which has been done in the Laboratory of Industrial Physics in industrial problems of a physical nature has considerably increased, and the laboratory has now become practically self-supporting, and seems likely to continue so in the future. A very considerable further addition to the equipment of the Laboratory of Industrial Physics in the matter of industrial gas appliances has been made during the year as the result of gifts following the short course for industrial gas engineers.

The department is hampered in its work because of the lack of an adequate lecture room in which experimental lectures may be set up and given, in addition to the large lecture room 10–250. The effectiveness of the lectures in Physics would be materially increased if a lecture room were available for longer periods of preparation and for conference and discussion with the members of the class in the period immediately following the formal lecture.

There is further a great need for small rooms in which research may properly be carried on, the present facilities being entirely inadequate to take care of the needs of the graduate and undergraduate students of the present year.

The department sorely needs an apparatus construction shop for students' use, and it is hoped that some means will be found to take care of this increasing need of research students in the near future.

C. L. NORTON.

COURSE IN ELECTROCHEMICAL ENGINEERING AND THE ELECTROCHEMICAL LABORATORIES

We have fortunately passed the period when the registration was such that desk space and equipment were inadequate to properly accommodate the fourth-year students in Electrochemical Engineering. From present indications it appears that our laboratory facilities for undergraduate work will be ample during the next few years. Additional small research rooms suitable for graduate students working for higher degrees are on the other hand greatly needed. All available space this last year was occupied, and some of the investigations suffered from overcrowding.

Among the researches which have been in progress during the past year, the following may be mentioned: Mr. D. C. Stockbarger continued his research on the "Ultra Violet Spectrum of the Mercury Arc," and in connection therewith is to offer a graduate course this coming year on photo-chemistry. Mr. A. L. M. Dingee has been investigating the "Absorption Spectrum of Spluttered Metallic Films for Ultra Violet Light," with a view of obtaining screens for transmitting definite regions of the ultra violet spectrum. Mr. V. E. Whitman completed an interesting research on the "Ionization of Gases by Ultra Violet Light." Professor Goodwin also had several other investigations on the effect of ultra violet light on chemical reactions under his direction. The importance of photo-chemical phenomena on chemical reactions is only beginning to be appreciated, and many new lines of research have been opened up in this field. Among other investigations in Applied Electrochemistry carried out under Professor Thompson's direction may be mentioned "The Conversion of Diamond to Graphite," "The Electrolytic Separation of Manganese and Nickel," "The Production of Chromates From Ferro Chromium," and a furnace process for obtaining metallic tungsten from its oxide. Dr. Max Knobel continued his researches on over-voltage, and published two papers bearing upon this subject during the year. He has received an appointment to one of the National Research Council Fellowships, and will continue his research work this coming year at the University of California.

The most important addition to the equipment of the Elec-

trochemical Laboratory during the past year was a 50 kw. Booth steel refining furnace. To bring the equipment of this laboratory up to date, a high frequency induction furnace of the Ajax type is greatly needed, not only for purposes of instruction, but also to meet the outside demand for facilities to melt metals and alloys out of contact with carbon. A General Electric horizontal vacuum furnace together with an additional optical pyrometer of the Foote & Fisher type for controlling furnace temperatures is also essential to carry on certain lines of research work. It will be necessary during the coming year to replace a number of the larger units of the storage battery supplying current to the Electrochemical Laboratory, as the present battery which has been in constant use during the past eight years now requires complete overhauling.

H. M. GOODWIN.

DEPARTMENT OF CHEMICAL ENGINEERING

Including the School of Chemical Engineering Practice and the Research Laboratory of Applied Chemistry

The instructional work of the department during the year was handicapped by the losses of staff members reported elsewhere. The load was carried by extra work on the part of the staff, by the appointment of an additional instructor and through the coöperation of the Research Laboratory of Applied Chemistry.

Graduate students are coming to the department in increased numbers, more particularly from other institutions. Until very recently the type of undergraduate Chemical Engineering instruction given at the Institute was not available elsewhere. As a result, students coming to us from other universities took much of their work in undergraduate classes. These students are now beginning to come with preparation sufficient to spend the majority of their time in purely graduate work. This, combined with the increased numbers, imposes a double burden on the department.

The development of instruction of this character is difficult and expensive. This is true because, to be of the maximum value, such instruction must be closely correlated with the most recent progress in research. On the other hand, no other type of instruction is equally effective in developing in the student that scientific

imagination and initiative without which professional leadership is impossible. The department has therefore laid special emphasis on this phase of its work.

The facilities of the department were planned on the assumption of thirty-five students in each graduating class. Since the present laboratories were built, the expansion in Chemical Engineering has brought attendance up to three times this figure. The situation has been met by modification in instructional methods and by the utilization to the utmost of all the facilities of the department

The department is glad to report the appointment of Dr. William H. Walker as non-resident professor of Chemical Engineering.

The Buffalo Foundry and Machine Company, has presented to the department a large rotary vacuum drier together with auxiliary equipment which has been installed and is available for both instructional and research work.

W. K. LEWIS.

THE SCHOOL OF CHEMICAL ENGINEERING PRACTICE

Progress in the School of Chemical Engineering Practice has continued along the lines outlined in the last two reports. The situation at the end of our third year of continuous operation is very satisfactory.

The following table shows the increase in attendance, particularly as compared with the number of graduates in the regular Chemical Engineering Course (X), the main preparatory course or feeder for the School of Chemical Engineering Practice.

Year	*Number Graduates Course X*	*Number Graduates Course X-B*	*Number Graduates Course X-A*	*Ratio of Graduates from the School of Chemical Engineering Practice to Graduates from Course X*
1921	90		25	27.8%
1922	76	14	33	62.0%
1923	57	20	35	96.5%
1924	57*	12*	53*	114.0%

*Estimated on basis of present registration

The above table clearly shows the following important points:

1. The attendance during the past four years has increased 160 per cent.

2. The main increase has been in the number of men taking the Master's Degree. Students having the interest and the funds to enable them to take the Bachelor's Course (X–B) are attracted to the five years' Master's Degree Course (X–A).

3. The large increase in the ratio of students taking work in the Practice School to the number of men graduating in Course X indicates that the maintenance of our present attendance and any future increase in enrollment must come through the attendance of an increased number of graduates from other colleges. (So far the number of graduates from other colleges has increased steadily from four in 1920–21 to eighteen in 1923–24.)

The greatest need of the School of Chemical Engineering Practice at the present time is an adequate fund from which deserving students may be aided, either by fellowships or loans. To obtain the Master's Degree in the School of Chemical Engineering Practice costs the student at least three hundred dollars above the normal costs at the Institute and at the same time deprives him of the opportunity for summer work between the fourth and fifth year. Consequently each year a number of the best men in the senior class must forego the graduate work in Chemical Engineering Practice because of the lack of funds.

During the year, with the generous coöperation of the companies, our facilities at the various stations were greatly improved. At the Eastern Manufacturing Company, Bangor, Maine, we now have a conference room and a library adjoining an office, with laboratories near at hand. The Merrimac Chemical Company at South Wilmington have contributed generously to the proper fitting up of one of their buildings for our use. This provides excellent quarters consisting of conference room, library, laboratory and office. At the Bethlehem Steel Company, Lackawanna Plant, Buffalo, New York, new quarters in the main office building have also been provided.

A club house at Buffalo has been in successful operation for the past two years. One was established at the beginning of this year at Winchester, Massachusetts, for the Boston Station. During June we outfitted a club house at Bangor, Maine, so that from now on all our students will live at their own club houses. At the beginning of the year 1923–24 board and room at all the club houses will be reduced from fourteen dollars to thirteen dollars

per week, which will cover all expenses including depreciation and sinking fund.

During the year, Asst. Prof. W. G. Whitman, Director of the Boston Station, resigned to become Assistant Director of the Research Laboratory of Applied Chemistry. Asst. Prof. William P. Ryan, Director of the Bangor Station, was transferred to the Directorship at the Boston Station and Mr. R. H. Price, Assistant Director of the Boston Station, was made Director of the Bangor Station. Mr. Harold C. Weber was appointed Assistant Director of the Boston Station with the rank of Assistant Professor.

R. T. HASLAM.

RESEARCH LABORATORY APPLIED CHEMISTRY

Owing to the large increase in number of graduate students, the most important problem of the laboratory has been the expansion of its thesis work. To avoid diffusion in effort the theses were arranged in groups of related topics. The students of each group participated in group conferences to be of great value in showing each student the relation of his specific problem to the broader field, the student further profiting from the discussion of the problems of the others in the group. Furthermore by this plan the efficiency of supervision was greatly increased. During the year a total of fifty thesis problems were carried out under the direction of various members of the Laboratory Staff. Of this number twenty were for the Master's Degree and thirty were undergraduate theses.

Supplementary to the instructional work in research, senior members of the staff gave courses during the academic year on the following subjects: Applied Colloid Chemistry, Corrosion of Metals as Related to the Materials of Construction, Automotive Fuel Problems, Combustion, and Industrial Stochiometry.

In general, our relations with industry have been maintained satisfactorily, as the following summary of major investigations now being carried on will show:

1. General Motors Research Corporation: (*a*) Mechanism of Lubrication. (*b*) A Study of Anti-Knock Compounds.
2. Standard Oil Company of New Jersey: (*a*) Mechanism of Lubrication. (*b*) Special Problems in Oil Refining.
3. Goodyear Tire and Rubber Company: (*a*) Study of Compounding Materials. (*b*) A Study of the Properties of Tire Cord.

4. Humble Oil and Refining Company: (*a*) Special Problems in Oil Refining.
5. National Tube Company: (*a*) Fundamental Factors in the Corrosion of Iron and Steel.
6. MacLaurin-Jones Company: (*a*) The Waterproofing of Paper.
7. National Lime Association: (*a*) A Study of the System CaO-CO_2-H_2O.
8. Philadelphia Storage Battery Company: (*a*) Some Factors Affecting Metallic Oxidation.

In addition to the foregoing investigations, the laboratory has been called upon to study more than an equal number of minor commercial problems. It is intended, in the future, to reduce the amount of this latter type of work to a minimum. The smaller problems, as a rule, are unremunerative, and do not offer to the research worker the larger opportunities for development.

As usual, there have been a large number of changes in the laboratory personnel. Of the eight resignations, the laboratory feels especially the loss of Professor Parsons, who left to accept a highly responsible research position with an industrial concern. Six others have entered industrial research work and one has been transferred to a teaching position in the School of Chemical Engineering Practice. Ten new men have been appointed to fill current vacancies and provide for expansion, thus making a total of twenty full-time research men on the Laboratory Staff.

The facilities of the laboratory have been improved greatly by the addition of a full-bearing testing machine for the study of the mechanism of lubrication, and by the rearrangement and improvement of the machine shop and store room equipment. For the most part, these changes have been made possible by the use of the Cabot and Charlotte B. Richardson Funds.

R. T. HASLAM.

DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING

The work of the department has proceeded smoothly during the session and very few changes have been found necessary. Slight rearrangements have been made in the schedule, especially to give more justice to "Elements of Electrical Engineering." The teaching staff remained unchanged.

The number of civilian students remained much the same but

was remarkable for the number of foreign students enrolled. The Naval Constructors' class was the largest that we have yet had. Twenty-one officers took the Master's Degree, and in addition three civilians obtained the Master's Degree, one of them being Mr. Magoun, Instructor in Course XIII–A, the other two being from Norway and India respectively.

The second scholarship presented by the American Committee of Lloyd's Register of Shipping was awarded to Mr. Robert W. Rogers. The beneficial influence of these scholarships on the work of the department is becoming increasingly evident.

J. R. JACK.

DEPARTMENT OF ECONOMICS AND STATISTICS

According to instructions from the Administrative Committee in March, 1922, the number of students entering the third year in the course of Engineering Administration was limited in the following October. It was difficult to lay down any fixed or precise rules to control this limitation, but as a general principle, no student was permitted to register in the third year who had deficiencies to an amount which could not be easily made up within the year. As a result, the number of students in the third year was greatly reduced. In pursuance of the policy of limitation by raising the standard, notice was also given in March of this year, that no student would be registered in the fourth year of the course, who had any deficiencies previous to the third year. It is believed that these restrictions have been most beneficial. They have served to weed out the students who are not fitted for the work of the Institute, and have forced others to make up their deficiencies promptly rather than to procrastinate in the fulfillment of requirements in the earlier years.

The Administrative Committee also instructed the department not to enroll in the professional subjects given by the Department of Economics, with the exception of Accounting, any students who are not registered in Course XV or in Courses VII and IX, whose regular programs of study include some of the subjects given by our department. These restrictions reduced the enrollment in our classes, and have made it possible to carry on instruction without further enlargement of the staff, and it is believed will make the work of the department more efficient.

As an offset to the barring of students, in courses other than VII, IX, and XV, from enrolling in courses scheduled for students in Course XV, the number of General Study courses given by the department was increased from two to six. These subjects include several of the major technical courses, somewhat abbreviated, offered by our department to students in Course XV, as follows: Political and Social Problems, Marketing Methods, Production Methods, Investment Finance, Banking and Finance, and Economics of Corporations.

During the past year, Professor Doten has continued to serve as Consulting Specialist in the Bureau of Agricultural Economics in the Department of Agriculture. In December, 1922, he was reappointed for a two-year term on the Joint Advisory Committee of the United States Census, representing the American Economic and American Statistical Associations. Professor Freeland has served during the past year on the Committee of Industrial Planning of the Boston Chamber of Commerce.

DAVIS R. DEWEY.

DEPARTMENT OF ENGLISH AND HISTORY

A noteworthy event of the year was the holding of a conference, called by the President, on the problems of the department. The direction of the conference was in the hands of Mr. James P. Munroe, chairman of the Visiting Committee of the Corporation for the department; it was attended by several members of the Corporation and by others qualified to give advice concerning the training in English and general studies which should be given to our students. The discussion revealed great interest in these questions on the part of those present, and a desire to coöperate in every way in improving the work of the department and in helping it to maintain a high standard of instruction. The value of such conferences to the staff is great, and it is hoped that the holding of them will become an established custom.

The lectures given in the first and second-year courses by men not connected with the department proved of unusual interest. For the second-year students in the first term a course of lectures on Interpretation of Democratic Theory was arranged;

among the speakers were Dean Pound of the Harvard Law School, J. J. Tigert, United States Commissioner of Education, ex-Mayor Peters, of Boston, R. L. O'Brien of the *Boston Herald*, and James P. Munroe. In the third term, the first-year students heard a series of lectures on American history by Charles R. Lingley, professor of history at Dartmouth. Both courses were very successful, and the plan will be continued in the coming year.

HENRY G. PEARSON.

DEPARTMENT OF MATHEMATICS

The most notable feature in the work of the department for the past year has been the use of the new Woods and Bailey "Elementary Calculus" through the several terms of the first year. During the coming year it will be continued through the first term and a part of the second, followed by a somewhat expanded edition of Phillips' "Differential Equations."

The main features of the present first-year program are as follows: in the first term a discussion of rates of change, followed by the differentiation of polynomials, simple problems in maxima and minima, differentials, elementary integration with applications to area, pressure of volume.

In the second term a brief treatment of the conic sections, use of the calculus for tangents, differentiation of trigonometric functions, curvature.

In the third term, polar coördinates, exponential and logarithmic functions, series, partial differentiation and additional integration. This leaves for the first half of the second year integration by tables, double and triple integration, additional applications to volume, center of gravity, moment of inertia, mean value, etc.

It is interesting to note that a French translation of Woods and Bailey "Elementary Calculus" has been announced and that the translator has asked permission to translate the two-volume Course in Mathematics.

The statistics of the principal undergraduate classes have been as follows:

	Students	*Sections*
In the first term:		
Elementary Calculus, M11 (first year)	612	26
Integral Calculus, M21 (second year)	582	24
Analytic Geometry and Calculus, M13 (first year)	41	2
Applied Mathematics, M23 (second year)	55	2
In the second term:		
Elementary Calculus, M11 (Junior Grade)	89	4
Analytic Geometry, M12 (first year)	541	21
Calculus and Differential Equations, M22 (second year)	507	20
Integral Calculus, M21	106	4
In the third term:		
Analytic Geometry, M12 (first year, Junior Grade)	118	4
Analytic Geometry and Calculus, M13 (first year)	543	20
Calculus and Differential Equations, M22	132	6
Applied Mathematics, M23 (second year)	406	15

The experiment of segregation of superior students in the first and second years has been continued with still some doubt as to whether the possible advantages have outweighed the inconvenience, or whether the former can be fully realized without an actual modification of the program.

The following elective and graduate courses have been given: Theory of Probability, Professor Bartlett; Analytic Mechanics and Mathematical Laboratory, Professor Lipka; Aeronautics, Professor Moore; Thermodynamics, Theory of the Gyroscope, Electrodynamics, Statistical Mechanics, Professor Phillips; Theory of Functions and Modern Algebra, Doctor Rutledge; Fourier's Series and Integral Equations, Doctor Wiener; Higher Geometry, Professor Woods; Vector Analysis, Doctor Zeldin.

The program of the summer courses for 1923 includes besides the usual general subjects, a special course in Differential Equations for United States Army students and a special course in Trigonometry for the United States Navy students. Certain courses for teachers were offered but not given.

The continued scientific activity of members of the department, particularly those released from a part of their teaching on the basis of special grants, has been noteworthy, as will appear by the list of publications and by the share the department has continued to have in the Journal of Mathematics and Physics.

H. W. TYLER.

DEPARTMENT OF MILITARY SCIENCE AND TACTICS

The Professor of Military Science and Tactics of the last academic year, Col. J. B. Christian, C.A.C., was relieved by retirement before the beginning of the academic year 1922–23 and Maj. E. W. Putney, C.A.C., performed the duties of that office until the arrival of the undersigned on December 5, 1922. Maj. A. E. Maish, O.D., was relieved also on account of retirement and the vacancy filled by the detail of Maj. C. A. Waldmann, O.D. Except for these, no changes in the Departmental Staff took place during the year. Since the close of the Institute year, the following changes have occurred: Maj. E. W. Putney, C.A.C., has been relieved because of expiration of the legal period of detail. Major Putney was the executive and officer in charge of the Coast Artillery Unit, Reserve Officers' Training Corps. The War Department has stated its inability to furnish an officer to fill this vacancy, though I feel that it is quite essential that the number of instructors in the department should not be reduced.

Maj. John C. McDonnell, A.S., who was in charge of the Air Service Unit, was relieved in June to make him available for foreign service for which he was due on the War Department roster. The vacancy will be filled by the detail of another experienced officer of the Air Service.

Maj. Carl A. Waldmann, O.D., the only officer with the Ordnance Unit, Reserve Officers' Training Corps, was relieved, after the instruction year ended, for duty in the office of the Chief of Ordnance. He will be replaced by another Ordnance officer.

A rearrangement of the course of instruction took effect at the beginning of the fall term.

The subject of "Orientation," heretofore taught the Coast Artillery Unit in the fall term, Junior year, has been omitted as a duplication of better Institute courses. With the consent of the Faculty, arrangement has been made by which students who have taken the Institute Course 1.02 or its equivalent, are excused from the subject of "Orientation." Those students in the Reserve Officers' Training Corps who have not taken course 1.02 or its equivalent are required to elect it.

The subject of "Military Law," and kindred subjects, have been given in the past in the Sophomore year for five weeks only.

Permission has been given by the Faculty and arrangements have been made whereby these subjects are now included in the Institute Course of "International Law" (GS 3). This will be a ten-weeks course in the winter term of the Senior year.

The Course in Military History and Policy of the United States has been given heretofore for five weeks in the Sophomore year. Permission has been granted to make this course into a ten-weeks course in the fall term of the Senior year. It is now rated as a general subject course (GS 98) required of all students registered in the Advanced Reserve Officers' Training Corps and elective for others.

These changes are believed to be of advantage, not only to the Military Science Department but to the students also, as the latter get Institute credit toward graduation for the enlarged courses as electives.

As a result of these changes, more time can be devoted to increasing the amount of instruction given to the various Units. Particularly is this true of the Coast Artillery Unit. Arrangements will be completed before fall for the installation of a complete fire-control equipment so that practical instruction in the use of these instruments can be given.

The principal need of the Military Science Department at present appears to be a suitable place in which to hold Infantry drill. At present this drill is scheduled for three times per week for ten weeks in the fall and spring terms of the Freshman year. For lack of a proper drill hall or armory these drills can be held only out of doors. The total of thirty drills possible under the schedule is usually reduced by a quarter, and sometimes by one third, by inclement weather. It is believed that by proper representation State aid could be obtained to build a suitable armory and drill hall, on the ground that the Institute has been designated by the State to share in the benefits of the Morrill Land Grant Act; assists in training officers for the National Guard, and is therefore, in effect, a State activity, as far as its Military Department is concerned. Such an armory, if built along plans already developed in other States (notably in New York State at Cornell University), could be used for large assemblies and other college and student activities.

For the first time selections have been made, during the past

year, of sergeants from volunteers from the Sophomore class, of second lieutenants from the Junior class, and of first lieutenants and captains from the Senior class. Warrants have been given to student non-commissioned officers and commissions, signed by the President of the Institute, to the commissioned officers, the only requirement in return being the promise to attend one drill per week during the year at such time as least interferes with the student's Institute work.

The past year, the Military Science Department offered three medals for competition among the Freshmen taking drill. These medals were awarded for proficiency in the school of the soldier. The selections in the preliminary competition were made by a board of officers on duty in the department, and the final competition was judged by a board of three officers not connected with the Institute.

The activities of the department closed with a review and parade May 28, and the presentation of commissions at the commencement exercises. Maj. Gen. André W. Brewster, the Corps Area Commander, consented to receive the review and present the medals. The Corps Area Commander also made an address to the successful candidates for commissions in the Officers' Reserve Corps and presented them with their commissions after they had taken the oath of office.

The growth of the Reserve Officers' Training Corps Unit at the Institute has been slow, but it is believed that it is a healthy growth. In 1922, one hundred and six commissions were granted, while in the past year there were one hundred and ninety-six students receiving commissions as second lieutenants in the Officers' Reserve Corps.

F. W. PHISTERER,
Colonel, C.A.C. (D.O.L.), P.M.S. and T.

DEPARTMENT OF HYGIENE

The purpose of the Department of Hygiene is twofold:

First. To guard and improve the health of the student body, members of the instructing staff, and of employees of the Institute.

Second. To take care of the sick and injured, and to see that they receive adequate treatment.

In order to preserve the health of the students the following measures were taken:

A physical examination was made of every new student entering the Institute.

During the year 839 examinations were made according to the standards required by the United States Army, and accurate records were catalogued for further reference.

As a result of these examinations 632 men were passed and 207 men were found to have defects of more or less importance.

In each instance when a defect was discovered the man was advised concerning it, and when possible, efforts to correct the defect were instituted.

In an effort to prevent accidents arising from competitive sports, all men were examined before being allowed to enter.

At the beginning of the year, three lectures were given to the freshmen on Personal Hygiene, First Aid and Sex Hygiene, special stress being given to instructing the students how to live, what to eat, and how to preserve their health.

It has been the policy of the department to influence every man to go into out-of-door competitive sports, and our efforts had the desired effect as shown by the following table:

Competitive Sports	725
Compulsory Gymnastics	135

By having so many men in competitive sports, the classes in compulsory gymnastics were smaller, and more effectively handled. It is the desire of the Medical Director to substitute competitive sports, especially out-of-doors sports, for compulsory gymnastics as far as possible.

Another effort to preserve the health of the students was made by the isolation of infectious and contagious diseases. Every illness was at once reported to the department, and all infectious or contagious cases were handled as efficiently as possible for the welfare of the whole student body.

During the year the following contagious diseases were discovered and isolated:

Parotitis, 5	Scarlet Fever, 2
Pertussis, 1	Diphtheria, 2
Measles, 7	Tuberculosis, 2

During the winter months, 2,825 cases of influenza, tonsillitis

and bronchitis were treated and isolated in order to prevent infection of others.

For the care of the sick and injured, two clinics were held: one from 8.30 to 9.30 A.M., and one from 4.00 to 5.00 P.M. The department was open for cases of accidents from 8.00 A.M. until 5.00 P.M., and a trained nurse was always in attendance.

During the year 14,548 visits were made at the department:

Total medical cases, 7,330.
Digestive disturbances, 364.
Total surgical cases, 6,854.
Nature: Appendicitis, hernia, fracture, wens, warts, etc.
Total number requiring hospital care, approximately, 15
Nature: Tuberculosis, fractures, burned eyes, contagious diseases, malaria, jaundice, influenza, appendicitis, tonsils and adenoids, etc.

These were distributed through the months as follows:

July	489	January,	2042
August,	512	February,	2277
September,	445	March,	1609
October,	1441	April,	1426
November,	1442	May,	1345
December,	966	June,	556

This table shows that the busiest months were January and February, when diseases of the respiratory tract were most prevalent.

In order to correct the defects found during the examinations, a special class was organized for corrective gymnastics under the direction of a man especially trained for this work. Forty entered these classes, and the most gratifying results were obtained. If it were not for this class many men with postural or minor defects would have received no exercise at all.

During the year approximately fifteen men required hospital care. When any serious illness was discovered, the students' parents were immediately notified, and every effort was made to carry out their requests. The parents were kept advised by telegram each day in regard to the condition of the patient.

As many of the students required treatment for which they were unable to pay, it was necessary for the department to use $605.96 of a fund provided for that purpose.

Four hundred ninety-seven visits were made by the Instructing Staff.

Only two deaths occurred during the year:

1 Pneumonia
1 General Septicaemia

The following table shows the comparative figures of 1921–1922, and 1922–1923:

1921–1922

Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1290	1244	1104	1892	2176	1744	1639	1928	784

1922–1923

Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1414	1442	966	2042	2277	1609	1426	1345	556

Each student absent on account of illness was required to report to the department before returning to work. In several instances men were found to have let their enthusiasm overrule their good judgment, and were sent home for further convalescence.

To show the great loss of time resulting from illness, I wish to report that there were 2,306 days lost from October to June. If we take the total enrollment as 3,180 and divide the number of days by it, it shows a loss of more than one day per student or nine hours taken from each student's work.

GEORGE W. MORSE, M.D.

DIVISION OF GENERAL STUDIES

Certain basic lines of action had been determined for the future of General Studies by Professor Warren before this future was entrusted to me. The intervening period has been largely devoted to analysis and consultation, only such action being taken as was obvious or inescapable. An advisory committee, composed of Mr. James P. Munroe, Prof. E. B. Wilson, Prof. Roger Merriman and Mr. Leonard Metcalf, was formed to discuss the recommendations received from Heads of Departments in answer to the questionnaire sent out at the opening of the year. Doctor Tyler, Professor Pearson, Doctor Tryon, and Prof. W. H. Lawrence assisted in this discussion.

A careful study of the earlier years of the Institute resulted in ample evidence that President Rogers foresaw a broad cultural education as a part of the technical training that Institute graduates should receive. The significance of this fact and of the growing recognition of the need for something more than a purely scientific

education for the successful engineer was presented at a joint meeting of the Faculty Club and the Alumni Council.

At the opening of the present year an appeal was addressed to Heads of Departments and Registration Officers asking for their interested coöperation in directing the students towards such a selection of General Studies as would acquaint them with an entirely new and untechnical field of study.

The following subjects were omitted either because they were not obviously of a general study character, or because the attendance during the past two years had been so slight as not to warrant their continuance: The Engineering Field and German GS95, 96, 97. The following new subjects were offered: Social Problems of Philosophy, Literary Study of the Bible, Roosevelt and His Times, Military History and Policy of the United States, and Technique of the Short Story.

In closing it would be ungracious not to acknowledge the splendid work of the English Department in offering such a varied and valuable list of subjects to those electing General Studies, and the assistance received from Doctor Tryon.

WILLIAM EMERSON.

PUBLICATIONS

DEPARTMENT OF CIVIL AND SANITARY ENGINEERING

CHARLES M. SPOFFORD. Opportunities in Civil Engineering. *The Tech*, December 8, 1922.

CHARLES M. SPOFFORD. Hampden County Memorial Bridge. *Cambridge (Mass.) Tribune*, March 3, 1923.

CHARLES M. SPOFFORD. Discussion on Engineering Education. *Proceedings, American Society Civil Engineers*, Vol. XLIX, No. 4, p. 734, April 1923.

CHARLES B. BREED. Methods of Track Construction on Highways Outside of Municipalities. *Proceedings, Permanent International Association of Road Congresses*, Seville, Spain. Vol. XX, pp. 24–26, June 1923.

CHARLES B. BREED and GEORGE L. HOSMER. Principles and Practice of Surveying, Vol. I. Revised Edition. John Wiley & Sons, Inc., New York.

DEPARTMENT OF MECHANICAL ENGINEERING

C. W. BERRY and F. G. KEYES. Report on Simultaneous Tests Made on a Cork Insulated and an Air-Space Insulated Refrigerator Truck Body.

G. B. HAVEN. The Design of Steam Boilers (revised and enlarged textbook).

G. B. HAVEN. A Constant Rate-Load Textile Testing Machine.

G. B. HAVEN. Methods and Materials Employed in Cleansing Paper Makers' Felts.

H. W. HAYWARD. Notes on Structural Mechanics for the Use of Students of the Lowell Institute School.

DEPARTMENT OF MINING, METALLURGY AND GEOLOGY

Geological Section

W. LINDGREN. Education of the Geologist. *Economic Geology*. Vol. 18, 1923, 5 pages.

Concentration and Circulation of the Elements. *Economic Geology*. Vol. 18, 1923, August, 30 pages.

H. W. SHIMER. Early Earth History. *The Tech Engineering News*. Vol. 2, 1922, 3 pages.

Mining Section

G. B. WATERHOUSE. Use of Coke Oven Gas in Open Hearth Furnaces. *Iron Age*, December 1922, 2 pages.

Influence of Temperature in Steel Making Processes. *Iron Age*, June 1923, 2 pages.

C. E. LOCKE and R. H. RICHARDS. Progress in Ore Dressing and Coal Washing in 1922. *Mineral Industry*. Vol. 31, 1923, 60 pages.

C. E. LOCKE. Application of Flotation Methods to Coal, especially Anthracite. *Coal Industry*. Vol. 6, January 1923, 3 pages.

C. R. HAYWARD. Technical Education in Metallurgy. *Chemical and Metallurgical Engineering*. Vol. 28, 1923, 2 pages.

C. R. HAYWARD and C. B. CARPENTER. The Equilibrium Diagram of the System Cu_2S-FeS. *Engineering and Mining Journal*. Vol. 115, 1923, 7 pages.

DEPARTMENT OF CHEMISTRY

A. A. BLANCHARD and J. W. PHELAN. Synthetic Inorganic Chemistry. Wiley & Sons.

A. A. BLANCHARD. The Unity of Science and Religion. *The Tech Engineering News*, June 1923. *The Christian Work*, August 11, 1923.

K. C. BLANCHARD. (See Tenney L. Davis and K. C. Blanchard.)

C. E. CARLSON. (See W. T. Hall and C. E. Carlson.)

TENNEY L. DAVIS and H. W. UNDERWOOD, JR. The Urea Dearrangement. *Journal of the American Chemical Society.* Vol. 44, p. 2595, November 1922.

TENNEY L. DAVIS. Colloiding Agents for Nitrocellulose. *Journal of Industrial and Engineering Chemistry.* Vol. 14, p. 1140, December 1922.

TENNEY L. DAVIS. The Spontaneous Degradation of Culture. *Science Progress.* Vol. 67, p. 468. (London) January 1923.

TENNEY L. DAVIS. Explosives from the Air. *Army Ordnance.* Vol. 3, p. 193, January–February 1923.

TENNEY L. DAVIS. Roger Bacon's Gunpowder. *Army Ordnance.* Vol. 3, p. 280, March-April 1923.

TENNEY L. DAVIS. Gelatinierungsmittel für Nitrozellulose. *Zeit. f. d. gesamte Schiess- und Sprengstoffwesen.* Vol. 18, p. 25. (Munich) March 1923.

TENNEY L. DAVIS. Die wahre Zusammensetzung von Roger Bacon's Schwartzpulver. *Zeit. f. d. gesamte Schiess- und Sprengstoffwesen.* Vol. 18, p. 51. May 1923.

TENNEY L. DAVIS and KENNETH C. BLANCHARD. The Urea Dearrangement II. *Journal of the American Chemical Society.* Vol. 45, p. 1816, July 1923.

TENNEY L. DAVIS. (In collab.) An Antiseptic Pyelographic Medium. *Journal of Urology*, September 1923.

TENNEY L. DAVIS. Roger Bacon's Letter Concerning the Marvelous Power of Art and of Nature and Concerning the Nullity of Magic, translated from the Latin together with an account of Bacon's Life and Work. The Chemical Publishing Co., 1923.

TENNEY L. DAVIS. Bibliography of Material of interest in connection with powder and explosives, published in English, during the calendar years 1918, 1919, 1920. *Mémorial des Poudres.* Vol. 19, p. 200. (Paris.) To end of year 1921. Item, Vol. 19, p. 381.

TENNEY L. DAVIS. Hippolyte Gruener's Chemistry, the Science of Matter and its Changes. *Journal of the American Chemical Society.* Vol. 45, p. 1856, July 1923.

HENRY FAY. Quantitative Analysis. Second edition.

ELIZABETH S. GATEWOOD. A Third Phenyl-Biuret. *Journal of the American Chemical Society.* Vol. 45, p. 146, 1923.

ELIZABETH S. GATEWOOD. (See F. J. MOORE and ELIZABETH S. GATEWOOD.)

AUGUSTUS H. GILL. Engine-room Chemistry. Third edition revised. McGraw-Hill Book Co., New York, 1922.

AUGUSTUS H. GILL. Automobile Gasoline. J. B. Lippincott Co., Philadelphia, 1923.

AUGUSTUS H. GILL. Curious Causes of Gasoline Fires and Gas Explosions. *Industrial and Engineering Chemistry.* Vol. 15, p. 140 (1923).

AUGUSTUS H. GILL. Occurrence of Levio-Menthone in Pine Oil. *Industrial and Engineering Chemistry.* Vol. 15, p. 887 (1923).

M. M. GREEN. Rapid Determination of Potash in Acid Insoluble Silicates. *Industrial and Engineering Chemistry.* Vol. 15, p. 163 (1923).

M. M. GREEN. Radiator for Platinum Crucibles. *Industrial and Engineering Chemistry.* Vol. 15, p. 890 (1923).

W. T. HALL. The Mechanism of the Corrosion of Iron. *Industrial and Engineering Chemistry.* Vol. 15, p. 426.

W. T. HALL and C. E. CARLSON. The Titration of Solutions of Permanganate and Sodium Arsenite. *Journal of the American Chemical Society.* Vol. 45, No. 7, p. 1615.

E. B. MILLARD. Surface Tension of Alkaline Soap Solutions. *Industrial and Engineering Chemistry.* Vol. 15, No. 8, p. 810, August 1923.

E. B. MILLARD. A Department Store Laboratory. *Journal of Industrial and Engineering Chemistry.* Vol. 14, No. 9, p. 785 (September 1922).

F. J. MOORE and ELIZABETH S. GATEWOOD. The Action of Hydrogen Peroxide upon Certain Phenyl-Substituted Uric Acids. *Journal of the American Chemical Society.* Vol. 45, p. 135, 1923.

J. W. PHELAN. (See A. A. BLANCHARD and J. W. PHELAN).

W. C. SCHUMB. The Dissociation Pressure of Certain Salt Hydrates by the Gas Current Saturation Method. *Journal of the American Chemical Society.* Vol. 45, p. 342, 1923.

M. S. SHERRILL. A Course of Laboratory Experiments on Physico-Chemical Principles. The Macmillan Co., New York.

S. G. SIMPSON. The Formation of Formic Acid by the Carmelization of Cane Sugar. *Industrial and Engineering Chemistry.* Vol. 15, No. 10, p. 1054.

S. G. SIMPSON. The Reaction between Bromine and Ammonium Salts and Its Effect on the Precipitation of Manganese Dioxide. *Journal of the American Chemical Society.* Vol. 45, No. 8, 1883.

H. M. SMITH. Indirect Calorimetry and Its Applications. *The Tech Engineering News,* November 1922.

HENRY P. TALBOT. Fifty Years of Chemistry; Our Heritage and Our Obligations. *Records of the Dedication of the Steele Chemical Building, Dartmouth College,* 1922.

H. W. UNDERWOOD, JR. The Mechanism of Catalysis. *Chemical and Metallurgical Engineering.* Vol. 29, pp. 584–587, (September 1923).

H. W. UNDERWOOD, JR. How to Choose and Use Catalysts. *Chemical and Metallurgical Engineering.* Vol. 29, pp. 709–710, October 1923.

H. W. UNDERWOOD, JR. (See TENNEY L. DAVIS and H. W. UNDERWOOD, JR.)

Research Laboratory of Physical Chemistry

ROBERT S. TAYLOR and LEIGHTON B. SMITH. The Vapor Pressure. Densities and Some Derived Quantities for Ether at Low Temperatures, *Journal of the American Chemical Society.* Vol. 45, No. 11, November 1922. Serial No. 149.

MAX KNOBEL. The Activities of the Tons of Potassium Hydroxide in Aqueous Solution. *Journal of the American Chemical Society.* Vol. 45, No. 1, January 1923. Serial No. 150.

DUNCAN A. MACINNES and EDGAR R. SMITH. A Study of the Moving Boundary Method for Determining Transference Numbers. *Journal of the American Chemical Society.* Vol. 45, No. 10, October 1923. Serial No. 151.

LEIGHTON B. SMITH and ROBERT S. TAYLOR. The Equation of State for Pure Nitrogen, Gas Phase. *Journal of the American Chemical Society.* Vol. 45, No. 9, September 1923. Serial No. 152.

LEIGHTON B. SMITH and ROBERT S. TAYLOR. The Melting Point of Ice on the Absolute Temperature Scale. *Journal of the American Chemical Society.* Vol. 45, No. 9, September 1923. Serial No. 154.

DEPARTMENT OF ELECTRICAL ENGINEERING

DUGALD C. JACKSON. President's Address, Boston Society of Civil Engineers. *Journal, Boston Society of Civil Engineers,* April 1923.

ARTHUR E. KENNELLY. On the Education of Engineers in France. *Engineering Education.* Vol. XIII, No. 3, November 1922.

ARTHUR E. KENNELLY. A Modern Mecca. *The Scientific Monthly.* Vol. XV, No. 6, pp. 571–580, December 1922.

ARTHUR E. KENNELLY. Dissymmetrical Conducting Networks. *Journal of the American Institute of Electrical Engineers*, pp. 1–11, February 1923.

ARTHUR E. KENNELLY. The Paris Observatory and its Influence upon the World. *The Harvard Graduate Magazine*, pp. 335–340, March 1923.

ARTHUR E. KENNELLY. Text of the Charter of the Academie Royale de Belgique, translated from the original in the Archives of the Academie at Brussels. *Proceedings, American Academy of Arts and Sciences.* Vol. 58, No. 9, pp. 347–351, April 1923.

ARTHUR E. KENNELLY. Electrical Vibration Instruments. The Macmillan Co., Engineering Science Series, edited by D. C. Jackson and E. R. Hedrick. The Behavior and Tests of Telephone Receivers, Oscillographs and Vibration Galvanometers. 450 pages.

ARTHUR E. KENNELLY. On the Constant Ratio of Mean-to-Mid Potential or Current at Successive Equidistant Points Along a Uniform Electric Conducting Line, Real or Artificial in the Steady State. *Proceedings, National Academy of Sciences*, July 1923.

FRANK A. LAWS. Electrical Engineering Laboratories of the Institute. *The Tech Engineering News.* Vol. III, p. 27.

VANNEVAR BUSH. Transmission Line Transients. *Journal, American Institute of Electrical Engineers*, July 1923.

WILLIAM H. TIMBIE. Section on Illumination of Buildings, Section on Electrical Work for Buildings, Kidder-Nolan's Architects and Builders' Handbook, revised for the seventeenth edition.

WILLIAM H. TIMBIE. Section on Illumination, Kent's Mechanical Engineering Pocketbook, revised for tenth edition.

WILLIAM H. TIMBIE. The Transportation Option. *Technology Review*, April 1923, *Aera*, May 1923.

WALDO V. LYON. Heat Losses. *Journal, American Institute of Electrical Engineers*, February 1923.

WALDO V. LYON. Transient Condition in Electric Machinery. *Journal, American Institute of Electrical Engineers*, April 1923.

F. S. DELLENBAUGH, JR. Another Harmonic Analyzer. *Journal, American Institute of Electrical Engineers*, January 1923.

F. S. DELLENBAUGH, JR. Artificial Transmission Lines with Distributed Constants. *Proceedings, American Institute of Electrical Engineers*, 1923.

F. S. DELLENBAUGH, JR. Proper Ratio of Tooth Width to Slot Width. *Electrical World*, November 1922.

F. S. DELLENBAUGH, JR. Electric Filters. *Q. S. T.*, July and August 1923.

E. L. BOWLES. Comment on paper, on "Permeability" by T. Spooner, at A. I. E. E. Convention, February 1923. *Proceedings, American Institute of Electrical Engineers*, 1923.

E. L. BOWLES. The Best Battery Connection for the Set You Use. *Radio Broadcast*, June 1923.

E. L. BOWLES. Radio Frequency Amplification. *Radio Broadcast*, July 1923.

E L. BOWLES. Section on Radio Communication in the Wonder Book, George L. Shuman & Co., publisher, November 1922.

E. L. BOWLES. Daily Articles on Radio. *The Boston Transcript*, March 1922 to date.

E. L. BOWLES. The Trend of Radio. *Bulletin, New England Physics Teachers' Association*, May 1923.

E. L. BOWLES. Radio — Its Past and Its Future. *Radio Record Book*, The Standard Diary Company, May 1923.

O. G. C. DAHL. Transformer Harmonics. *Bulletin, National Electric Light Association*, April 1923.

H. W. BIBBER. Engineering Education in France. *The Tech Engineering News*, May 1923.

H. W. BIBBER. A Note on the Use of the Lecture System. *Engineering Education*, May 1923.

C. H. MANNEBACK. Radiation from Transmission Lines. *Journal, American Institute of Electrical Engineers*, February 1923.

DEPARTMENT OF PHYSICS

C. L. NORTON. The Physical Laboratories of the Institute. *The Tech Engineering News*, April 1923.

H. M. GOODWIN. Research at the Institute. *The Tech Engineering News*, May 1923.

Louis Derr. A Biographical Sketch. *Technology Review*. Vol. XXV, p. 426, 1923.

E. P. WARNER. Glider Experiments in Europe. *Aviation*, September 1922.

Notes on the General Design of Commercial Aircraft. *Technical Note No. 113, National Advisory Committee for Aeronautics.*

Motorless Flight Impossible as Transport Means. *Automotive Industries*, September 14, 1922.

Glider Results Point Way to Sport Plane Development. *Automotive Industries*, October 12, 1923.

Fundamentals of Commercial Flying. *Proceedings of First National Air Institute*, Detroit, October 1922.

Flying through Europe. *The Technology Review*, November 1922.

Sailplaning. *Mechanical Engineering*, November 1922.

The Timing of Airplane Speeds. *Aviation*, January 1923.

The Design of Commercial Airplanes. *Journal of the Society of Automotive Engineers*, February 1923.

The Commercial Use of Airplanes. *Journal of the Boston Society of Civil Engineers*, December 1922.

Estimation of the Weight of Airplanes Parts. *Journal of the Royal Aeronautical Society*, January 1923.

The Nature of Invention. *Harvard Graduate Magazine*, March 1923.

The Design of Bow Stiffeners for Non-Rigid Airships. *Proceedings, International Air Congress*, London, June 1923.

Notes on the Longitudinal Stability, Controllability and Maneuverability of Airplanes. *Proceedings of International Air Congress*, London, June 1923.

Fairings of Airfoil Contours. *Technical Note No. 146 National Advisory Committee for Aeronautics.*

W. S. FRANKLIN. Mechanics. Third edition. Constable & Co., London, 1923.

Heat. Third edition. Constable & Co., London, 1923.

Electricity and Magnetism. Third edition. Constable & Co., London, 1923.

Light and Sound. Third edition. Constable & Co., London, 1923.

M. DEK. THOMPSON. The Conversion of Diamonds to Graphite at High Temperatures. *Transactions of the American Electrochemical Society*. Vol. XLIII, 5 pages, May, 1923 (with PER K. FRÖLICH).

A. C. HARDY. The Graininess of Photographic Materials. *Journal of Franklin Institute*. February 1923. (To appear in more detail in a later issue.)

The Graininess of Motion Pictures, Positives and Negatives. *Transactions, Society of Motion Picture Engineers*, 1922.

The Physics of the Developed Photographic Image. (One Chapter in the Eastman Kodak Company monograph.) Van Nostrand Company, New York.

PAUL HEYMANS. Stress Distribution in Electric Railway Motor Pinions as Determined by the Photo-Elastic Method (with A. L. KIMBALL, JR.), 1923. *General Electric Review*, February 1923.

MAX KNOBEL. Gas Electrode. Note in *Journal, American Chemical Society*. Vol. 45, p. 1723, 1923.

The Effect of Temperature on Overvoltage. *Transactions, American Electrochemical Society.* Vol. 43, 1923 (with D. B. Joy).

Reactions of the Lead Storage Battery. Note in *Journal, American Electrochemical Society.* Vol 43, 1923.

Effect of Current Density on Overvoltage. *Journal, American Electrochemical Society.* Vol. 43, 1923.

The Transference Members of Potassium Hydroxide in Aqueous Solution. *Journal, American Chemical Society.* Vol. 45, No. 1, January 1923.

The Activities of the Ions of Potassium Hydroxide in Aqueous Solution. *Journal, American Chemical Society.* Vol. 45, No. 1, January 1923.

F. H. Norton. The Effect of the Longitudinal Moment of Inertia upon Dynamic Stability (with T. Carroll). *Technical Note No. 115, National Advisory Committee for Aeronautics.*

Pressure Distribution over Thick Aerfoils. Model Tests (with D. L. Bacon). *Report No. 150, National Advisory Committee for Aeronautics.*

The Aerodynamic Properties of Thick Aerfoils (with D. L. Bacon). *Report No. 152, National Advisory Committee for Aeronautics.*

Controllability and Maneuverability of Airplanes (with W. G. Brown). *Report No. 153, National Advisory Committee for Aeronautics.*

Full Scale Airplane Tests. *Aeronautical Digest,* February 1923.

A Preliminary Study of Airplane Performance (with W. G. Brown). *Technical Note No. 120, National Advisory Committee for Aeronautics.*

Complete Study of the Longitudinal Oscillation of a VE-7 Airplane (with W. G. Brown). *Report No. 162, National Advisory Committee for Aeronautics.*

The Vertical Longitudinal and Lateral Accelerations Experienced by an Airplane while Maneuvering (with T. Carroll). *Report No. 163, National Advisory Committee for Aeronautics.*

A Study of Longitudinal Dynamic Stability in Flight. *Report No. 170, National Advisory Committee for Aeronautics.*

J. T. Norton. A Single Tube Super-Regenerative Receiver. *Radio News.* April 1923.

M. S. Vallarta. Discussion on Heat Losses in Stranded Armature Conductors. *Transactions, American Institute Electrical Engineers.* Vol. 41, p. 212, 1922.

Notes on Heaviside's Operational Method. Part I. Massachusetts Institute of Technology. Electrical Engineering Department, March 1923.

Notes on Heaviside's Operational Method. Part II. Electromagnetic Waves along Wires. Massachusetts Institute of Technology. Electrical Engineering Department, April 1923.

DEPARTMENT OF CHEMICAL ENGINEERING

Including Research Laboratory of Applied Chemistry and School of Chemical Engineering Practice.

R. E. Wilson and W. H. McAdams. The Modern Treatment of the Flow of Fluids through Commercial Pipe Lines. *Engineering News Record.* Vol. 89, No. 17, p. 690, October 1922. Contribution No. 19.

R. T. Haslam, F. L. Hitchcock and E. W. Rudow. The Water Gas Reactions. *Industrial and Engineering Chemistry.* Vol. 15, No. 2, p. 115, February 1923. Contribution No. 30.

R. T. Haslam and L. Harris. Producer Gas from Powdered Coal. *Industrial and Engineering Chemistry.* Vol. 15, No. 4, p. 355, April 1923. Contribution No. 34.

J. Harrop and H. O. Forrest. Causticization of Soda Ash. *Industrial and Engineering Chemistry.* Vol. 15, No. 4, p. 362, April 1923. Contribution No. 35.

C. S. Robinson. The Pumping of Liquids in Chemical Plants. *Industrial and Engineering Chemistry.* Vol. 15, No. 1, p. 33, January 1923. Contribution No. 36a.

R. E. Wilson, E. W. Fuller and M. O. Schur. The Acceleration of the

Hydrolysis of Mustard Gas by Alkaline Colloidal Solutions. *Journal, American Chemical Society.* Vol. 44, No. 12, p. 2762, December 1922. Contribution No. 57.

R. E. WILSON, E. W. FULLER and M. O. SCHUR. The Solubility and Rates of Hydrolysis of Mustard Gas in Water. *Journal, American Chemical Society.* Vol. 44, No. 12, p. 2867, December 1922. Contribution No. 58.

T. FUWA and G. A. SHATTUCK. Accurate Bubble Meters for very small Rates of Gas Flow. *Industrial and Engineering Chemistry.* Vol. 15, No. 3, p. 230, March 1923. Contribution No. 60.

H. V. ATWELL and T. FUWA. The Electrolytic Production of Acids and Alkali from Sodium Sulphate Solutions. *Industrial and Engineering Chemistry,* Vol. 15, No. 6, p. 617, January 1923. Contribution No. 61.

R. E. WILSON and M. A. YOUTZ. The Importance of Diffusion in Organic Electrochemistry. *Industrial and Engineering Chemistry.* Vol. 15, No. 6, p. 603, June 1923. Contribution No. 62.

R. E. WILSON and F. P. HALL. The Measurement of the Plasticity of Clay Slips. *Journal of Industrial and Engineering Chemistry.* Vol. 14, No. 12, p. 1120, October 1922. Contribution No. 63.

R. E. WILSON. The Mechanism of the Corrosion of Iron and Steel in Natural Waters and the Calculation of Specific Rates of Corrosion. *Industrial and Engineering Chemistry.* Vol. 15, No. 2, p. 127, February 1923. Contribution No. 64.

R. E. WILSON and D. P. BARNARD, 4TH. Further Data on the Measurements of the Effective Volatility of Motor Fuels. *Journal of Society of Automotive Engineers,* March 1923. Contribution No. 67.

R. E. WILSON and W. B. ROSS. Control of the Gelling Point of Glue with Specific Application to Drying Barrel Linings in Hot Weather. *Industrial and Engineering Chemistry.* Vol. 15, No. 4, p. 367, April 1923. Contribution No. 70.

C. S. ROBINSON. The Handling of Corrosive Gases in Chemical Plants. *Industrial and Engineering Chemistry.* Vol. 15, No. 3, p. 225, March 1923. Contribution No. 78.

W. K. LEWIS. Chemistry of Combustion in Coal-Fired Furnaces. *Industrial and Engineering Chemistry.* Vol. 15, No. 5, p. 502, May 1923.

D. W. WILSON, H. O. FORREST and C. H. HERTY, JR. Thermal Operation of Modern Regenerator Coke Ovens. *Industrial and Engineering Chemistry.* Vol. 15, No. 3, p. 251, March 1923.

E. V. MURPHREE. Effect of Agitation on the Rate of Solution of Crystals. *Industrial and Engineering Chemistry.* Vol. 15, No. 2, p. 148, February 1923.

W. H. WALKER, W. K. LEWIS and W. H. MCADAMS. Principles of Chemical Engineering (first edition). New York. McGraw-Hill Book Co., Inc., June 1923.

T. FUWA. Recent Developments in the use of X-Rays. *The Tech Engineering News,* June 1923.

R. E. WILSON and D. P. BARNARD, 4TH. Lubrication. *The Tech Engineering News,* October 1922.

W. G. WHITMAN and L. EVANS. The Air Bleaching of Nitric Acid. *Chemical and Metallurgical Engineering.* Vol. 27, No. 14, p. 686, October 1922.

W. G. WHITMAN. Safe Handling of Materials in Chemical Plants. *Chemical Age.* Vol. 30, No. 9, p. 377, September 1923.

W. K. LEWIS. How Does Production Affect Profits? *Chemical and Metallurgical Engineering.* Vol. 28, No. 22, p. 988, June 1923.

C. S. ROBINSON. The Design of Cooling Towers. *Mechanical Engineering.* Vol. 45, No. 2, p. 99, February 1923; *Refrigerating Engineering.* Vol. 9, No. 6, p. 169, December 1922; *Steam.* Vol. 31, No. 1, p. 3, January 1923.

R. T. HASLAM and C. M. TAYLOR. Compounds of Lime, Carbon Dioxide and Water. *Proceedings of the National Lime Association,* 1923.

R. T. HASLAM, W. P. RYAN and H. C. WEBER. Some Factors Influencing the Design of Absorption Apparatus. *Transactions of the American Institute of Chemical Engineers,* 1922.

R. T. HASLAM and H. O. FORREST. The Production and Utilization of Producer Gas for Heating Open-Hearth Furnaces. *Blast Furnace and Steel Plant*, May and June 1923.

DEPARTMENT OF ECONOMICS

DAVIS R. DEWEY and MARTIN J. SHUGRUE. Banking and Credit. A textbook for colleges and schools of business administration, p. 506. Ronald Press Company, New York City.

DAVIS R. DEWEY. Financial History of the United States, p. 567. Eighth edition. Longmans, Green & Company, New York.

DAVIS R. DEWEY. The Relation of the Economist to Business. *Report of Proceedings, Ninth National Convention of the Society of Industrial Engineers.* Vol. VI, No. 1, April 1923, pp. 158–164.

DAVIS R. DEWEY. United States — Statistics. Encyclopaedia Britannica. Twelfth edition. Vol. 32, pp. 851–862.

MARTIN J. SHUGRUE. (See DAVIS R. DEWEY and MARTIN J. SHUGRUE above.)

DONALD S. TUCKER. The Evolution of People's Banks. Columbia University Studies in History, Economics, and Public Law. Vol. 102, No. 1, p. 272. Longmans, Green & Company, New York.

DEPARTMENT OF MATHEMATICS

F. L. HITCHCOCK. The Water Gas Reactions (with R. T. HASLAM and E. W. RUDOW). *Industrial and Engineering Chemistry.* Vol. 15, No. 2, February 1923.

F. L. HITCHCOCK. A Method for the Numerical Solution of Integral Equations. *Journal of Mathematics and Physics.* Vol. 2, No. 2, March 1923.

F. L. HITCHCOCK. On Double Polyadics, with Application to the Linear Matrix Equation. *Proceedings of the American Academy of Arts and Sciences.* Vol. 58, No. 10, May 1923.

F. L. HITCHCOCK. Identities Satisfied by Algebraic Point Functions in N-Space. *Proceedings of the American Academy of Arts and Sciences.* Vol. 58, No. 11, May 1923.

JOSEPH LIPKA. On Hamilton's Canonical Equations and Infinitesimal Contact Transformations. *Journal of Mathematics and Physics.* Vol. 2, No. 1, January 1923.

JOSEPH LIPKA. On Irreversible Dynamical Systems. *Journal of Mathematics and Physics.* Vol. 2, No. 2, March 1923.

JOSEPH LIPKA. On Conformal Parallelism. *Journal of Mathematics and Physics.* Vol. 2, No. 3, May 1923.

C. L. E. MOORE. Note on the Vanishing of the Determinant of the Second Fundamental Form of Hypersurface. *Journal of Mathematics and Physics.* Vol. 2, March 1923.

H. B. PHILLIPS. Nets and the Dirichlet Problem (with N. WIENER). *Journal of Mathematics and Physics.* Vol. 2, March 1923.

L. H. RICE. Determinantal Relations Based on a Matrix Whose Elements Fall into Two Classes. *American Mathematical Bulletin.* Vol. 29, No. 4, April 1923.

J. S. TAYLOR. A Four-Space Representation of Complex Plane Analytics. *Journal of Mathematics and Physics.* Vol. 2, No. 1, November 1922.

NORBERT WIENER. Limit in Terms of Continuous Transformation. *Bulletin, Société Mathématique de France,* February 1923.

NORBERT WIENER. Note on a Paper of M. Banach. *Fundamenta Mathematicae.* Vol. 3 (Poland), February 1923.

NORBERT WIENER. Nets and the Dirichlet Problem (with H. B. PHILLIPS), *Journal of Mathematics and Physics.* Vol. 2, March 1923.

NORBERT WIENER. Space, Geometry and Experience (completed). *Monist.*

NORBERT WIENER. Differential Space. *Journal of Mathematics and Physics,* May 1923.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

TREASURER'S REPORT

FOR THE YEAR ENDED JUNE 30, 1923

August 16, 1923.

To the Auditing Committee of the
Massachusetts Institute of Technology,
Cambridge, Mass.

Gentlemen:

We hereby certify that we have examined the books and have audited the accounts of the Treasurer and Bursar of the Massachusetts Institute of Technology for the year ended June 30, 1923.

We have established the assets and liabilities of the Institute as set forth in the balance-sheet of the printed report of the Treasurer, including a comparison of the detailed list of securities with the certified list furnished by the Old Colony Trust Company.

The various schedules A to S, inclusive, except the supporting details of Schedule C, have been verified by us as being accurately drawn from the books and truly showing the intent of each schedule.

We have verified the details of the bookkeeping during the year and have satisfied ourselves that all receipts of money have been acknowledged on the books and deposited in the banks and that the cash balances shown by the books on June 30, 1923, were actually available and that these balances are correct.

We have also extended our audit to cover the transactions pertaining to the Wyeth and Hewett Funds, as the accounts of these funds are kept on the Institute books although not shown in the balance-sheet and income accounts.

Very respectfully,

(Signed) HARVEY S. CHASE AND COMPANY,
Certified Public Accountants.

REPORT OF THE AUDITING COMMITTEE TO THE CORPORATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

September 22, 1923.

This Committee reports that in carrying out its duties it has employed Messrs. Harvey S. Chase and Company, Certified Public Accountants, to examine the books and audit the accounts of the Treasurer and Bursar for the year ended June 30, 1923. The report of this company is attached.

AUDITING COMMITTEE,
MERTON L. EMERSON,
WILLIAM L. PUTNAM,
FRANCIS W. FABYAN.

Treasurer's Report

To the Corporation of
the Massachusetts Institute of Technology:

The statements submitted herewith show the financial condition of the Massachusetts Institute of Technology as of June 30, 1923, 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:

Estate of Francis A. Foster, for Francis A. Foster Fund	$1,000,000.00	
Subscriptions to M. I. T. Educational Endowment Fund	294,848.72	
Estate of Arthur F. Estabrook, for Arthur F. Estabrook Fund	75,000.00	
Estate of Edward S. Philbrick, for Edward S. Philbrick Fund	34,213.92	
Estate of J. Pauline Schenkl, for John P. Schenkl Scholarship Fund	20,000.00	
Estate of Samuel P. Colt, for Samuel P. Colt Fund	10,000.00	
Estate of Walter L. Frisbie, for Walter L. Frisbie Fund	7,614.98	
Estate of Harriet L. Brown, for Harriet L. Brown Scholarship Fund	6,024.79	
Anonymous Donor for Walker Memorial	5,000.00	
Estate of Hiram F. Mills, for Hiram F. Mills Fund	5,000.00	
Alumni Association of the Lowell Institute for Scholarship Fund	2,314.76	
Estate of A. H. Munsell, additional for A. H. Munsell Fund	530.04	
Subscriptions to M. I. T. Alumni Fund	70.00	
		$1,460,617.21

Gifts for Research:

American Tel. & Tel. Co., for Electrical Engineering Research	$10,000.00	
Subscriptions to Tech Plan Research Fund	5,100.00	
Subscriptions to Tractive Resistance of Roads Research Fund	3,000.00	
National Electric Light Asso., for Paper Insulated Cable Research	3,000.00	
American Tel. and Tel. Co., for Vail Library	2,000.00	
School of Public Health, Cambridge, for Public Health Fund.	1,000.00	
Knox Woolen Co., for Division Fund	500.00	
F. A. Woods, for Food Engineering Fund	150.00	
		$24,750.00

Miscellaneous Gifts:

General Electric Co., for Course VI-A	$5,000.00	
Charles W. Eaton, for Civil Engineering Summer Camp	1,500.00	
Graselli Chemical Co., for Scholarship and Fellowship	1,250.00	
Henry A. Morss, for Naval Architectural Department	600.00	
Estate of F. E. Weston, for Scholarships	400.00	
Miscellaneous for Course XV Fund	175.00	
		$8,925.00
		$1,494,292.21

Of the above total the sum of $26,925.00 was given for current expenses or research and has been carried into the income for the year.

The M. I. T. Educational Endowment Fund on June 30, 1923, amounted to $7,068,797.51. A condensed statement follows herewith:

Subscriptions		*Payments*
$4,000,000.00	George Eastman	$4,000,000.00
2,927,649.00	Alumni and Others	2,201,333.51
1,082,330.00	Technology Plan Contracts	867,464.00
$8,009,979.00	Total	$7,068,797.51

A comparison with last year's report shows many changes in the General Investments. This is partially due to the action of the Finance Committee in disposing of many odd lots of securities in our list which were received as gifts and replacing them with securities better fitted to remain in our Investment Account.

Attention is called to classification of the General Investments on page 38.

Dormitories are our most pressing need at the moment, and it is hoped that sufficient funds for this purpose may soon be forthcoming.

Respectfully submitted,

EVERETT MORSS

September 29, 1923. *Treasurer.*

SCHEDULE A

FINANCIAL RESULT OF THE YEAR ENDED JUNE 30, 1923 COMPARED WITH THE PREVIOUS YEAR

	1921–1922	1922–1923
Current Outgo (Schedule C)	$2,054,649.81	$2,083,603.31
Current Income (Schedule B)	2,012,008.98	2,096,893.11
Excess Expenditures	$42,640.83	.....
Excess Income	.....	$13,289.80
PROFIT AND LOSS		
Net Loss (Schedule S)	$12,260.79	$38,550.50
	$54,901.62	$25,260.70
Excess Expense of Funds, charged to funds	42,465.58	6,651.22
Decrease of Current Surplus (Schedule S)	$12,436.04	$18,609.48

SCHEDULE B

INCOME

	Regular Courses	*Research and Funds*	*Total*
INCOME FROM STUDENTS:			
(*a*) Tuition Fees	$957,476.30	.....	.....
(*a*) Laboratory Fees	46,753.43	.....	.....
Locker Fees	2,722.37	.....	.....
Entrance Examination Fees	3,268.00	.....	.....
Condition Examination Fees	22,790.00	.....	.....
Registration Fees	5,066.00	.....	.....
Sale of Lecture Notes, etc.	2,403.68	.....	.....
Dormitory, Net (Schedule C-6)	12,644.25	.....	.....
	$1,053,124.03	.....	$1,053,124.03
INCOME FROM INVESTMENTS:			
Endowments for General Purposes, (Schedule P)	$658,789.85	$1,539.57	$660,329.42
(*a*) Endowments for Scholarship Purposes, applied	43,520.00	.....	43,520.00
Endowments for other Designated Purposes	63,074.19	85,167.23	148,241.42
(*b*) Net, (Schedule Q)	$765,384.04	$86,706.80	$852,090.84
GRANTS FROM NATION:			
Federal Aid Income from Land Grant,			
Act 1862	$5,306.68	.....	.....
Act 1890	16,666.67	.....	.....
	$21,973.35	.....	$21,973.35
GIFTS FOR			
Course VI-A	$5,000.00	.....	$5,000.00

(*a*) Total Tuitions and Scholarships, including $4,860.00 applied to Scholarships from the Laboratory Fees Income, $1,005,856.30.

(*b*) Additional Income offset by Accrued Interest, Expenses, etc. $79,540.94.

	Regular Courses	*Research and Funds*	*Total*
MINOR FUND EARNINGS:			
Total, (Schedule R).	.....	$128,397.55	$128,397.55
INCOME FROM OTHER SOURCES:			
Division of Laboratory Supplies	$2,744.84	.....	.....
From Torpedo Research. . . .	3,938.40	.....	.....
Interest.	13,124.10	.....	.....
Huntington Hall	3,500.00	.....	.....
U. S. Smelting, Refining and Mining Co.	3,000.00	.....	.....
Walker Building	10,000.00	.....	.....
	$36,307.34	.....	$36,307.34
Total Income, (Schedule A) . .	$1,881,788.76	$215,104.35	$2,096,893.11

SCHEDULE C

OUTGO

	Regular Courses	*Research and Funds*	*Total*
ACADEMIC EXPENSES:			
Salaries of Teachers, (Schedule C-1)	$877,778.53	.....	.....
Wages Accessory to Teaching	29,694.33	.....	.....
Wages, Laboratory Service	47,206.75	.....	.....
Department Expenses (Schedule C-1)	128,706.95	.....	.....
Salaries and Expense of Library. (Schedule C-1)	33,952.39	.....	.....
Total Academic Expenses	$1,117,338.95	.....	$1,117,338.95
ADMINISTRATION EXPENSES:			
Salaries, Administrative Officers	$46,325.02	.....	.....
Wages, Clerical	70,668.96	.....	.....
Printing and Advertising, (Schedule C-2)	33,066.52	.....	.....
General Expense, (Schedule C-3)	73,796.95	.....	.....
Total Administration Expenses	$223,857.45	.....	$223,857.45
PLANT OPERATION AND MAINTENANCE:			
Wages, Building Service	$120,489.11	.....	.....
Power Plant Operation, (Schedule C-4)	129,579.97	.....	.....
Fire Insurance	8,389.73	.....	.....
Repairs, Alterations, etc., (Schedule C-5)	116,744.97	.....	.....
Total Plant Operation	$375,203.78	.....	$375,203.78
EXPENSES OF MINOR FUNDS (including salaries):			
Total, (Schedule R)	.....	$160,532.70	$160,532.70
*AWARDS:			
Edward Austin Fund (Research)	.....	$5,750.00	.....
Edward Austin Fund (Graduate Scholarship)	.....	9,982.98	.....
Teachers' Fund (Retiring Allowances	.....	7,889.84	.....
Robert A. Boit Fund, (Prizes)	.....	225.00	.....
Bursar's Fund, (Student Aid) Net	.....	534.42	.....
Graduate Scholarships and Fellowships	.....	4,946.00	....
Arthur Rotch Prize Fund	.....	400.00	....
Jonathan Whitney Fund:			
For T. C. A.	.....	1,200.00	....
For Dormitory Awards	.....	412.00	....
For Undergraduate Dues	.....	2,133.00	.....
For Student Aid	.....	954.23	.....
Total Awards	.....	$34,427.47	$34,427.47

*For other than Undergraduate Scholarship.

	Regular Courses	*Research and Funds*	*Total*
MISCELLANEOUS EXPENSES:			
Division of Industrial Coöperation and Research	$16,373.82	.....	.....
Summer Camp 1922	10,257.74	.....	.....
Athletic Field	6,174.35	.....	.....
Boat House	2,502.41	.....	.....
Dining Service (Schedule C-7)	.....	.....	.....
Walker Memorial (Schedule C-8)	17,079.87	.....	.....
Division of Laboratory Supplies, (Chemicals)	6,530.23	.....	.....
New Equipment (Net)	54,585.65	.....	.....
Society of Arts	1,854.02	.....	.....
Funds:			
Frank Harvey Cilley	.....	$2,073.37	.....
Ellen H. Richards Research	.....	567.82	.....
Pratt Naval Architectural	.....	13,514.06	
Technology Plan Research (Net)	.....	1,836.76	.....
Charles Lewis Flint Library	.....	167.12	.....
Technology Matrons' Teas	.....	106.26	.....
John Hume Tod	.....	185.59	.....
F. W. Boles Memorial	.....	1,184.09	.....
Edmund K. Turner	.....	2,040.00	.....
Charlotte B. Richardson	.....	1,600.00	.....
Edward Whitney	.....	3,000.00	.....
Total Miscellaneous	$115,358.09	$26,275.07	$141,633.16
PREMIUMS CHARGED OFF:			
General Investments	$8,067.47	.....	.....
Draper Fund Investments	22.00	.....	.....
Frank Harvey Cilley Fund	.....	$16.00	.....
Jonathan Whitney Fund	.....	504.33	.....
Total Premiums	$8,089.47	$520.33	$8,609.80
SPECIAL APPROPRIATIONS:			
Journal of Mathematics and Physics	$2,000.00	.....	.....
Research Laboratory of Applied Chemistry	9,000.00	.....	.....
Research Laboratory of Industrial Physics	4,000.00	.....	.....
Biology, Special Research	1,000.00	.....	.....
General Library, Special	1,000.00	.....	.....
Nutrition Research	3,500.00	.....	.....
Ednah Dow Cheney Fund	1,500.00	.....	.....
Total Special Appropriations	$22,000.00	.....	$22,000.00
Total Outgo, (Schedule A)	$1,861,847.74	$221,755.57	$2,083,603.31

SCHEDULE C-1
*DETAIL OF DEPARTMENT SALARIES AND EXPENSES (Net)

Department	Teachers' Salaries (Net)	Expenses (Net)	Overdrafts
Aëronautics	$5,900.00	$540.25	.....
Architecture	46,680.00	2,330.66	$130.66
Biology	19,784.94	2,500.00	.....
Biology, Fisheries Account	.....	600.00	.....
Chemistry	103,021.77	16,308.41	408.41
Chemical Engineering, No. 1	18,860.00	3,000.00	.....
Chemical Engineering No. 2	.....	539.14	.....
Chemical Engineering, No. 3	.....	459.96	.....
Chemical Engineering Practice School	21,967.50	14,500.00	.....
Chemical Engineering Practice (Special)	.....	949.10	.....
Physical Chemistry, Res. Lab. of	21,100.00	5,412.41	162.41
Civil Engineering	57,885.00	1,880.78	.....
Dean, Office of	.....	576.70	.....
Drawing	23,300.00	951.86	51.86
Economics	36,990.40	1,751.05	.....
Electrical Engineering	75,298.21	7,891.11	391.11
Electrical Engineering Special No. 1	.....	4,627.76	.....
Electrical Engineering, Special No. 2	.....	8,000.00	.....
Electrical Engineering Department Research	3,600.00	†.....	.....
English and History	41,058.34	510.08	10.08
English and History, Special No. 1	.....	493.52	.....
English and History, Special No. 2	.....	1,250.00	.....
General Engineering	500.00	51.97	.....
General Science	1,250.00	266.30	.....
Hygiene	12,364.58	2,792.97	.....
Mathematics	49,000.00	1,250.00	.....
Mechanical Engineering	126,200.14	19,500.00	.....
Mechanical Engineering, Special No. 1	.....	4,614.72	.....
Military Science	3,542.00	2,000.00	.....
Mining Engineering and Geology	43,231.79	6,222.91	.....
Modern Language	16,750.00	476.32	.....
Naval Architecture	22,900.00	1,797.67	.....
Physics	65,842.36	15,415.06	215.06
Industrial Physics, Res. Lab. of	6,660.00	†.....	.....
Summer Session Salaries	54,091.50	.....	.....
United States Ordnance Officers	.....	615.83	.....
Total Teachers' Salaries (Schedule C)	$877,778.53	$130,076.54	$1,369.59
Less Overdrafts	.....	1,369.59	.....
Net Expenses (Schedule C)	.....	128,706.95	.....
General Library (Including Staff) (Schedule C)	$20,452.39	$13,895.92	395.92
Less Overdraft	.....	395.92	.....
Net Expenses (Schedule C)	.....	$13,500.00	.....
Total Overdrafts (Schedule D-2)	.....	.....	$1,765.51

* Does not include Wages Accessory to Teaching nor Wages, Laboratory Service.
†See Minor Funds, Schedule R.

SCHEDULE C-2
DETAIL OF EXPENSE OF PRINTING AND ADVERTISING (Net)

For Administration Offices	$7,896.15
Advertising in Technology Publications	2,266.50
Other Publicity	946.37
President's and Treasurer's Reports	1,117.00
Catalog	2,392.62
Courses of Study	4,881.00
Examinations	2,462.25
Circular of General Information	2,122.00
Directory of Students	1,428.00
Summer Courses and Summer Camp Circulars	1,617.85
Reprints and Binding	1,100.00
Tabular View	1,688.28
Registration Material	2,245.25
Bulletins	903.25
Total, (Schedule C)	$33,066.52

SCHEDULE C-3
DETAIL OF ITEMS OF GENERAL EXPENSE (Net)

Administration Expense	$8,198.58
Carfares, etc.	916.95
Express, Freight, Telegrams, etc.	305.55
Fees, Dues, Commissions, etc.	21,484.81
Summer Session	470.99
General Office Supplies	576.74
Expenses of Graduation, etc.	9,406.31
Expenses of Inauguration	9,140.32
Ice, Spring Water	496.98
Collection of Endowment Fund	707.88
Postage	2,577.72
Traveling Expenses	1,975.60
Telephone Service	11,342.63
Trucking	3,030.40
Laundry	158.95
Identification Photograph	645.20
Miscellaneous	3,195.85
Total	$74,631.46
Less Credits Blue Printing	230.62
Photostat	466.21
Neostyle	137.68
Total, (Schedule C)	$73,796.95

SCHEDULE C-4
DETAIL OF POWER PLANT OPERATION (Net)

Coal	$100,118.16
Water	2,630.32
Electricity (Rogers)	2,504.22
Power Plant and Boiler Room Supplies	2,010.99
Repairs	11,827.82
Ashes and Trucking	1,060.78
Salaries	28,977.24
	$149,129.53
Less Sales of Electricity	19,549.56
Total, (Schedule C)	$129,579.97

SCHEDULE C-5
DETAIL OF PLANT, REPAIRS, ALTERATIONS AND MAINTENANCE

	Repairs	*Alterations*	*Supplies*	*Total*
General Educational Buildings:				
Group No. 1	$3,881.96	$2,238.84	$777.04	$6,897.84
Group No. 2	4,636.08	4,863.50	858.21	10,357.79
Group No. 3	6,475.62	4,370.78	1,233.97	12,080.37
Group No. 4	7,750.35	874.75	913.98	9,539.08
Group No. 5	874.91	.....	837.12	1,712.03
Group No. 8	2,422.57	4,313.07	748.49	7,484.13
Group No. 10	6,374.65	1,165.76	891.37	8,431.78
Rogers Building, Boston	3,520.14	819.94	387.11	4,727.19
Building 35, Mechanic Arts	629.97	123.41	127.24	880.62
Building 37, Gas Laboratory	34.95	.....	8.22	43.17
Service Building	173.92	.....	.....	173.92
President's House	984.34	.....	50.27	1,034.61
Furniture	3,960.27	.....	.....	3,960.27
Elevators	1,828.28	.....	.....	1,828.28
Garage	112.92	.....	17.66	130.58
Compressor House	232.56	.....	.....	232.56
Building 17, Storage	264.00	.....	.....	264.00
Building 19, Applied Chemistry	31.73	.....	28.26	59.99
Building 12, Hangar	430.74	17,169.79	.....	17,600.53
Building 21, Gas Engine Lab.	109.54	.....	8.36	117.90
Building 20, Wind Tunnels	87.03	.....	.....	87.03
Rifle Range	38.39	.....	.....	38.39
Fire Alarm	163.20	.....	.....	163.20
Grounds	15,096.93	573.17	131.74	15,801.84
Rubbish	1,166.06	.....	.....	1,166.06
Keys	288.35	.....	.....	288.35
Boat House	.....	969.70	.....	969.70
Water	.....	.....	6,401.80	6,401.80
Gas	.....	.....	3,423.30	3,423.30
Undistributed	848.66	.....	.....	848.66
Total, (Schedule C)	$62,418.12	$37,482.71	$16,844.14	$116,744.97

SCHEDULE C-6
DORMITORY ACCOUNT (Net)

Income:		
Cash	$44,304.22	
Less Rental Refunds	1,363.24	
Total		$42,940.98
Expenditures:		
Salaries	$10,627.19	
Laundry	1,240.02	
Heat, Light and Power	5,159.67	
Water	950.45	
Repairs	2,351.76	
Supplies	624.76	
Insurance	462.00	
Trucking, etc.	41.30	
Printing, etc.	162.84	
New Equipment	51.74	
Interest on Mortgage Loan (Whitney Fund)	8,625.00	
Total		$30,296.73
Net Income, (Schedule B)		$12,644.25

SCHEDULE C-7
DINING SERVICE ACCOUNT (Net)

Income:

Cash	$126,496.46	
Total		$126,496.46

Expenditures:

Food	$54,352.62	
Salaries	45,340.91	
Light, Heat, Power, etc.	5,035.97	
Laundry	2,482.80	
Printing and Advertising	1,090.70	
Ice, Refrigeration, etc.	2,907.68	
Repairs	1,215.70	
Administration Expense and Telephone	432.78	
Dining-room and Kitchen Utensils	1,721.74	
Soap, Cleansers, etc.	184.40	
Express, Freight and Trucking	125.80	
Insurance	365.00	
Equipment Depreciation	7,500.00	
Dining Service Reserve Fund	3,740.36	
Total		$126,496.46

SCHEDULE C-8
WALKER MEMORIAL ACCOUNT (Net)

Income:

Undergraduate Dues	$2,792.00	
Games	3,869.97	
Net Income		$6,661.97

Expenditures:

Salaries	$10,941.45	
Light, Heat, Power, etc.	4,542.50	
Water	741.84	
Repairs, Alterations and Upkeep	4,398.54	
Telephone, Trucking and Administration Expense	375.03	
Building and Janitors' Supplies	591.70	
Insurance	342.00	
Equipment	1,062.45	
Entertainment	746.33	
Net Expense		$23,741.84
Net Loss, (Schedule C)		$17,079.87

SCHEDULE D
TREASURER'S BALANCE SHEET

1
INVESTMENT ASSETS

Investments and Real Estate, (Schedule H)	$16,859,220.93
Cash: For Investments, (Schedule E)	374,515.54
Cash: Advanced for Current Purposes (per contra)	44,883.55
	$17,278,620.02

2
CURRENT ASSETS

Cash: For General Purposes, (Schedule E)	$15,731.70
Accounts Receivable, (Schedule D-1)	75,870.99
Students' Fees, Receivable	1,331.52
Students' Deposits, Receivable	907.89
Premiums Paid on Unexpired Insurance	19,567.95
Inventories and Advances for 1923–24 ,(Schedule D-2)	134,957.91
	$248,367.96

3
EDUCATIONAL PLANT ASSETS

Land, Buildings, and Equipment, (Schedule J)	$11,423,691.97
	$11,423,691.97

SCHEDULE D

JUNE 30, 1923

1

ENDOWMENT FUNDS

Funds, (Schedule Q)	$17,278,620.02
	$17,278,620.02

2

CURRENT LIABILITIES

Borrowed from Investment Assets (per contra)	$44,883.55
Minor Funds, (Schedule R)	87,710.47
Accounts Payable	6,983.78
Tuition Fees for Summer Session, 1923	57,517.70
Tuition Fees for 1923–1924	400.00
Students' Deposits 1922–23, Payable	6,452.75
Students' Deposits for Summer Session, 1923	4,000.94
Students' Deposits for 1923–24	50.00
Deposits for Summer Camp, 1923	2,726.98
Deposits for Uniforms, 1922–23, Payable	590.05
Dormitory Fees for Summer Session, 1923	2,600.58
Dormitory Fees for 1923–24	790.00
Undergraduate Dues, Balance	4,796.91
Dining Room Coupons, Outstanding	633.67
Total	$220,137.38
Surplus, Available for Current Expenses, (Schedule S)	28,230.58
Total	$248,367.96

3

EDUCATIONAL PLANT AND CAPITAL ACCOUNTS

Endowment for Educational Plant, (Schedule K)	$11,423,691.97
	$11,423,691.97

SCHEDULE D-1
DETAIL OF ACCOUNTS RECEIVABLE

United States Government, Miscellaneous Contract	$8,732.61
For Account of Research Laboratory of Applied Chemistry	8,899.18
Boston University	12,350.00
Knights of Columbus	350.48
United States Veterans' Bureau	11,748.67
United States Naval Academy	7,504.13
Harvard Coöperative Society, Inc.	2,500.29
Rentals Due	7,906.68
Miscellaneous Accounts	15,878.95
Total (Schedule D)	$75,870.99

SCHEDULE D-2
DETAIL OF INVENTORIES AND ADVANCES FOR 1923-1924

Department Overdrafts (Schedule C-1)	$1,765.51
Advance to C. E. P. Club House	495.77
Summer Session Salaries	2,775.00
Civil Engineering Summer Camp 1923	4,976.03
Mining Engineering Summer Camp 1923	151.34
Inventories — Notes held by Coöperative Society	3,834.14
Dining Service, Food, Cigars, Utensils, etc.	21,229.99
Walker Memorial, Games, Candy, Cigars, etc.	392.16
Office Supplies	2,369.78
Building and Janitors' Supplies	3,042.05
Architectural Students' Supply Room, Stock	1,416.25
Stock Room: Pipe, Fittings, Lumber, Hardware, Paint, Oil, Glass and Miscellaneous Supplies	24,926.50
Division of Laboratory Supplies; Chemicals, Glassware, Platinum, etc.	67,583.39
Total (Schedule D)	$134,957.91

SCHEDULE E
TOTAL CASH RECEIPTS AND DISBURSEMENTS FOR THE YEAR

Total Cash Receipts	$7,834,756.03
Total Cash Disbursements	7,742,551.45
Excess of Receipts	$92,204.58
Cash, June 30, 1922	298,042.66
Cash, June 30, 1923	$390,247.24

CASH BALANCE

Cash for Investment — on Deposit		$374,515.54
Cash for Current Purposes:		
On Deposit	$13,614.24	
In Office	2,117.46	
		$15,731.70
Total Cash (Schedule D)		$390,247.24

SCHEDULE H

INVESTMENTS, BONDS, STOCKS

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1922
	GOVERNMENT AND MUNICIPAL BONDS			
$260,000	Canada, Dominion of, 30-Year Gold	5%	1952	.....
1,000	Cincinnati, City of, Street Imp.	4½%	1933	$1,019.00
500	Cincinnati, City of, Street Imp.	4½%	1935	531.60
1,000	Cincinnati, City of, Street Imp.	4½%	1935	1,063.40
6,500	Cincinnati, City of, Condemnation	4½%	1945	7,114.00
100,000	Columbus, City of, Water Ext. No. 2	4½%	1944	107,184.00
85,000	Great Britain and Ireland	5½%	1937	86,097.00
18,000	Kansas City, Sewer, 2d Issue	4½%	1935	19,027.08
5,000	Kansas City, 23d St. Trafficway	4½%	1935	5,285.30
50,000	Los Angeles, City of, Water Works	4½%	1942	52,429.00
10,000	Los Angeles, City of, Water Works	4½%	1943	10,372.00
15,000	Los Angeles, City of, Water Works	4½%	1943	15,558.00
50,000	Maisonneuve, City of (Montreal)	5%	1954	.....
19,000	Milwaukee Co. House of Correction	4½%	1927	19,374.30
19,000	Milwaukee Co. House of Correction	4½%	1928	19,456.34
19,000	Milwaukee Co. House of Correction	4½%	1929	19,533.34
19,000	Milwaukee Co. House of Correction	4½%	1930	19,605.34
19,000	Milwaukee Co. House of Correction	4½%	1931	19,675.34
5,000	Milwaukee Co. House of Correction	4½%	1932	5,091.34
25,000	Montreal, City of	5%	1936	25,000.00
100,000	Montreal, City of	5%	1942	.....
60,000	New York, City of, Corporate Stock	4¼%	1964	62,343.00
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	52,601.00
50,000	Omaha, City of, Water Works	4½%	1941	53,563.00
50,000	Ontario, Province of, Debenture	5%	1926	50,000.00
50,000	Ontario, Province of, Debenture	5½%	1937	50,687.50
50,000	Ontario, Province of, Debenture	6%	1943	.....
50,000	Ontario, Province of, Debenture	5%	1952	.....
41,000	Ottawa, City of, Ontario	4½%	1930	39,003.30
1,000	Ottawa, City of, Ontario	4½%	1935	.....
2,000	Ottawa, City of, Ontario	5%	1930	.....
10,000	Ottawa, City of, Ontario	5%	1945	.....
7,000	Ottawa, City of, Ontario	5½%	1931	.....
42,000	Ottawa, City of, Ontario	5½%	1932	.....
60,000	Ottawa, City of, Ontario	5½%	1939	.....
2,000	Ottawa, City of, Ontario	6%	1927	.....
1,000	Ottawa, City of, Ontario	6%	1929	.....

SCHEDULE H

REAL ESTATE AND MORTGAGES

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$258,511.88	.....	$258,511.88	$4,111.12	$13,000.00
.....	$ 2.00	1,017.00	.....	45.00
.....	3.60	528.00	.....	22.50
.....	5.40	1,058.00	.....	45.00
.....	5.00	7,109.00	.....	292.50
.....	354.00	106,830.00	.....	4,500.00
.....	79.00	86,018.00	.....	4,675.00
.....	86.08	18,941.00	.....	810.00
.....	24.30	5,261.00	.....	225.00
.....	128.00	52,301.00	.....	2,250.00
.....	19.00	10,353.00	.....	450.00
.....	28.00	15,530.00	.....	675.00
49,000.00	.....	49,000.00	763.89	2,500.00
.....	94.30	19,280.00	.....	855.00
.....	91.34	19,365.00	.....	855.00
.....	88.34	19,445.00	.....	855.00
.....	86.34	19,519.00	.....	855.00
.....	84.34	19,591.00	.....	855.00
.....	10.34	5,081.00	.....	225.00
.....	.....	25,000.00	.....	1,250.00
97,500.00	.....	97,500.00	1,763.89	2,500.00
.....	57.00	62,286.00	.....	2,550.00
.....	.....	4,625.00	.....	225.00
.....	.....	33,000.00	.....	1,320.00
.....	237.00	52,364.00	.....	2,250.00
.....	198.00	53,365.00	.....	2,250.00
.....	.....	50,000.00	.....	2,500.00
.....	49.50	50,638.00	.....	2,750.00
54,875.00	244.00	54,631.00	525.00	1,500.00
49,250.00	.....	49,250.00	201.39	1,250.00
.....	.....	39,003.30	.....	1,845.00
945.00	.....	945.00	11.38	22.50
1,995.00	.....	1,995.00	25.28	50.00
9,975.00	.....	9,975.00	126.39	250.00
7,144.90	18.90	7,126.00	141.02	192.50
42,945.00	105.00	42,840.00	847.12	1,155.00
62,328.00	146.00	62,182.00	1,210.03	1,650.00
2,080.00	20.00	2,060.00	30.33	60.00
1,048.50	8.50	1,040.00	15.17	30.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1922*
	GOVERNMENT AND MUNICIPAL BONDS (*Continued*)			
$1,000	Ottawa, City of, Ontario	6%	1931	.....
5,000	Ottawa, City of, Ontario	6%	1936	.....
1,000	Ottawa, City of, Ontario	6%	1938	.....
8,000	Ottawa, City of, Ontario	6%	1939	.....
8,000	Ottawa, City of, Ontario	6%	1940	.....
1,000	Ottawa, City of, Ontario	6%	1948	.....
10,000	Ottawa, City of, Ontario	6%	1951	.....
50,000	Toronto, City of, Ontario, Gen. Loan	5%	1932	$50,000.00
5,000	Toronto, City of, Ontario	6%	1934	.....
10,000	City of Toronto, Ontario	5%	1935	.....
35,000	Toronto, City of, Ontario	5%	1936	.....
18,000	Toronto, City of, Ontario	5%	1937	.....
23,000	Toronto, City of, Ontario	5%	1939	.....
9,000	Toronto, City of, Ontario	5%	1942	.....
23,000	Toronto, City of, Consolidated Loan	6%	1944	24,402.70
18,000	Toronto, City of, Consolidated Loan	6%	1945	19,124.40
9,000	Toronto, City of, Consolidated Loan	6%	1946	9,574.40
446,800	United States of A., 3d Liberty Loan	4¼%	1928	414,800.00
75,000	United States of A., 4th Liberty Loan	4¼%	1938	68,050.00
40,000	Winnipeg, City of, Debenture	5%	1926	39,350.00
50,000	Winnipeg, City of, Debenture	5%	1943	.....
7,000	Winnipeg, City of, Gr. Water Dist.	5%	1952	.....
25,000	Winnipeg, City of	6%	1946	.....
	Sold or matured during year			689,012.62
$2,268,800	*Total Government and Municipal Bonds*			$2,093,553.30
	INDUSTRIAL BONDS			
$25,000	Aluminum Co. of America	7%	1925	.....
50,000	Am. Agri. Chem. Co., 1st Ref. S. F.	7½%	1941	$48,500.00
88,000	American Sugar Ref. Co.	6%	1937	.....
100,000	American Thread Co., 1st Mtg.	6%	1928	73,500.00
50,000	Anaconda Cop. Min.Co.,1st Con."A"	6%	1953	.....
100,000	Armour & Co., Real Estate 1st Mtg.	4½%	1939	41,431.25
25,000	Armour & Co. of Del., 1st Mtg. "A"	5½%	1943	.....
10,000	Brown Co., Serial Gold Deb. "C"	6%	1929	.....
10,000	Brown Co., Serial Gold Deb. "C"	6%	1930	.....
10,000	Brown Co., Serial Gold Deb. "C"	6%	1931	.....
10,000	Brown Co., Serial Gold Deb. "C"	6%	1932	.....
5,000	Brown Co., Serial Gold Deb. "C"	6%	1933	.....

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$1,055.00	$7.00	$1,048.00	$15.17	$30.00
5,394.00	34.00	5,360.00	75.83	150.00
1,091.20	6.20	1,085.00	15.17	30.00
8,716.00	45.00	8,671.00	121.33	240.00
8,741.60	43.60	8,698.00	121.33	240.00
1,100.40	4.40	1,096.00	15.17	30.00
11,000.00	36.00	10,964.00	151.67	300.00
.....	.....	50,000.00	.....	2,500.00
5,257.50	23.50	5,234.00	95.83	150.00
9,845.00	.....	9,845.00	159.72	250.00
34,475.00	.....	34,475.00	559.03	875.00
17,721.00	.....	17,721.00	287.50	450.00
22,655.00	.....	22,655.00	367.36	575.00
8,830.80	.....	8,830.80	143.75	225.00
.....	66.70	24,336.00	.....	1,380.00
.....	51.40	19,073.00	.....	1,080.00
.....	25.40	9,549.00	.....	540.00
35,477.05	4,000.00	446,277.05	268.57	18,276.78
6,848.81	.....	74,898.81	24.78	3,039.83
.....	.....	39,350.00	.....	2,000.00
48,750.00	.....	48,750.00	458.34	.....
6,790.00	.....	6,790.00	106.94	350.00
27,000.00	87.00	26,913.00	583.33	1,500.00
.....	689,012.62	.....	11.80	33,381.80
$898,346.64	$695,716.10	$2,296,183.84	$13,354.63	$127,183.41
$25,875.00	$438.00	$25,437.00	$777.78	$875.00
.....	.....	48,500.00	.....	3,750.00
102,900.00	12,531.00	90,369.00	1,201.00	.....
26,000.00	.....	99,500.00	637.83	6,000.00
49,125.00	.....	49,125.00	341.67	.....
45,187.50	.....	86,618.75	1,068.75	4,500.00
24,000.00	.....	24,000.00	64.93	.....
9,912.50	.....	9,912.50	16.66	.....
9,912.50	.....	9,912.50	16.67	.....
9,912.50	.....	9,912.50	16.67	.....
9,912.50	.....	9,912.50	16.67	.....
4,950.00	.....	4,950.00	8.33	.....

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1923*
	INDUSTRIAL BONDS (*Continued*)			
$5,000	Brown Co., Serial Gold Deb. "C"	6%	1934	.....
50,000	Central Leather Co., 1st Lien	5%	1925	.....
150,000	Consol. Coal Co., 1st & Ref. Mtg. S.F.	5%	1950	.....
50,000	Corning Gl. Wks. S.F. Gold Deb. "A"	5½%	1937	.....
32,000	General Electric, Gold Deb.	5%	1952	$64,827.00
100,000	Gulf Oil Corp. of Pennsylvania	5%	1937	.....
25,000	Simonds Saw & Steel Co., Deb. "F"	5½%	1929	.....
25,000	Simonds Saw & Steel Co., Deb. "G"	5½%	1930	.....
50,000	Smith & Wesson Inc., 1st Mtg. S. F.	5½%	1938	.....
75,000	Swift & Co., 1st S. F.	5%	1944	22,625.00
50,000	Union Twist Drill Co., 1st Mtg. S. F.	7%	1932	48,875.00
98,000	U. S. Steel, 10–60 Yr. S. F.	5%	1963	121,676.50
50,000	Waltham Watch & Clock Co.	6%	1943	.....
	Sold or matured during year			218,074.25
$1,243,000	*Total Industrial Bonds*			$639,509.00

			Shares	
	INDUSTRIAL STOCKS			
$2,500	Ahmeek Mining Company, Capital	...	100	.....
5,000	American Sugar Refining Co., Pref.	7%	50	$5,900.00
50,000	Amoskeag Mfg. Co., Pref.	4½%	500	27,471.50
34,200	Amoskeag Mfg. Co., Common	4½%	342	25,285.50
50,000	Anaconda Copper Co., Capital	...	1,000	.....
50,000	Campbell's Soup, Pfd.	7%	500	.....
11,500	Charlton Mills, Capital	8%	115	.....
50,000	Eastern Mfg., Pref.	7%	500	49,000.00
*1,250,000	Eastman Kodak Co., Common	5%	12,500	.....
17,500	Flint Mills, Capital	...	175	.....
50,000	General Electric Company, Capital	13%	500	42,805.50
7,960	General Electric Co., Special	6%	796	.....
10,000	Goodyear Tire & Rubber Co., Pref.	...	100	10,000.00
800	Hamilton Woolen Company, Capital	6%	8	8,137.92
14,300	Lancaster Mills, Capital	10%	143	9,642.64
5,800	Lincoln Mfg. Company, Capital	8%	58	7,800.00
29,000	Merchants' Mfg. Co., Capital	8%	290	.....
50,000	Nashua Mfg. Company, Common	...	500	27,911.51
6,800	Naumkeag Steam Cotton Co., Capital	15%	68	.....
50,000	Norton Company, Cumulative Pref.	7%	500	50,000.00
*32,500	Pacific Oil Co., Capital	...	650	.....

* No par value.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$4,950.00	.....	$4,950.00	$8.33	.....
49,625.00	.....	49,625.00	76.39	.....
135,243.75	.....	135,243.75	2,555.56	$7,500.00
49,500.00	.....	49,500.00	.....	1,375.00
.....	$31,931.00	32,896.00	.....	2,375.00
96,750.00	.....	96,750.00	13.89	2,500.00
24,687.50	.....	24,687.50	164.23	.....
24,645.00	.....	24,645.00	34.38	.....
49,500.00	.....	49,500.00	68.75	.....
48,202.50	.....	70,827.50	923.76	2,400.00
.....	.....	48,875.00	.....	3,500.00
.....	21,683.50	99,993.00	.....	5,475.00
49,000.00	.....	49,000.00	116.67	750.00
.....	218,074.25	.....	.....	10,852.34
$849,791.25	$284,657.75	$1,204,642.50	$8,128.92	$51,852.34
$11,350.00	$6,634.00	$4,716.00	.....	$500.00
.....	.....	5,900.00	.....	350.00
13,923.50	.....	41,395.00	.....	1,685.25
.....	.....	25,285.50	.....	1,539.00
47,500.00	.....	47,500.00	.....	750.00
52,000.00	.....	52,000.00	$48.61	1,750.00
11,550.00	63.96	11,486.04	.....	384.00
.....	.....	49,000.00	.....	.....
4,000,000.00	3,385,001.41	614,998.59	.....	218,750.00
26,910.00	82.96	26,827.04	.....	818.00
35,027.60	.....	77,833.10	.....	4,056.00
8,600.00	.....	8,600.00	.....	238.80
.....	.....	10,000.00	.....	.....
.....	7,827.64	310.28	.....	504.00
9,240.00	.....	18,882.64	.....	2,710.00
.....	5,135.50	2,664.50	.....	744.00
49,300.00	.....	49,300.00	.....	1,160.00
.....	.....	27,911.51	.....	.....
17,136.00	.....	17,136.00	.....	1,020.00
.....	.....	50,000.00	.....	3,500.00
29,981.25	.....	29,981.25	.....	975.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Shares*	*Balance June 30, 1920*
	INDUSTRIAL STOCKS (*Continued*)			
$7,700	Pepperell Mfg. Co., Common	8%	77	$6,845.50
12,600	Plymouth Cordage Company	10%	126	11,970.00
19,700	Pullman Company, Capital	8%	197	31,520.00
6,500	Queen City Cotton Co., Capital	6%	65	.....
*7,500	Samson Cordage Company	10%	75	5,000.00
36,000	Sanford Mills, Pref.	7%	360	50,000.00
75	Swift Compania Internacional	...	5	.....
16,500	Southern Pipe Line Co., Capital	12%	165	.....
24,000	Union Cotton Mfg. Co., Capital	6%	240	.....
160,000	United Fruit Company, Capital	10%	1,600	127,362.50
50,000	U. S. Steel Corp., Cum. Pref.	7%	500	55,162.50
25,000	U. S. Worsted Company, 1st Pref.	...	250	25,000.00
32,100	Wamsutta Mills, Capital	6%	321	.....
5,000	Westinghouse Elec. & Mfg. Co., Pref.	8%	100	6,393.90
37,500	Westinghouse Elec. & Mfg. Co., Com.	8%	750	9,106.54
50,000	Winnsboro Mills, Pref.	7%	500	51,000.00
	Sold during year			79,715.57
$2,268,035	*Total Industrial Stocks*			$723,031.08

	PUBLIC UTILITY BONDS		*Maturity*	
$100,000	Adirondack P'r & Lt. Corp., 1st Ref. Gold	6%	1950	.....
100,000	Alabama Power Co.	5%	1946	.....
141,000	Am. Tel. & Tel. Co., Col. Trust	4%	1929	$114,025.00
82,000	Am. Tel. & Tel. Co., Col. Trust	5%	1946	2,900.00
500	Beaumont Gas Lt. Co., 1st Mtge. Gold	6%	1944	500.00
50,000	Bell Telephone Co. of Canada, Ltd.	7%	1925	.....
50,000	Blackstone Valley Gas & El. Co., Mtg.	5%	1939	50,173.00
45,000	Boston Elevated Ry. Co.	6%	1933	.....
70,000	Brooklyn Rapid Tr. Co. Ctf. of Dep.	7%	1921	70,000.00
190,000	Cedars Rapids Mfg. & P. Co., 1st Mt. S. F.	5%	1953	27,975.00
50,000	Central Maine Power Co., Gold	6%	1926	.....
25,000	Chesapeake & Potomac Tel. Co., S.F. "A"	5%	1943	24,500.00
50,000	Chicago City Railway Co., 1st Mtge.	5%	1927	49,750.00
120,000	Commonwealth Edison Co., 1st Mtge.	5%	1943	.....
150,000	Cleveland Elec. Ill. Co., 1st Mtge.	5%	1939	101,534.00
50,000	Commonwealth Electric Co., 1st Mtge.	5%	1943	47,937.50
49,000	Conn. Lt.& Power Co., 1st Mtge. S.F. "A"	7%	1951	47,250.00
100,000	Con. Gas, Elec. Lt. & Power Co., Mtge.	4½%	1935	63,630.00

*No par value.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$6,845.50	.....	$616.00
.....	.....	11,970.00	.....	661.50
.....	.....	31,520.00	.....	1,576.00
$5,850.00	.....	5,850.00	.....	195.00
.....	.....	5,000.00	.....	750.00
.....	$14,700.00	35,300.00	.....	3,500.00
75.00	.....	75.00	.....	9.00
16,500.00	.....	16,500.00	.....	990.00
36,000.00	.....	36,000.00	.....	720.00
.....	.....	127,362.50	.....	16,000.00
.....	.....	55,162.50	.....	3,500.00
.....	619.00	24,381.00	.....	.....
32,528.00	.....	32,528.00	.....	963.00
.....	.....	6,393.90	.....	400.00
32,306.81	.....	41,413.35	.....	1,592.00
.....	.....	51,000.00	.....	3,500.00
.....	79,715.57	.....	.....	3,293.95
$4,435,778.16	$3,499,780.04	$1,659,029.20	$48.61	$279,700.50

$102,000.00	$75.00	$101,925.00	$208.33	.....
94,000.00	.....	94,000.00	250.00	.....
24,000.00	.....	138,025.00	258.34	$4,620.00
80,595.00	2,947.10	80,547.90	1,640.00	4,205.42
.....	.....	500.00	.....	30.00
51,625.00	813.00	50,812.00	48.61	.....
.....	11.00	50,162.00	.....	2,500.00
44,100.00	.....	44,100.00	52.50	.....
.....	.....	70,000.00	.....	.....
150,200.00	.....	178,175.00	1,916.66	6,500.00
49,625.00	.....	49,625.00	166.67	.....
.....	.....	24,500.00	.....	1,250.00
.....	.....	49,750.00	.....	2,500.00
148,500.00	29,100.00	119,400.00	1,875.00	3,375.00
49,687.50	76.50	151,145.00	378.47	6,250.00
.....	.....	47,937.50	.....	2,500.00
.....	1,100.00	46,150.00	.....	3,465.00
29.560.00	.....	93,190.00	556.00	3,780.00

Schedule H (*Continued*)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1922
	PUBLIC UTILITY BONDS (*Continued*)			
$100,000	Consumers Power Co., 1st L. & Ref. . .	5%	1936	$50,000.00
50,000	Cumberland County Power & Lt. Co. .	5%	1942	.....
51,000	Cumberland Tel. & Tel. Co., 1st Mtge. .	5%	1937	50,305.75
25,000	Detroit Edison Co., 1st Mtge.	5%	1933	25,336.00
151,000	Detroit Edison Co., 1st & Ref. Mtge. "A"	5%	1940	50,095.00
105,000	Duquesne Lt. Co., 1st Mtge., Coll. Tr. "A"	6%	1949	30,720.75
35,000	East. Mass. St. Ry. Co., Ref. Mtge. . .	4½%	1948	35,000.00
200,000	Edison Elec. Ill. Co., 3-Year Notes . . .	5½%	1925	123,937.50
17,000	Elec. Securities Corp., Col. Tr. S. F. . .	5%	1940	16,830.00
2,000	Elec. Securities Corp., Col. Tr. S. F. . .	5%	1942	990.00
44,000	Elec. Securities Corp., Col. Tr. S. F. . .	5%	1943	25,000.00
25,000	Em. Gas & El. Co. & Em. Coke Co., Jt.	5%	1941	18,250.00
47,000	Georgia Ry. & El. Co., 1st Cons. Mt. . .	5%	1932	47,639.00
1,000	Georgia & Southern Utilities Co.	8%	1922	1,000.00
100	Georgia & Southern Utilities, 1st Mtge. .	6%	1932	100.00
50,000	Great Lakes Power Co., Ltd., 1st Mtge.	6%	1943	43,187.50
25,000	Great Western Power Co.	6%	1925	.....
150,000	Hydraulic Pr. Co. of Niag. F'lls, Ref.& Im.	5%	1951	42,500.00
50,000	Illinois Bell Telephone Co.	5%	1956	.....
7,000	Illinois Gas Co., 1st Mtge. Gold	6%	1933	5,460.00
25,000	Indianapolis Water Co., 1st Lien & Ref.	5½%	1953	.....
50,000	Interboro Rapid Transit Co., 1st Mtge. Ref.	5%	1966	49,562.50
50,000	Laclede Gas Lt. Co., 1st Mtge. Coll.& Ref.	5½%	1953	.....
200,000	Laurentide Power Co., Ltd., 1st Mtge. S.F.	5%	1946	45,730.00
100,000	Los Angeles Gas & Elec. Corp., Ref. "F" .	5½%	1943	.....
100,000	Louisville Gas & Elec. Co., 1st & Ref. Mtge.	5%	1952	.....
100,000	Massachusetts Gas Co., Consolidated . .	4½%	1931	96,812.50
50,000	Milwaukee Elec. Ry. & Lt. Co.	5%	1961	.....
100,000	Milwaukee Gas Light Co., 1st Mtge. . .	4%	1927	61,932.50
50,000	Minneapolis Gen. Elec. Co., Mtge. . . .	5%	1934	50,325.00
75,000	Mississippi River Power Co., 1st. Mtge. .	5%	1951	18,531.25
100,000	Montreal Light, Heat & Power Co. . . .	4½%	1932	.....
50,000	New England Tel. & Tel. Co., Deb. . .	5%	1932	50,599.00
50,000	New England Tel. & Tel. Co., Deb. . .	4%	1930	50,154.00
100,000	New Orleans Pub.Serv.Inc., 1st Ref.Mtge.	5%	1952	.....
55,000	New York Telephone Co., 1st Mtge. . .	4½%	1939	53,130.86
50,000	Norfolk & Portsmouth Trac. Co., 1st Mtge.	5%	1936	.....
50,000	Northern States Pr. Co., 1st & Ref. Mtge.	5%	1941	.....
25,000	Northwestern Bell Tel. Co., 1st Mtge. .	7%	1941	24,151.88

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$49,000.00	.....	$99,000.00	$798.61	$3,750.00
46,000.00	.....	46,000.00	104.17	.....
.....	.....	50,305.75	.....	2,550.00
.....	$39.00	25,297.00	.....	1,250.00
98,275.00	.....	148,370.00	884.44	5,025.00
77,668.75	139.50	108,250.00	1,431.84	4,050.00
.....	.....	35,000.00	.....	2,575.00
75,468.75	.....	199,406.25	928.13	6,875.00
.....	.....	16,830.00	.....	850.00
968.75	.....	1,958.75	11.39	75.00
18,406.25	.....	43,406.25	216.39	1,725.00
.....	.....	18,250.00	.....	1,250.00
.....	71.00	47,568.00	.....	2,350.00
.....	.....	1,000.00	.....	.....
.....	.....	100.00	.....	6.00
.....	.....	43,187.50	.....	3,000.00
25,000.00	.....	25,000.00	620.83	750.00
99,500.00	.....	142,000.00	497.92	5,000.00
47,375.00	.....	47,375.00	187.50	.....
.....	.....	5,460.00	.....	.....
24,000.00	.....	24,000.00	175.70	.....
.....	.....	49,562.50	.....	2,500.00
48,100.00	.....	48,100.00	106.95	.....
145,000.00	.....	190,730.00	2,447.92	5,625.00
95,750.00	.....	95,750.00	1,237.50	.....
91,250.00	.....	91,250.00	194.44	2,500.00
.....	.....	96,812.50	.....	4,500.00
46,125.00	.....	46,125.00	1,076.39	2,500.00
31,365.00	.....	93,297.50	75.55	3,320.00
.....	30.00	50,295.00	.....	2,500.00
47,102.50	.....	65,633.75	777.79	2,500.00
93,812.50	.....	93,812.50	1,540.63	1,687.50
.....	71.00	50,528.00	.....	2,500.00
.....	22.00	50,132.00	.....	2,000.00
89,875.00	.....	89,875.00	1,048.61	1,875.00
.....	.....	53,130.86	.....	2,475.00
46,375.00	.....	46,375.00	1,125.00	2,500.00
45,000.00	.....	45,000.00	1,138.89	1,250.00
.....	.....	24,151.88	.....	1,750.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1922*
	PUBLIC UTILITY BONDS (*Continued*)			
$50,000	Ontario Power Company	5%	1943	.....
25,000	Pacific Gas & Elec. Co., 1st & Ref. "C"	5½%	1952	.....
75,000	Pacific Gas & El. Co., 1st Ref. Mtge. "B"	6%	1941	.....
75,000	Pacific Tel.& Tel. Co., 1st Mt., Col. Tr.S.F.	5%	1937	$73,915.10
25,000	Portland Gen. Electric Co., 1st Mtge.	5%	1935	25,328.00
25,000	Potomac Edison Co., 1st Mtge. "A"	6½%	1948	.....
50,000	Potomac Elec. Power Co., Mtge. "B"	6%	1953	.....
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	Shawinigan Wr. & Pr. Co., 1st Mtge. Ref.	6%	1950	51,147.00
100,000	Southern Bell Tel.& Tel. Co., 1st Mt. S.F.	5%	1941	101,077.00
160,000	Southern Calif. Edison Co., Gen. Mtge.	5%	1939	44,550.00
25,000	Terre Haute Tract. & Light Co., Mtge.	5%	1944	25,000.00
100,000	Texas Power & Light Company	5%	1937	.....
4,000	United Elec. Securities Co., Col. Tr. S.F.	5%	1940	.....
50,000	West Penn. Power Co., 1st Mtge. "E"	5%	1963	.....
2,500	Western Pub. Serv. Co., Mtge. Lien Conv.	6½%	1923	.....
2,500	Western Pub. Serv. Co., Mtge. Lien Conv.	6½%	1924	.....
75,000	Western Tel. & Tel. Co., Col. Tr.	5%	1932	75,630.00
	Sold or matured during year			169,180.25
$4,950,600	*Total Public Utility Bonds*			$2,299,337.84
	PUBLIC UTILITY STOCKS		*Shares*	
$50,000	American Tel. & Tel. Co., Capital	9%	500	$22,885.81
19,800	Boston Elevated Ry. Co., Common	6%	198	16,636.00
200	Boston Elevated Ry. Co., 1st Pfd.	8%	2	.....
7,500	Brooklyn Union Gas Co., Capital	8%	75	.....
16,800	Cambridge Gas Light Co., Capital	12%	168	34,875.00
5,000	Mass. Gas Companies, Preferred	4%	50	4,100.00
10,300	Salem Gas Light Co., Common	8%	103	17,200.00
	Sold during year			7,862.97
$109,600	*Total Public Utility Stocks*			$103,559.78
	RAILROAD BONDS			
$75,000	Atch., Top. & S. F., Cal. & Ariz. Lines	4½%	1962	$73,143.75
100,000	Atch. Top. & Santa Fe, Gen. Mtge.	4%	1995	72,000.00
60,000	Baltimore & Ohio R.R. Co., S.W. Div.	3½%	1925	48,890.00
40,000	Balt. & Ohio Co., S.W. Div., Reg.	3½%	1925	37,600.00
2,000	Campbell's Creek R.R. Co., 1st Mtge.	5%	1924	2,000.00
50,000	Cen. Pacific Ry. Co., Short Line Mtge.	4%	1954	40,918.75

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$49,312.50	.....	$49,312.50	$638.89	$1,250.00
24,562.50	.....	24,562.50	328.47	687.50
79,250.00	$190.00	79,060.00	1,759.33	3,750.00
.....	.....	73,915.10	.....	3,750.00
.....	28.00	25,300.00	.....	1,250.00
24,250.00	.....	24,250.00	157.99	.....
50,625.00	.....	50,625.00	525.00	.....
.....	.....	47,625.00	.....	2,500.00
.....	.....	18,430.00	.....	950.00
52,750.00	153.00	103,744.00	958.33	4,500.00
.....	60.00	101,017.00	.....	5,000.00
113,575.00	.....	158,125.00	2,027.77	5,125.00
.....	.....	25,000.00	.....	1,250.00
95,500.00	.....	95,500.00	2,020.82	5,000.00
4,022.00	2.00	4,020.00	.....	200.00
44,875.00	.....	44,875.00	229.17	.....
2,500.00	.....	2,500.00	.....	116.50
2,500.00	.....	2,500.00	.....	149.25
.....	70.00	75,560.00	.....	3,750.00
.....	169,180.25	.....	.....	5,858.39
$2,709,032.00	$204,178.35	$4,804,191.49	$32,622.94	$169,125.56
$36,649.00	.....	$59,534.81	.....	$2,565.00
.....	.....	16,636.00	.....	1,163.25
180.00	.....	180.00	.....	16.00
8,587.50	.....	8,587.50	.....	300.00
2,213.00	.....	37,088.00	.....	1,938.00
.....	.....	4,100.00	.....	200.00
1,700.00	$10.79	18,889.21	.....	756.00
.....	7,862.97	.....	.....	288.00
$49,329.50	$7,873.76	$145,015.52	.....	$7,226.25
.....	.....	$73,143.75	.....	$3,375.00
$24,470.00	.....	96,470.00	.....	4,000.00
5,310.00	.....	54,200.00	.....	2,100.00
.....	.....	37,600.00	.....	1,400.00
.....	.....	2,000.00	.....	100.00
.....	.....	40,918.75	.....	2,000.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1922*
	RAILROAD BONDS (*Continued*)			
$100,000	Chesapeake & Ohio Ry. Co., Mtge.	5%	1939	$98,540.00
51,000	Chicago, Burlington & Quincy, Mtge.	4%	1958	47,307.00
50,000	Chic.Junc. Rys.& Un.St.Yds.Mt.& Co. Tr.	4%	1940	49,250.00
75,000	Chic.J. Ry.& Un.St.Yd. Ref.Mt.& Co. Tr.	5%	1940	34,743.75
55,000	Chic. Mil. & St. Paul, Conv. Mtge.	5%	2014	56,043.00
25,000	Chic. Milwaukee & St. Paul, R.R. Deb.	4%	1934	23,406.25
135,000	Chicago Union Station, 1st Mtge. "C"	6½%	1963	.....
65,000	Chicago Union Station, 1st Mtge. "A"	4½%	1963	65,427.00
100,000	Chicago & Northwestern Ry. Co., Mtge.	4%	1987	96,500.00
25,000	Cleveland & Pittsburg R.R. Co., Mtge.	4½%	1942	25,564.00
100,000	Delaware & Hudson Co., 20-Yr. Con.	5%	1935	104,447.00
35,000	Fort St. Union Depot Co., 1st Mtge.	4½%	1941	.....
10,000	Illinois Central Equip. Trust "J"	5%	1928	.....
10,000	Illinois Central Equip. Trust "J"	5%	1929	.....
10,000	Illinois Central Equip. Trust "J"	5%	1930	.....
10,000	Illinois Central Equip. Trust "J"	5%	1931	.....
10,000	Illinois Central Equip. Trust "J"	5%	1932	.....
10,000	Illinois Central Equip. Trust "J"	5%	1933	.....
10,000	Illinois Central Equip. Trust "J"	5%	1934	.....
10,000	Illinois Central Equip. Trust "J"	5%	1935	.....
10,000	Illinois Central Equip. Trust "J"	5%	1936	.....
10,000	Illinois Central Equip. Trust "J"	5%	1937	.....
75,000	Illinois Central R.R. Co., Sec. Gold	4%	1952	67,875.00
59,000	Ill. Cen. R.R. Co., West Lines Mtge.	4%	1951	54,526.25
9,000	Ill. Cen. R.R. Co.,West. Lines Mtge.(Reg.)	4%	1951	8,291.25
50,000	Indianapolis Un. Ry. Co., Gen. Mtge.	5%	1965	24,906.25
7,000	Kan. City, Clinton & Springfield R.R. Co.	5%	1925	6,289.21
8,500	Kan. City, Mem. & Birm. R.R. Co., Mtge.	4%	1934	8,287.50
37,000	Kan. City, Mem. & Birm. R.R. Co. In.Mt.	5%	1934	34,225.00
50,000	Kan. City. Ft.Scott & Mem.R.R. Co., Mt.	6%	1928	51,817.00
50,000	Kansas City Terminal Co., 1st Mtge.	4%	1960	44,187.50
85,000	Lake Shore & Michigan South. R.R. Co.	4%	1931	84,087.50
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	75,063.00
100,000	Minn., St. Paul & S. St. Marie Ry. Co.	4%	1938	93,425.00
21,000	Miss. & Ill. Bridge & Belt R.R. Co., Mtge.	4%	1951	13,650.00
31,000	N. Y. C. & H. R. R.R.	4%	1934	.....
4,000	New York Central R.R., Equip. Trust	7%	1928	.....

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$7,511.00	$381.00	$105,670.00	.....	$5,000.00
3,000.00	.....	50,307.00	.....	2,000.00
.....	.....	49,250.00	.....	2,000.00
39,400.00	.....	74,143.75	.....	3,750.00
.....	12.00	56,031.00	.....	2,750.00
.....	.....	23,406.25	.....	1,000.00
155,847.50	521.50	155,326.00	$1,809.16	.....
.....	11.00	65,416.00	.....	2,925.00
.....	.....	96,500.00	.....	4,000.00
.....	30.00	25,534.00	.....	1,125.00
.....	371.00	104,076.00	.....	5,000.00
34,825.00	.....	34,825.00	.....	1,575.00
9,825.00	.....	9,825.00	45.84	.....
9,825.00	.....	9,825.00	45.84	.....
9,825.00	.....	9,825.00	45.84	.....
9,825.00	.....	9,825.00	45.83	.....
9,825.00	.....	9,825.00	45.83	.....
9,825.00	.....	9,825.00	45.83	.....
9,825.00	.....	9,825.00	45.83	.....
9,825.00	.....	9,825.00	45.83	.....
9,825.00	.....	9,825.00	45.83	.....
.....	.....	67,875.00	.....	3,000.00
.....	.....	54,526.25	.....	2,360.00
.....	.....	8,291.25	.....	360.00
24,562.50	.....	49,468.75	121.53	1,250.00
.....	.....	6,289.21	.....	350.00
.....	.....	8,287.50	.....	340.00
.....	.....	34,225.00	.....	1,850.00
.....	365.00	51,452.00	.....	3,000.00
.....	.....	44,187.50	.....	2,000.00
.....	.....	84,087.50	.....	3,400.00
.....	.....	48,068.75	.....	2,000.00
.....	.....	48,068.75	.....	2,000.00
.....	8.00	75,055.00	.....	3,375.00
.....	.....	93,425.00	.....	4,000.00
.....	.....	13,650.00	.....	840.00
30,225.00	.....	30,225.00	.....	1,240.00
4,319.03	64.03	4,255.00	22.00	140.00

Schedule H (*Continued*)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1922
	RAILROAD BONDS (*Continued*)			
$18,000	New York Central R.R., Equip. Trust	7%	1932	.....
6,000	New York Central R.R., Equip. Trust	7%	1933	.....
11,000	New York Central R.R., Equip. Trust	7%	1934	.....
52,000	New York Cen. R.R. Co., Cons. Mt. "A"	4%	1998	$46,046.65
22,000	New York Central Lines Equip., Trust	4½%	1928	.....
43,000	New York Central Lines Equip., Trust	4½%	1929	.....
42,000	New York Central Lines Equip., Trust	4½%	1930	.....
15,000	New York Central Lines Equip., Trust	4½%	1932	.....
14,000	New York Central Lines Equip., Trust	4½%	1933	.....
7,000	New York Central Lines Equip., Trust	4½%	1935	.....
9,000	New York Central Lines Equip., Trust	4½%	1936	.....
9,000	New York Central Lines Equip., Trust	4½%	1937	.....
100,000	New York Connect. R.R., 1st Mtge.	4½%	1953	98,625.00
31,200	N. Y., N. H. & Hart. Co., Con. Deb. Reg.	6%	1948	34,171.00
75,000	No. Pacific R.R. Co., Prior Lien Ry.	4%	1997	67,875.00
100,000	No. Pacific Ry. Co., Ref. & Imp.	6%	2047	.....
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	15,181.00
18,000	Pennsylvania R.R. Co., Cons. Mtge.	4½%	1960	18,555.00
10,000	Pennsylvania R.R. Co., Equip. Trust	5%	1926	.....
10,000	Pennsylvania R.R. Co., Equip. Trust	5%	1927	.....
15,000	Pennsylvania R.R. Co., Equip. Trust	5%	1928	.....
15,000	Pennsylvania R.R. Co., Equip. Trust	5%	1929	.....
15,000	Pennsylvania R.R. Co., Equip. Trust	5%	1930	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1931	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1932	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1933	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1934	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1935	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1936	.....
5,000	Pennsylvania R.R. Co., Equip. Trust	5%	1937	.....
100,000	Pennsylvania R.R. Co., Gen. Mtge.	4½%	1965	100,983.00
117,900	Pere Marquette Ry., 1st Mtge. "A"	5%	1956	104,719.59
37,500	Pere Marquette Ry. Co., 1st Mtge. "B"	4%	1956	.....
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
25,000	So. Ry. Co., St. Louis Div., 1st Mtge.	4%	1951	24,875.00
100,000	Term. R.R. Asso. of St. Louis, Mtge.	4½%	1939	100,273.00

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$20,325.76	$259.76	$20,066.00	$504.00	$630.00
6,840.38	84.38	6,756.00	168.00	210.00
12,654.15	154.15	12,500.00	314.42	385.00
.....	.....	46,046.65	.....	2,080.00
21,478.36	.....	21,478.36	114.33	.....
41,822.36	.....	41,822.36	46.75	.....
40,702.79	.....	40,702.79	42.00	.....
14,439.21	.....	14,439.21	15.00	.....
13,434.36	.....	13,434.36	14.00	.....
6,674.50	.....	6,674.50	117.25	157.50
8,558.10	.....	8,558.10	150.75	202.50
8,536.50	.....	8,536.50	150.75	202.50
.....	.....	98,625.00	.....	4,500.00
.....	119.00	34,052.00	.....	1,872.00
.....	.....	67,875.00	.....	3,000.00
96,500.00	.....	96,500.00	.....	6,250.00
.....	.....	82,668.25	.....	3,360.00
.....	.....	48,500.00	.....	2,000.00
.....	30.00	15,151.00	.....	725.00
.....	15.00	18,540.00	.....	810.00
9,953.00	.....	9,953.00	58.33	.....
9,946.00	.....	9,946.00	58.33	.....
14,910.00	.....	14,910.00	87.50	.....
14,901.00	.....	14,901.00	89.58	.....
14,892.00	.....	14,892.00	89.58	.....
4,961.50	.....	4,961.50	29.17	.....
4,959.00	.....	4,959.00	29.17	.....
4,956.50	.....	4,956.50	29.17	.....
4,954.00	.....	4,954.00	29.17	.....
4,952.00	.....	4,952.00	29.17	.....
4,950.00	.....	4,950.00	29.17	.....
4,948.00	.....	4,948.00	29.17	.....
.....	23.00	100,960.00	.....	4,500.00
.....	.....	104,719.59	.....	5,895.00
37,500.00	.....	37,500.00	.....	1,500.00
.....	.....	49,935.00	.....	2,040.00
.....	.....	850.00	.....	40.00
.....	.....	24,875.00	.....	1,000.00
.....	17.00	100,256.00	.....	4,500.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1922*
	RAILROAD BONDS (*Continued*)			
$100,000	Un. Pac. R.R. Co., 1st Mtge. & L. Gr.	4%	1947	$100,910.00
10,000	Western Pacific R.R. Co., 1st Mtge.	5%	1946	8,000.00
50,000	Winston Salem South. Ry. Co., Mtge.	4%	1960	43,875.00
	Sold or matured during year			202,215.00
$3,417,600	*Total Railroad Bonds*			$2,686,805.95

	RAILROAD STOCKS		*Shares*	
$33,600	Atchison, Topeka & Santa Fe Co., Pref.	5%	336	$25,200.00
60,800	Atchison, Topeka & Santa Fe Co., Com.	6%	608	51,680.00
35,000	Baltimore & Ohio R.R., Common	...	350	.....
34,000	Boston & Albany R.R. Co., Capital	8¾%	340	68,921.50
19,200	B. & M. Co., Class A, 1st Pref.	...	192	14,699.00
20,000	Chicago & Northwestern Ry., Common	5%	200	.....
103,200	Delaware & Hudson R.R. Co., Cap.	9%	1,032	3,104.00
12,500	Del. Lack. & Western R.R.	6%	250	.....
72,500	Great Northern Ry. Co., Preferred	5%	725	355.00
40,000	Illinois Central R.R. Co., Capital	7%	400	.....
95,000	Louisville & Nashville R.R.	7%	950	.....
31,600	Maine Central R.R. Co., Capital	...	316	9,740.00
17,600	Minn., St. Paul & S. St. Marie Co., Pref.	4%	176	9,680.00
79,000	New York Central R.R. Co., Capital	5%	790	5,760.63
33,500	Norfolk & Western Ry. Co., Common	7%	335	.....
33,000	Northern Pacific Ry., Capital	5%	330	.....
8,800	Old Colony R.R. Co., Capital	7%	88	12,050.00
25,000	Pere Marquette Ry. Co., Pr. Pref.	5%	250	8,640.00
65,000	Southern Pacific Co., Capital	6%	650	.....
63,500	Union Pacific R.R., Common	10%	635	12,235.00
22,400	Wisconsin Central Ry. Co., Common	...	224	7,168.00
$905,200	*Total Railroad Stocks*			$229,233.13

	REAL ESTATE BONDS		*Maturity*	
$5,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1926	.....
15,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1928	.....
10,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1931	.....
7,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1937	.....
4,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1940	.....
9,000	Cent. Mfg. Dist., 1st Mfg. R. E. Imp.	5½%	1941	.....

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
.....	$38.00	$100,872.00	.....	$4,000.00
.....	.....	8,000.00	.....	500.00
.....	.....	43,875.00	.....	2,000.00
.....	202,215.00	.....	.....	7,297.50
$856,469.50	$204,718.82	$3,338,556.63	$4,635.78	$135,262.00
.....	.....	$25,200.00	.....	$1,680.00
.....	.....	51,680.00	.....	3,648.00
$16,100.00	.....	16,100.00	.....	.....
.....	.....	68,921.50	.....	2,975.00
.....	.....	14,699.00	.....	.....
16,975.00	.....	16,975.00	.....	500.00
123,500.00	.....	126,604.00	.....	7,038.00
35,050.00	.....	35,050.00	.....	750.00
62,460.00	.....	62,815.00	.....	1,830.00
43,400.00	.....	43,400.00	.....	1,400.00
79,675.63	$54.59	79,621.04	.....	2,047.50
10,535.00	.....	20,275.00	.....	.....
.....	.....	9,680.00	.....	704.00
68,512.50	.....	74,273.13	.....	2,137.50
38,860.00	.....	38,860.00	.....	2,093.75
26,523.75	.....	26,523.75	.....	825.00
.....	.....	12,050.00	.....	616.00
8,390.65	.....	17,030.65	.....	985.00
58,500.00	.....	58,500.00	.....	1,950.00
75,970.00	.....	88,205.00	.....	3,675.00
.....	.....	7,168.00	.....	.....
$664,452.53	$54.59	$893,631.07	.....	$34,854.75
$5,000.00	.....	$5,000.00	$100.07	$137.50
14,925.00	.....	14,925.00	300.21	412.50
9,925.00	.....	9,925.00	200.14	275.00
6,947.50	.....	6,947.50	140.10	192.50
3,970.00	.....	3,970.00	80.06	110.00
8,955.00	.....	8,955.00	180.13	247.50

Schedule H (*Continued*)

Par Value	Description of Securities	Rate	Maturity		Balance June 30 1922
	REAL ESTATE BONDS (*Continued*)				
$487,000	Equip., Office Build. Corp., 35-Yr. Deb.	5%	1952		$499,000.00
50,000	43 Exchange Place Bldg., 1st Mtge. S. F.	6%	1938		.....
400	Technology Club of New York W. F. . .	5%			400.00
98,000	Trinity Building Corp. of N. Y., 1st Mtge.	5½%	1939		94,750.00
	Sold or matured during year				3,500.00
$685,400	*Total Real Estate Bonds*				$597,650.00
	REAL ESTATE STOCKS			*Shares*	
$58,800	Alaska Building Trust	3¼%		588	$58,251.22
68,000	Boston Real Estate Trust Capital . . .	5%		68	71,661.64
$126,800	*Total Real Estate Stocks*				$129,912.86
	MISCELLANEOUS STOCKS				
$10,000	Beacon Trust Company, Capital	15%		100	$20,801.36
3,600	National Shawmut Bank, Capital . . .	12%		36	.....
	Sold during year				3,774.00
$13,600	*Total Miscellaneous Stocks*				$24,575.36
	MORTGAGE NOTES			*Maturity*	
$4,500	E. V. and C. T. Bigelow	5%		1923	$4,500.00
30,000	Cambridge Tobacco Co.	6%		1924	30,000.00
75,000	Samuel Carr, *et al.*, Trustees	6%		....	75,000.00
70,000	Charles H. Connelly	5½%		1927	.....
75,000	Harry A. Henderson	6½%		1924	75,000.00
44,000	F. J. Holderried (at $22,000 each) . . .	6%		1927	44,000.00
50,000	Chester J. O'Brien	6½%		....	50,000.00
50,000	Edward F. Kakas & Sons, Inc.	6½%		1923	50,000.00
250,000	The Park Sq. Real Estate Trust	6½%		1924	250,000.00
7,000	Phineas Matlin	5%		....	7,000.00
30,000	W. J. Stober	5%		1925	30,000.00
25,000	Theta Chi	6%		1925	.....
	Sold or matured during year				92,500.00
$710,500	*Total, Mortgage Notes*				$708,000.00
	REAL ESTATE				
$75,732.55	Avon St. Land and Building Equity .				$75,732.55
135,364.53	Franklin St. Land and Build. Equity				135,364.53
200.00	Dorchester Land and Building . . .				200.00
	Real Estate sold during year				37,100.00
$211,297.08	*Total Real Estate*				$248,397.08

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 20, 1923*	*Accrued Interest, etc.*	*Income Received*
.....	$12,000.00	$487,000.00	.....	$24,950.00
$49,625.00	.....	49,625.00	$108.33	.....
.....	.....	400.00	.....	20.00
.....	.....	94,750.00	.....	5,390.00
.....	3,500.00	.....	.....	199.99
$99,347.50	$15,500.00	$681,497.50	$1,109.04	$31,934.99
.....	.....	$58,251.22	.....	$1,911.00
.....	.....	71,661.64	.....	3,400.00
.....	.....	$129,912.86	.....	$5,311.00
.....	.....	$20,801.36	.....	$1,500.00
$8,640.00	.....	8,640.00	.....	216.00
.....	$3,774.00	.....	.....	24.00
$8,640.00	$3,774.00	$29,441.36	.....	$1,740.00
.....	.....	$4,500.00	.....	$225.00
.....	.....	30,000.00	.....	1,800.00
.....	.....	75,000.00	.....	4,500.00
$70,000.00	.....	70,000.00	.....	1,925.00
.....	.....	75,000.00	.....	4,875.00
.....	.....	44,000.00	.....	2,640.00
.....	.....	50,000.00	.....	3,250.00
.....	.....	50,000.00	.....	3,250.00
.....	.....	250,000.00	.....	.....
.....	.....	7,000.00	.....	350.00
.....	.....	30,000.00	.....	1,500.00
25,000.00	.....	25,000.00	.....	750.00
.....	$92,500.00	.....	.....	4,891.66
$95,000.00	$92,500.00	$710,500.00	.....	$29,956.66
.....	.....	$75,732.55	$7,507.50	$9,455.30
.....	.....	135,364.53	10,915.41	9,071.56
.....	.....	200.00	.....	.....
.....	$37,100.00	.....	1,218.11	917.79
.....	$37,100.00	$211,297.08	$19,641.02	$19,444.65

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Percent of Total 1922*	*Percent of Total 1923*	*Balance June 30, 1922*
	RECAPITULATION, GENERAL INVESTMENTS			
$2,268,800.00	Goverment & Municipal Bonds	20.00	13.40	$2,093,553.30
1,243,000.00	Industrial Bonds	6.10	7.34	639,509.00
2,268,035.00	Industrial Stocks	6.91	13.40	723,031.08
4,950,600.00	Public Utility Bonds	21.90	29.30	2,299,337.84
109,600.00	Public Utility Stocks	.99	.64	103,559.78
3,417,600.00	Railroad Bonds	25.60	20.20	2,686,805.95
905,200.00	Railroad Stocks	2.19	5.42	229,233.13
685,400.00	Real Estate Bonds	5.71	4.04	597,650.00
126,800.00	Real Estate Stocks	1.24	.74	129,912.86
13,600.00	Miscellaneous Stocks	.23	.08	24,575.36
710,500.00	Mortgage Notes	6.47	4.20	708,000.00
211,297.08	Real Estate	2.66	1.24	248,397.08
$16,910,432.08	*Total General Investments*	100.00	100.00	$10,483,565.38
	INVESTMENTS, MALCOLM COTTON BROWN FUND		*Maturity*	
$15,000	Metro. West Side Elev. Ry. Co., Mtge. . 4%		1938	$6,750.00
10,000	Metro. West Side Elev. Ry. Co., Mtge. . 4%		1938	4,100.00
$25,000	*Total*			$10,850.00
	INVESTMENTS, FRANK HARVEY CILLEY FUND			
$10,000	New York, City of, Corp. Stock 4¼%		1964	$10,400.00
6,000	Gen. Elec. Co., Deb. 5%		1952	.....
5,000	Cedars Rapids Mfg. & Pr. C., 1st Mt. S.F. 5%		1953	4,075.00
8,000	Elec. Securities Corp., Col. Tr. S. F. . . 5%		1940	7,960.00
5,000	St. Louis Iron Mt. & So. R.R. Mtge. . . 4%		1933	4,812.50
			Shares	
2,500	Boston Elev. Ry. Co., 2d Pfd. 7%		25	.....
3,600	Edison Electric Ill. Co., Capital 12%		36	$7,883.74
7,500	Mass. Gas Companies, Pref. 4%		75	6,825.00
1,250	Springfield Ry. Com., Pref. 8%		25	2,125.00
4,000	Boston & Albany R.R. Co., Capital . . 8¾%		40	8,000.00
5,000	B. & M. R.R. Co., Class A, 1st Pref.		50	5,000.00
1,000	Boston & Providence R.R. Corp. 10%		10	2,500.00
5,000	N. Y., N. H. & H. R.R., Capital		50	600.00
*1	South American Properties		....	1.00
1,600	Mortgage Note, Isabella Aznive 6%		....	1,600.00
2,400	Mortgage Note, E. and A. Orlogski . . 5%		....	2,400.00
	Sold or matured during year			3,600.00
$67,851	*Total*			$67,782.24

*Book value.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
$898,346.64	$695,716.10	$2,296,183.84	$13,354.63	$127,183.41
849,791.25	284,657.75	1,204,642.50	8,128.92	51,852.34
4,435,778.16	3,499,780.04	1,659,029.20	48.61	279,700.50
2,709,032.00	204,178.35	4,804,191.49	32,622.94	169,125.56
49,329.50	7,873.76	145,015.52	.....	7,226.25
856,469.50	204,718.82	3,338,556.63	4,635.78	135,262.00
664,452.53	54.59	893,631.07	.....	34,854.75
99,347.50	15,500.00	681,497.50	1,109.04	31,934.99
.....	.....	129,912.86	.....	5,311.00
8,640.00	3,774.00	29,441.36	.....	1,740.00
95,000.00	92,500.00	710,500.00	.....	29,956.66
.....	37,100.00	211,297.08	19,641.02	19,444.65
$10,666,187.08	$5,045,853.41	$16,103,899.05	$79,540.94	$893,592.11
.....	.....	$6,750.00	.....	$600.00
.....	.....	4,100.00	.....	400.00
.....	.....	$10,850.00	.....	$1,000.00
.....	$10.00	$10,390.00	.....	$425.00
$6,174.00	6.00	6,168.00	.....	150.00
.....	.....	4,075.00	.....	250.00
.....	.....	7,960.00	.....	400.00
.....	.....	4,812.50	.....	200.00
3,600.00	.....	3,600.00	.....	175.00
900.00	.....	8,783.74	.....	380.75
.....	.....	6,825.00	.....	300.00
.....	.....	2,125.00	.....	100.00
.....	.....	8,000.00	.....	350.00
.....	.....	5,000.00	.....	.....
.....	.....	2,500.00	.....	100.00
.....	.....	600.00	.....	.....
.....	.....	1.00	.....	.....
.....	.....	1,600.00	.....	96.00
.....	.....	2,400.00	.....	120.00
.....	3,600.00	.....	.....	.....
$10,674.00	$3,616.00	$74,840.24	.....	$3,046.75

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Shares*	*Balance June 30, 1922*
	INVESTMENTS EBEN S. DRAPER FUND		*Maturity*	
$16,000	Georgia Ry. & Elec. Co., 1st Mtge. S. F.	5%	1932	$16,162.00
20,000	New York Tel. Co., 1st & Gen. Mtge. .	4½%	1939	19,395.00
20,000	Wilmington City Elec. Co., 1st Mtge. .	5%	1951	19,600.00
20,000	Chicago, Mil. & St. Paul, Conv. Gold .	5%	2014	20,368.00
24,000	Indianapolis Un. Ry. Co., Gen. Mtge. .	5%	1965	23,880.00
$100,000	*Total*			$99,405.00
	*INVESTMENTS, M. I. T. EDUCATIONAL ENDOWMENT FUND			
	Eastman Kodak Common	5%		$4,000,000.00
	*INVESTMENTS, WILLIAM BARTON ROGERS MEMORIAL FUND			
	Cedar Rapids Mfg. & Power Co., Mtge.	5%	1953	$32,600.00
	United Electric Securities Co. S. F. . .	5%	1940	4,022.00
	Atch. Top. & Santa Fe R.R. Co., Mtge.	4%	1995	24,470.00
	Baltimore & Ohio S. W. Div., Mtge. .	3½%	1925	5,310.00
	Chesapeake & Ohio Cons., 1st Mtge. .	5%	1939	7,511.00
	Chicago, Burlington & Quincy, Mtge. .	4%	1958	1,000.00
	Chi. Jt. Rys. & Un. St. Yds. Co., Mtge.	5%	1940	39,400.00
	Fort St. Union Depot Co., 1st Mtge. .	4½%	1941	34,825.00
	New York Central & Hudson River . .	4%	1934	30,225.00
	Pere Marquette Ry. Co., 1st Mtge. . .	4%	1956	37,500.00
	Sold or matured during year			24,000.00
				$240,863.00
	INVESTMENTS, JOY SCHOLARSHIP FUND			
$5,000	Cedars Rapids Mfg. & Pr. Co., 1st Mt.S.F.	5%	1953	$4,075.00
5,000	Mass. Hospital Life Insurance Co. . .	5%	....	5,000.00
$10,000	*Total*			$9,075.00
	INVESTMENTS, RICHARD LEE RUSSEL FELLOWSHIP FUND			
$2,000	Trinity Build. Corp. of N. Y., 1st Mtge.	5½%	1939	$2,000.00
	INVESTMENTS, SUSAN H. SWETT SCHOLARSHIP FUND			
$10,000	Mass. Hospital Life Insurance Co. . .	5%	....	$10,000.00

* Sold or transferred to General Investments.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
.....	$18.00	$16,144.00	.....	$800.00
.....	.....	19,395.00	.....	900.00
.....	.....	19,600.00	.....	1,000.00
.....	4.00	20,364.00	.....	1,000.00
.....	.....	23,880.00	.....	1,200.00
.....	$22.00	$99,383.00	.....	$4,900.00
.....	$4,000,000.00	.....	.....	.....
.....	$32,600.00	.....	.....	.....
.....	4,022.00	.....	.....	.....
.....	24,470.00	.....	.....	.....
.....	5,310.00	.....	.....	.....
.....	7,511.00	.....	.....	.....
.....	1,000.00	.....	.....	.....
.....	39,400.00	.....	.....	.....
.....	34,825.00	.....	.....	.....
.....	30,225.00	.....	.....	.....
.....	37,500.00	.....	.....	.....
.....	24,000.00	.....	.....	.....
.....	$240,863.00	.....	.....	.....
.....	.....	$4,075.00	.....	$250.00
.....	.....	5,000.00	.....	250.00
.....	.....	$9,075.00	.....	$500.00
.....	.....	$2,000.00	.....	$110.00
.....	.....	$10,000.00	.....	$50000

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1922*
	INVESTMENTS, JONATHAN WHITNEY FUND			
$25,000	Montreal, City of, Canada	5%	1936	$25,000.00
25,000	New York, City of, Corporate Stock	4¼%	1964	26,062.00
29,000	United States of America, 3d Lib. Loan	4¼%	1928	25,000.00
25,000	American Thread Co., 1st Mtge.	6%	1928	26,561.00
25,000	Gen. Elec. Co., Deb.	5%	1952	.....
25,000	Swift & Co., 1st Sinking Fund	5%	1944	22,625.00
16,000	U. S. Steel Corp., S. F.	5%	1963	.....
25,000	Detroit Edison Co., 1st Mtge.	5%	1933	25,300.00
25,000	Georgia Rail. & Elec. Co., 1st Mtge.	5%	1932	25,378.00
25,000	N. Y. Tel. Co., 1st & Gen. Mtge.	4½%	1939	24,150.39
21,000	United Elec. Securities Co., Tr. S. F.	5%	1940	21,070.00
25,000	Western Tel. & Tel. Co., Co. Tr.	5%	1932	25,423.00
25,000	Atch.,Top.& S.F.,Cal.& Ar. Lines, 1st Mt.	4½%	1962	24,381.25
35,000	Chicago Union Station, 1st Mtge.	4½%	1963	35,231.00
25,000	Illinois Cen. R.R. Co., Sec. Gold	4%	1952	22,625.00
25,000	Maine Cen. R.R. Co., 1st & Ref. Mtge.	4½%	1935	25,019.00
150,000	Mortgage Note, M. I. T. Dormitory	5¾%	1924	150,000.00
	Sold or matured during year			23,625.00
$551,000	*Total*			$527,450.64
$17,676,283.08	*Grand Total, All Investments (Schedule D)*			$15,450,991.26

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1923*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$25,000.00	.....	$1,250.00
.....	$26.00	26,036.00	.....	1,062.50
$4,000.00	.....	29,000.00	.....	1,182.92
.....	312.00	26,249.00	.....	1,500.00
25,725.00	25.00	25,700.00	.....	625.00
.....	.....	22,625.00	.....	1,250.00
19,427.33	3,310.33	16,117.00	.....	475.00
.....	30.00	25,270.00	.....	1,250.00
.....	42.00	25,336.00	.....	1,250.00
.....	.....	24,150.39	.....	1,125.00
.....	4.00	21,066.00	.....	1,050.00
.....	47.00	25,376.00	.....	1,250.00
.....	.....	24,381.25	.....	1,125.00
.....	6.00	35,225.00	.....	1,575.00
.....	.....	22,625.00	.....	1,000.00
.....	2.00	25,017.00	.....	1,125.00
.....	.....	150,000.00	.....	8,625.00
.....	23,625.00	.....	.....	1,262.50
$49,152.33	$27,429.33	$549,173.64	.....	$27,982.92
$10,726,013.41	$9,317,783.74	$16,859,220.93	$79,540.94	$931,631.78

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 and Improvements, New Technology, Cambridge	1,119,266.67
Main Educational Building Group, Cambridge	4,071,492.13
Pratt School of Naval Architecture, Cambridge	674,971.70
Mechanic Arts Building, Cambridge	83,658.89
Power Plant (inc. Machinery and Equipment), Cambridge	262,026.08
Educational Equipment, Cambridge	1,806,414.29
Steam and Electrical Distribution System, Cambridge	155,448.64
Gas Engine Laboratory, Cambridge	26,301.88
Service Garage, Cambridge	5,981.54
Athletic Field, Cambridge	19,815.14
Summer Camp, East Machias, Maine	102,558.00
Walker Memorial Building, Cambridge	575,111.50
Walker Memorial Building, Equipment	139,475.52
Dormitories, Cambridge, ($331,357.67 less mortgage $150,000)	181,357.67
Dormitories, Equipment	20,707.57
New Service Building, Cambridge	42,988.20
Boat House, Cambridge	15,000.00
Miscellaneous and Undistributed	266,581.79
Total, June 30, 1923, (Schedule D)	$11,423,691.97

SCHEDULE K

PRINCIPAL GIFTS AND APPROPRIATIONS FOR EDUCATIONAL PLANT

George Eastman, for New Buildings	$3,500,000.00
Maria A. Evans, for Dormitories	100,000.00
Appropriation, Maria A. Evans Fund, for New Equipment	169,080.60
T. C. du Pont, Donation for Land	500,000.00
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	604,000.00
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
Estate of F. W. Emery, for New Equipment	125,611.30
Appropriation of Charles C. Drew Fund	230,000.00
Appropriation of Lucius Tuttle Fund for New Equipment	50,000.00
Appropriation of Frank E. Peabody Fund	50,000.00
Appropriation of Nathaniel Thayer Fund for New Equipment	25,000.00
Appropriation of French Fund for New Equipment	100,843.34
Appropriation of George B. Dorr Fund for New Equipment	49,573.47
Land in Boston, Grant of Commonwealth	1,500,000.00
Sale of Land and Buildings in Boston	656,919.45
Equipment from Buildings in Boston (estimated)	500,000.00
Other Funds, Donations, etc.	1,552,641.75
Total, June 30, 1923, (Schedule D)	$11,423,691.97

SCHEDULE P

ENDOWMENT FUNDS FOR GENERAL PURPOSES

Restricted	*Funds June 30, 1922*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds June 30, 1923*
George Eastman (Building)	$2,500,000.00	$129,050.00	.....	$129,050.00	$2,500,000.00
Educational Endowment	6,773,948.79	357,365.26	$294,848.72	357,365.26	7,068,797.51
General Endowment . .	1,527,549.00	78,849.55	.....	78,849.55	1,527,549.00
*Anonymous	5,000.00	392.31	5,115.50	.....	10,507.81
George Robert Armstrong	5,000.00	258.10	.....	258.10	5,000.00
Charles Choate	35,858.15	1,848.00	.....	1,848.00	35,858.15
Eben S. Draper	100,000.00	4,900.00	.....	4,900.00	100,000.00
Martha Ann Edwards . .	30,000.00	1,548.60	.....	1,548.60	30,000.00
William Endicott	25,000.00	1,290.50	.....	1,290.50	25,000.00
Francis Appleton Foster .	.....	25,810.00	1,000,000.00	25,810.00	1,000,000.00
Jonathan French	25,212.48	1,300.82	.....	1,300.82	25,212.48
James Fund	163,654.21	8,445.03	.....	8,445.03	163,654.21
Katharine B. Lowell . .	5,000.00	258.10	.....	258.10	5,000.00
M. I. T. Alumni Fund (Bal.)	17,161.52	887.86	70.00	.....	18,119.38
Richard Perkins	50,000.00	2,581.00	.....	2,581.00	50,000.00
John W. and Belinda L. Randall	83,452.36	4,305.10	.....	4,305.10	83,452.36
William Barton Rogers Memorial	250,225.00	12,915.32	.....	12,915.32	250,225.00
†Saltonstall Fund	50,565.57	2,606.81	.....	1,955.10	51,217.28
Samuel E. Sawyer . . .	4,764.40	242.61	.....	242.61	4,764.40
Andrew Hastings Spring	50,000.00	2,581.00	.....	2,581.00	50,000.00
Seth K. Sweetser	25,061.62	1,290.50	.....	1,290.50	25,061.62
William J. Walker . . .	23,663.59	1,218.23	.....	1,218.23	23,663.59
Albion K. P. Welch . . .	5,000.00	258.10	.....	258.10	5,000.00
	$11,756,116.69	$640,202.80	$1,300,034.22	$638,270.92	$13,058,082.79
Unrestricted					
Sidney Bartlett	$10,000.00	$516.20	.....	$516.20	$10,000.00
A. Farwell Bemis	10,000.00	516.20	.....	516.20	10,000.00
Stanton Blake	5,000.00	258.10	.....	258.10	5,000.00
Helen Collamore	12,483.97	645.25	.....	645.25	12,483.97
Samuel P. Colt	.....	438.77	$10,000.00	438.77	10,000.00
Charles C. Drew (Bal.) .	75,171.52	3,876.66	.....	3,876.66	75,171.52
Arthur F. Estabrook . .	.....	1,909.94	75,000.00	1,909.94	75,000.00
Maria A. Evans (Bal.) .	61,192.55	3,159.14	.....	3,159.14	61,192.55
Walter L. Frisbie	.....	232.29	7,614.98	232.29	7,614.98
Arthur T. Lyman . . .	5,000.00	258.10	.....	258.10	5,000.00
James McGregor	2,500.00	129.05	.....	129.05	2,500.00
Hiram F. Mills	.....	154.86	5,000.00	154.86	5,000.00
Albert H. Munsell . . .	7,378.24	381.99	530.04	381.99	7,908.28
Margaret A. Munsell . .	1,105.32	56.78	.....	56.78	1,105.32
Nathaniel C. Nash . . .	10,000.00	516.20	.....	516.20	10,000.00
Moses W. Oliver	11,220.49	578.14	.....	578.14	11,220.49
Frank E. Peabody (Bal.).	2,238.89	113.56	.....	113.56	2,238.89
Frances M. Perkins . . .	16,525.00	851.73	.....	851.73	16,525.00
Edward S. Philbrick . .	.....	1,548.60	34,213.92	1,548.60	34,213.92
Robert E. Rogers . . .	7,680.77	397.47	.....	397.47	7,680.77
Richard B. Sewall . . .	30,000.00	1,548.60	.....	1,548.60	30,000.00
Horace W. Wadleigh . .	2,143.14	108.40	.....	108.40	2,143.14
Charles G. Weld	15,000.00	774.30	.....	774.30	15,000.00
Alexander S. Wheeler . .	30,000.00	1,548.60	.....	1,548.60	30,000.00
	$314,639.89	$20,518.93	$132,358.94	$20,518.93	$446,998.83

* Income added to fund.
† One-fourth of net income added to fund.

SCHEDULE Q

ENDOWMENT FUNDS FOR DESIGNATED PURPOSES

Invested Funds	*Funds June 30, 1922*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds June 30, 1923*
FUNDS FOR SALARIES:					
Samuel C. Cobb For General Salaries . . .	$36,000.00	$1,858.32	.....	$1,858.32	$36,000.00
Sarah H. Forbes For General Salaries . . .	500.00	25.81	.....	25.81	500.00
George A. Gardner For General Salaries . . .	20,000.00	1,032.40	.....	1,032.40	20,000.00
James Hayward Professorship of Engineering	18,800.00	970.46	.....	970.46	18,800.00
William P. Mason Professorship of Geology .	18,800.00	970.46	.....	970.46	18,800.00
Henry B. Rogers For General Salaries . . .	25,000.00	1,290.50	.....	1,290.50	25,000.00
Nathaniel Thayer Professorship of Physics .	25,000.00	1,290.50	.....	1,290.50	25,000.00
	$144,100.00	$7,438.45	.....	$7,438.45	$144,100.00
FUNDS FOR LIBRARY, READING ROOMS AND GYMNASIUM:					
Frank Harvey Cilley	$73,575.96	$3,046.75	$824.61	$2,089.37	$75,357.95
Charles Lewis Flint Library	5,000.00	258.10	.....	258.10	5,000.00
William Hall Kerr Library .	2,167.97	108.40	.....	80.00	2,196.37
Arthur Rotch Architectural Library	5,000.00	258.10	.....	258.10	5,000.00
Technology Matrons' Teas .	6,106.26	314.88	.....	106.26	6,314.88
John Hume Tod	2,711.85	139.37	.....	185.59	2,665.63
Edna Dow Cheney	13,269.58	681.38	1,500.00	1,274.25	14,176.71
	$107,831.62	$4,806.98	$2,324.61	$4,251.67	$110,711.54
FUNDS FOR DEPARTMENTS:					
George Eastman, Chemistry and Physics	$400,000.00	$20,648.00	.....	$20,648.00	$400,000.00
William Parsons Atkinson .	13,082.20	676.22	.....	676.22	13,082.20
Frank Walter Boles Memorial	16,002.65	825.92	.....	1,184.09	15,644.48
William E. Chamberlain . .	7,309.77	376.83	.....	376.83	7,309.77
Chemical Engineering Practice	257,772.97	13,302.47	.....	13,302.47	257,772.97
Susan E. Dorr	95,955.67	4,955.52	.....	4,955.52	95,955.67
George Henry May, Chemistry	5,000.00	258.10	.....	258.10	5,000.00
Pratt Naval Architectural .	396,166.07	20,441.52	$6.68	20,441.52	396,172.75
Arthur Rotch Architectural	25,000.00	1,290.50	.....	1,290.50	25,000.00
*Edmund K. Turner . . .	214,588.53	11,077.65	.....	8,818.24	216,847.94
	$1,430,877.86	$73,852.73	$6.68	$71,951.49	$1,432,785.78

*One-fourth of net income added to fund.

Schedule Q (*Continued*)

Invested Funds	*Funds June 30, 1922*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds June 30, 1923*
FUNDS FOR RESEARCH:					
Samuel Cabot	$66,418.66	$3,427.57	.....	.....	$69,846.23
Ellen H. Richards	16,209.28	836.24	.....	$567.82	16,477.70
Charlotte B. Richardson	37,378.78	1,930.59	.....	1,600.00	37,709.37
Technology Plan Research	12,803.74	660.74	$5,100.00	6,936.76	11,627.72
Edward Whitney	47,657.92	2,457.11	.....	3,000.00	47,115.03
	$180,468.38	$9,312.25	$5,100.00	$12,104.58	$182,776.05
FUNDS FOR FELLOWSHIPS:					
Malcolm Cotton Brown	$12,350.00	$1,000.00	.....	$1,270.00	$12,080.00
Collamore	11,729.28	603.95	.....	500.00	11,833.23
Dalton Graduate Chemical	5,848.16	299.40	.....	75.00	6,072.56
du Pont Fellowship	750.00	.....	.....	750.00	.....
Graselli Fellowship	.....	.....	$750.00	.....	750.00
Monsanto Fellowship	*50.00	.....	.....	.....	*50.00
Moore	6,544.35	335.53	.....	250.00	6,629.88
Willard B. Perkins	8,668.00	443.93	.....	625.00	8,486.93
Henry Bromfield Rogers	21,150.91	1,089.18	.....	450.00	21,790.09
Richard Lee Russel	2,326.57	110.00	.....	200.00	2,236.57
Henry Saltonstall	10,115.92	521.36	.....	426.00	10,211.28
James Savage	10,429.10	536.85	.....	300.00	10,665.95
Susan H. Swett	10,120.45	500.00	.....	100.00	10,520.45
	$99,982.74	$5,440.20	$750.00	$4,946.00	$101,226.94
FUNDS FOR SCHOLARSHIPS:					
Elisha Atkins	$5,382.93	$278.75	.....	$300.00	$5,361.68
Billings Student	52,821.92	2,725.54	.....	3,000.00	52,547.46
Jonathan Bourne	10,671.59	552.33	.....	500.00	10,723.92
Harriet L. Brown	.....	258.10	$6,024.79	70.00	6,212.89
Lucius Clapp	5,280.96	273.59	.....	300.00	5,254.55
Lucretia Crocker	64,006.70	3,303.68	.....	1,800.00	65,510.38
Isaac W. Danforth	5,453.64	278.75	.....	300.00	5,432.39
Ann White Dickinson	43,122.79	2,224.82	.....	2,000.00	43,347.61
Farnsworth	5,437.38	278.75	.....	300.00	5,416.13
Charles Lewis Flint	5,514.25	283.92	.....	300.00	5,498.17
Sarah S. Forbes	3,649.97	185.83	.....	300.00	3,535.80
Graselli Scholarship	.....	.....	500.00	.....	500.00
George Hollingsworth	5,315.86	273.59	.....	300.00	5,289.45
T. Sterry Hunt	3,287.25	170.35	.....	200.00	3,257.60
William F. Huntington	5,462.48	283.92	.....	300.00	5,446.40
Joy Scholarships	10,000.00	.....	.....	.....	10,000.00
Income, Joy Scholarships	5,384.60	500.00	.....	300.00	5,584.60
Letter Box Fund	148.08	1.92	.....	150.00	.....
William Litchfield	5,487.74	283.92	.....	300.00	5,471.66
Elisha T. Loring	5,497.53	283.92	.....	300.00	5,481.45
Lowell Institute Scholarship	.....	.....	2,314.76	.....	2,314.76
George Henry May	5,017.67	258.10	24.23	300.00	5,000.00
James H. Mirrlees	3,061.67	154.86	.....	300.00	2,916.53
Nichols Scholarship	5,437.38	278.75	.....	300.00	5,416.13
Charles C. Nichols	5,488.03	283.92	.....	300.00	5,471.95
John Felt Osgood	5,428.38	278.75	.....	300.00	5,407.13
George L. Parmelee	18,334.69	944.65	.....	300.00	18,979.34

*Overdraft.

Schedule Q (*Continued*)

Invested Funds	*Funds June 30, 1922*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds June 30, 1923*
Richard Perkins	$56,463.10	$2,916.53	.....	$3,000.00	$56,379.63
John P. Schenkl	.....	542.01	$20,000.00	200.00	20,342.01
Thomas Sherwin	5,496.74	283.92	.....	300.00	5,480.66
Susan Upham	1,072.10	51.62	.....	50.00	1,073.72
Ann White Vose	65,043.22	3,355.30	.....	3,700.00	64,698.52
Louis Weissbein	4,210.15	216.80	.....	200.00	4,226.95
Frances Erving Weston	1,494.68	77.43	200.00	600.00	1,172.11
Samuel Martin Weston	209.24	10.32	200.00	200.00	219.56
	$418,682.72	$22,094.64	$29,263.78	$21,070.00	$448,971.14
Funds for Prizes:					
Robert A. Boit	$5,137.80	$263.26	.....	$225.00	$5,176.06
Arthur Rotch	5,368.03	278.75	.....	200.00	5,446.78
Arthur Rotch, Special	6,501.79	335.53	.....	200.00	6,637.32
	$17,007.62	$877.54	.....	$625.00	$17,260.16
Funds for Relief:					
Architectural Society	$1,436.93	$72.27	$57.00	$300.00	$1,266.20
Edward Austin	425,551.41	21,964.31	.....	17,732.98	429,782.74
Thomas Wendell Bailey	2,413.88	123.89	.....	100.00	2,437.77
Levi Boles	11,717.38	603.95	.....	1,000.00	11,321.33
Bursar's Fund	6,595.99	368.33	227.58	762.00	6,429.90
Dormitory Fund	3,262.32	170.35	.....	.....	3,432.67
*Charles Tidd Baker	20,138.60	1,032.40	.....	300.00	20,871.00
Mabel Blake Case	26,473.56	1,367.93	.....	940.00	26,901.49
Norman H. George	75,095.24	3,876.66	.....	3,500.00	75,471.90
Teachers' Fund	115,354.31	5,951.79	.....	7,889.84	113,416.26
Jonathan Whitney	551,164.48	27,982.92	2,625.00	16,013.56	565,758.84
Morrill Wyman	78,085.17	4,031.52	.....	3,500.00	78,616.69
	$1,317,289.27	$67,546.32	$2,909.58	$52,038.38	$1,335,706.79
Recapitulation of Funds:					
For General Purposes, Restricted	$11,756,116.69	$640,202.80	$1,300,034.22	$638,270.92	$13,058,082.79
For General Purposes, Unrestricted	314,639.89	20,518.93	132,358.94	20,518.93	446,998.83
For Salaries	144,100.00	7,438.45	.....	7,438.45	144,100.00
For Libraries, etc.	107,831.62	4,806.98	2,324.61	4,251.67	110,711.54
For Departments	1,430,877.86	73,852.73	6.68	71,951.49	1,432,785.78
For Research	180,468.38	9,312.25	5,100.00	12,104.58	182,776.05
For Fellowships	99,982.74	5,440.20	750.00	4,946.00	101,226.94
For Scholarships	418,682.72	22,094.64	29,263.78	21,070.00	448,971.14
For Prizes	17,007.62	877.54	.....	625.00	17,260.16
For Relief	1,317,289.27	67,546.32	2,909.58	52,038.38	1,335,706.79
Total (Schedule D)	$15,786,996.79	$852,090.84	$1,472,747.81	$833,215.42	$17,278,620.02

*One-half of the income to be added to the principal each year.

SCHEDULE R

MINOR FUNDS

Name	Balance June 30, 1922	Income	Other Increases	Salaries and Expenses	Balance June 30, 1923
Aeronautics	$1,272.13	$16,057.00	.....	$19,840.83	*$2,511.70
Alumni Dormitory Committee	.....	900.00	.....	291.55	608.45
Alumni Office	.....	9,280.48	.....	8,646.40	634.08
A. T. and T. Library	2,569.02	2,000.00	.....	2,238.07	2,330.95
Biology, Special	.....	.....	†1,000.00	631.03	368.97
Chemical Eng., Cabot No. 2	110.01	.....	.....	.....	110.01
Chemical Eng., Cabot No. 4	1,759.19	.....	.....	564.41	1,194.78
Course XV	212.90	180.00	.....	35.00	357.90
Dining Service Reserve	4,793.79	.....	‡3,740.36	3,113.77	5,420.38
Division Fund	500.00	510.00	.....	.....	1,010.00
Electrical Eng. Research	637.13	10,000.00	§4,312.54	15,506.98	* 557.31
Food Eng. Research	1,013.33	150.00	.....	1,106.80	56.53
General Library, Special	.....	.....	†1,000.00	346.80	653.20
Hale Spectroscopic	2,793.36	.....	.....	.....	2,793.36
Journal of Mathematics and Physics	419.65	1,172.97	†2,000.00	2,425.04	1,167.51
Mechanical Eng., Special No. 2	602.71	.....	.....	.....	602.78
Medical Dept., Special	4,985.88	90.00	.....	566.95	4,508.93
Nutrition Research	.....	.....	†3,500.00	642.92	2,857.08
Paper Ins. Cable Research	*199.90	3,000.00	.....	3,429.56	*629.46
Petroleum	296.02	.....	.....	207.40	88.62
President's	212.42	.....	.....	.....	212.42
Public Health	.....	1,020.00	.....	.....	1,020.00
Research Lab., Applied Chemistry	23,648.30	61,474.26	¶10,600.00	67,936.59	27,785.97
Research Lab., Industrial Physics	8,716.34	4,655.40	†4,000.00	12,227.24	5,144.50
Research Lab., Physical Chemistry (Royalties)	366.55	.....	.....	200.00	166.55
Research on Explosives, No. 34161	5,000.00	5,000.00	.....	4,586.93	5,413.07
Roentgen Ray	1,609.63	32.00	.....	.....	1,641.63
Rollins Boat House	1,526.00	.....	.....	1,526.00	.....
Sargent Fund	1,000.00	20.00	.....	.....	1,020.00
Special Research, No. 6003	*51.64	4,000.00	.....	2,637.08	1,311.28
Special Research, No. 13101	8,569.57	.....	.....	105.11	8,464.46
Steam Table Research	.....	1,936.87	.....	2,471.34	*534.47
Tractive Resistance of Roads, No. 1	*102.57	3,690.02	.....	3,587.45	.....
Tractive Resistance of Roads, No. 2	*376.96	728.55	.....	351.59	.....
Torpedo Research, No. 53713	2,762.69	2,500.00	.....	5,262.69	.....
X-Ray Research	.....	.....	‖15,000.00	.....	15,000.00
Women Students' Hospitality Fund	47.17	.....	.....	47.17	.....
	$74,692.72	$128,397.55	$45,152.90	$160,532.70	$87,710.47

* Overdraft.
† Appropriation from Current Funds.
‡ From Dining Service Earnings.
¶ Appropriation from Richardson Fund $1,600 — from Current Funds $9,000.
§ Transfer from Elec. Eng. Spec. No. 2.
‖ Transfer from Tech Plan Research Fund $5,000, from Res. Lab. Industrial Physics $10,000.

SCHEDULE S

CURRENT SURPLUS

Balance, July 1, 1922	$46,840.06
Net Decrease, (Schedule A)	18,609.48
Balance, June 30, 1923, (Schedule D)	$28,230.58

DETAIL OF PROFIT AND LOSS ACCOUNT

LOSSES AND CHARGES:

Expenses of Gas Engine Laboratory, charged off	$10,768.05
Accounts Receivable, charged off	156.24
Students' Fees and Deposits (previous years), charged off	1,855.78
Loss on sale of Stocks, Bonds, Real Estate, etc.	53,881.87
Expense, Newbury Street Properties, charged off	347.32
Salaries, Account, 1921–22	1,262.50
Adjustment of Departments	78.47
Adjustment of Cilley Fund	824.61
Total Losses	$69,174.84

GAINS AND CREDITS:

Gain on sale of Stocks, Bonds, Real Estate, etc.	$29,204.79
Students' Fees and Deposits (previous years)	393.39
Accounts Receivable (previous years)	1,026.16
Total Gains	$30,624.34
Profit and Loss. Net Loss, (Schedule A)	$38,550.50

Publications of the Massachusetts Institute of Technology

BULLETINS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Title	*Vol.*	*No.*	*Date of Publication*
Directory of Officers and Students, 1923-1924 .	59	2	December, 1923
President's Report for 1922-1923	59	3	October, 1923
The Massachusetts Institute of Technology . .	59	10	December, 1923
Military Science and Tactics. R. O. T. C. . .	59	11	August, 1923
General Information Requirements for Admission	58	1	January, 1923
Summer Session	58	4	January, 1923
Summer Surveying Courses At Camp Technology	58	5	April, 1923
Courses of Study	58	6	April, 1923
Graduate Study and Research	58	7	March, 1923
Biology and Public Health Department Circular	58	8	September, 1922
The Research Laboratory of Physical Chemistry	58	9	March, 1923
Engineering Administration. (Course XV Circular)	58	10	May, 1923