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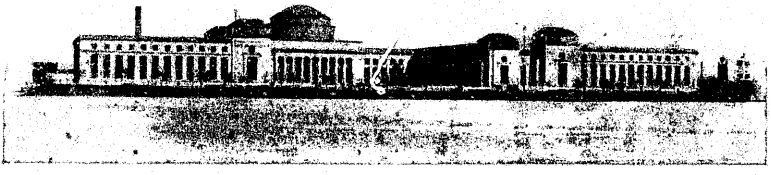

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President's Report January, 1921

Cambridge, Massachusetts
1921

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REPORTS OF THE PRESIDENT AND TREASURER

FOR THE YEAR 1920-1921

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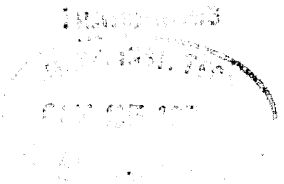

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REPORT OF THE PRESIDENT

(Prepared by the Administrative Committee)

To the Members of the Corporation:

In accordance with the by-laws we beg to submit to your Corporation a report of the affairs of the Institute, appending, as usual, reports prepared in coöperation with other administrative officers with reference to the work of their special departments.

The Election of the President. The outstanding event of the year was the election on March 30, 1921, of Dr. Ernest Fox Nichols, Director of Pure Science, Nela Park Research Laboratory, as seventh President of the Institute in succession to Dr. Maclaurin. Friend, admirer and former colleague of Dr. Maclaurin, experienced to an unusual degree in teaching, research and educational administration, President Nichols comes to the Institute, which his friend had rebuilt, and to whose re-endowment he gave his last strength, and dedicates himself to carry forward his predecessor's work. The inauguration, held on June 8 in Walker Memorial before an audience filling the hall to overflowing, was very impressive. Through the installation of the recently perfected telephonic amplifiers, the many who could not gain access to the hall were able, nevertheless, to hear all the addresses from the greensward in front of the building. An account of the ceremonies may be found in the *Technology Review*.

It was a great shock to all Technology men and to the many others who are interested in the Institute and who look to it for leadership in scientific and engineering education to learn that shortly after the inauguration President Nichols, while taking a brief rest before returning to Nela Park for his few final weeks of work there, was taken ill as a result of having already unwittingly worked beyond his strength. The many testimonials of affection and expressions

of concern which have steadily flowed into the President's office have borne witness to the unanimous longing for his prompt recovery.*

Changes in the Corporation. During the interval since the last annual report the Corporation has lost one member by death — Mr. Hiram F. Mills. The Term Members retiring in 1921 were Messrs. Harry J. Carlson, Henry J. Horn and Dr. Samuel J. Mixter. The new Term Members are Col. Frank L. Locke, Messrs. Leonard Metcalf and Van Rensselaer Lansingh. Mr. Harry J. Carlson was elected a Life Member of the Corporation on March 9, 1921.

Losses in the Faculty. The Institute has suffered in the sudden death of Prof. W. T. Sedgwick on January 25, 1921, a loss greater than that alone of a gifted leader these well-nigh forty years within her halls. Ever alert alike to the inspiration of student or colleague and to the awakening of his State and Nation to human conservation, Sedgwick belonged to humanity at large. Braver than many realized, beneath his cheering smile he had struggled for several years to conserve his somewhat shattered physique that he might express from it the last drop of service to mankind.

By resignation the Faculty loses Dean A. E. Burton and Prof. Dwight Porter, each after about forty years of service. It is regretted that they found it advisable to retire at so early an age. The classes of the near future would have profited by their guidance as have the classes of the past decades. Dean Burton needs no encomium other than the statement that he has made the office of Dean of Students and student government what they are at Technology and that his policies will never lightly be abandoned. As the life of President Walker was in his Faculty and his Faculty lived in him so the life of Dean Burton has been in successive generations of the student body and the students and alumni have learned to live more abundantly through him. Although fewer students came in contact with Professor Porter, those who were privileged to sit in his classes will

*Since the presentation of this Report of the Corporation, President Nichols has informed the Executive Committee that, acting upon the urgent advice of his physicians, he must ask to be relieved of his office.

remember him as a particularly fine type of teacher, gentleman and scholar.

No permanent appointments have been made to replace any of these three losses; that problem remains for the new administration. Prof. H. P. Talbot has undertaken the duties of Acting Dean during the year 1921–1922.

On January 1, 1921, Dr. W. H. Walker retired by resignation from his position as Director of the Division of Industrial Coöperation and Research, which he had been so largely instrumental in establishing under the so-called Technology Plan. It was only under great pressure from President Maclaurin that he had consented to hold the office for the initial year. His energy and effectiveness have left a deep mark upon the work of the Institute. We were fortunate in persuading Prof. C. L. Norton to undertake the directorship. So prostrate has been the condition of the industries during the past year that no real test has been made of the effectiveness of the Plan, in providing either personnel or the solution of research problems for the industries or in supplying additional opportunities for research and outside contacts to our teaching staff; but enough has none the less been accomplished to be a bright harbinger of wide success in all these directions in the near future.

Financial Status. The details of fiscal operation are to be found in the report of the Treasurer. It is desired, however, to draw attention to a number of points. The Institute has operated in each of the past two years at a deficit, which though small compared with the total income and outgo is still equal to the income return on more than $500,000. There has been a decrease of current surplus during the past year from about $95,000 to about $60,000. It is to be noticed that the increase in tuition fees paid was $160,000, part of which was due to the number of students paying $300 compared to those paying $250, but the larger part to the gain of approximately 350 in the total number of students; roughly speaking $60,000 was due to increase in tuition per student and $100,000 to increase in total registration.

The increases in payments to teachers were $275,000 —

a much larger sum than the gain in tuition. The result has been a rise in the cost per student from about $500 to about $575. It therefore appears that practically all of the increase in cost per student figures in additional payment for instruction and little in additional overhead. Moreover the rise of $75 in cost is 50% in excess of the very moderate increase of $50, or 20% in tuition charges. In view of the much larger increases in tuition effective in many institutions and the particularly expensive form of instruction by laboratory methods, which from our very foundation has been characteristic of our educational policies, it has been resolved to put into general effect fees in all regular undergraduate laboratory courses. The estimated new income from this source is about $100,000 per annum of which $10,000 has been appropriated to the use of the Committee on Undergraduate Scholarships, and $25,000 for a reduction of charges for supplies to students, making the net additional cost per student for tuition about $20 per annum.

Number of Students. The student body continues to increase in size. This is in part due to the effect of the wave which came in with the Student Army Training Corps. The class of 1922 has contained in its successive years about 850 freshmen, 1050 sophomores, 1000 juniors and 850 seniors. The following classes have been smaller than this and the indications all show that with the passing of the present senior class the numbers enrolled at the Institute will decrease. With such a major surge over, it is likely that the Institute will have fairly stable numbers for several years. The educational buildings, now reinforced by the addition of the completed Pratt Building, have sufficed to carry this large class of 1922; it is not likely that they will be so severely taxed for some time.

Looking into the future it may be said that no major additions to the educational plant are immediately urgent. The matter is entirely different with respect to dormitories. With the increase of 1500 in our student body, coming at a time when building has been at a standstill, housing conditions for our students are far from what is desired. Dean Burton has called attention to our responsibilities in this

respect and it must be expected that the arguments which he presented will be reiterated until adequate facilities are provided. It is certain that we have to face a building program for dormitories comparable in magnitude with the new Harkness Memorial Quadrangle at Yale or the block of Freshman Dormitories at Harvard. The problem is the more serious because building costs are so high that there is little hope of applying liquid investment capital to dormitory construction with any prospect of a rental return justifying such investment. The report of the Treasurer shows that the net income return from our present dormitories is only about 1.6% on the equity valued at $200,000 which we hold above the mortgage of $150,000 at 5½%. Although the dormitory income account should show a better yield next year because of the increased rentals that have been put into effect, that yield is likely still to be below what is obtainable from seasoned investment securities.

Another problem, less urgent perhaps but very persistent, which lies before your Corporation will be found in a rising cost of instruction. It is a familiar phenomenon of industry that when demand outstrips supply and prices are rising one hears constantly increasing complaints of the inefficiency of the laborer and of rising costs until the crisis sets in, supply exceeds demand, unemployment follows with increased efficiency of the laborer still employed and costs of production decline. In many respects the course of educational business is directly antithetical to this. The first reaction of a Faculty to an increased number of students is to load the members of the Staff with more hours of instruction per week and further to increase the load of student hours by enlarging the size of the classroom sections. The result, granting a fixed salary scale, is a drop in the cost of instruction and a gain in the "efficiency" of the instructor — though usually not without compensating losses of effectiveness of instruction and further sacrifices of that opportunity for individual research and consulting practice which redounds even more to the permanent credit of the Institute than to the transient reputation of the individual.

Once the number of students is stabilized, the staff unloads and costs of instruction rise.

To see how matters have worked out in the past and form an idea of what must be expected in the next decade reference may be made to the statistical tables accompanying the report of the Registrar. The last rapid but relatively moderate rise in numbers culminated in 1902 with 1608 students. At this time the Instructing Staff (omitting research assistants and associates and lecturers) numbered 164, or 1 to 9.8 students. In the next four years the student body fell by more than 200 to 1397 while the staff steadily increased to 215, yielding a ratio of one teacher to 6.5 students. With the ensuing slow increase in students the ratio became stabilized at about 1 to 7.5. But the course of the ratio of staff to students by no means tells the tale. The first relief from a heavy load of students is found in adding to the staff largely at the bottom rather than at the top. Promotions to permanent positions are slow and their effect on the distribution of the staff is delayed. Thus in the year 1902–1903, when the number of students reached its maximum, the ratio of the number of permanent officers in the various professorial grades to the total number of (non-professional) instructors and assistants was 64%, but fell to 50% two years later and might perhaps have become stabilized at about 60% had not the slow insidious effect of promotion asserted itself. As a matter of fact during the five academic years, 1908–1913, the percentage was fairly stable about the figure 78%. The ratio of students to professors (of all grades) in 1902–1903 was 25 to 1, whereas during the whole decade, 1908–1918, the ratio was reasonably steady at around 16 to 1.

To draw your attention in this report each year to such dull matters as the statistical relations between the staff and the student body and to such uninspiring ideas as costs of education would be inexcusable, but we stand today at the Institute in a peculiar position, owing to an extraordinary influx of students such as happens but rarely, and we stand in the world at large in an economic situation that arises only once or twice per century. If events are to follow their

natural course with respect to immediate increase in staff and subsequent increase in the higher grades, the chance amounts to practically a certainty that we must be prepared to raise large additional endowments for salaries or materially to increase our tuition charges, or (particularly if the number of students should seriously diminish) even to be resigned to reductions in our salary scale for permanent officers. Each of these three expedients has been used at the Institute in its half century of existence and by other institutions during the same period. It is the privilege of intelligent foresight to mitigate disagreeable events by contemplating them long enough in advance to prepare the necessary palliatives.

Summer Activities. It is a matter of social economy that the large investment in the Institute's plant and equipment for education and research should not lie idle for three and a half months each year. Successful efforts have been made toward an increase of activity during the summer with the accompanying benefit of a distribution of general expense over a longer portion of the year. The summer session has been strengthened by offering new and more advanced courses, the enrollment has increased, and the quality of the student body during the summer has improved. Further expansion will, however, be necessary before all of the staff who may desire to teach during some of the vacation months can be employed. The Division of Industrial Coöperation and Research operates the year around, and its operations are aided by having accessibly in residence a larger fraction of the staff. The research laboratories of electrical engineering, of physical chemistry, of applied chemistry, of industrial physics, and of aerodynamics are now all running throughout the year.

Advanced Study and Research. The Institute is becoming more and more a graduate school. For many of our undergraduates the Institute courses leading to the S.B. degree are postgraduate study; 15% of our students already hold a Bachelor's degree. The percentage of students seeking the Master's and the Doctor's degree is increasing, the actual numbers were 91 two years ago, 176 last year and will be

higher the coming year. For many years the United States Navy has sent officers here to take the Constructors' Course XIII-A. The United States Army is now using our facilities for advanced instruction to an increasing degree; the Air Service, the Ordnance Department and the Engineer Corps were well represented last year, and for the coming year in addition the Army has transferred to us from Aberdeen the Ordnance School of Application and is to transfer the instruction in gas engines, tanks, and tractors.

Under various contracts and special arrangements important investigations in chemistry, physics, engineering and aeronautics are being carried on for different departments of the Federal Government, in some cases by officers detailed for the purpose, but more generally by members of our instructing staff. The great activity in individual research has led to the establishment of our *Journal of Mathematics and Physics* under the management of a committee representative of our departments of Mathematics and Physics and our Research Laboratory of Physical Chemistry. A Research Laboratory of Industrial Physics has been established, better arrangements for advanced instruction and research in Metallography have been made, and in our Aerodynamical Laboratory the old 4-foot wind tunnel has been rebuilt and a new 7½-foot wind tunnel is under construction.

The School of Chemical Engineering Practice, X-A, the coöperative course in Electrical Engineering, VI-A, undertaken with the General Electric Company and the Edison Illuminating Company, and the graduate course in Aeronautical Engineering, have all been strengthened during the year. At the solicitation of the United States Fisheries Bureau and of leading interests in the fisheries industry and with their active support the option in Industrial Biology has been revamped to be more effective in training young men for the diversified interests of the fisheries industry and of the manufacture and conservation of food products in general. The option in Railroad Engineering has been broadened into an option in Transportation Engineering and an option in Hydro-Electric Engineering

has been added. Leading organizations in the oil and leather industries have approached us relative to the establishment of courses or options in existing courses, through which students may be better trained for the special scientific and engineering necessities of these two fields. It is obvious that with the increasingly intensive application of science and engineering to industry the Institute will be urged more and more to undertake specialized training in many directions. It will be necessary for us to be somewhat on our guard against tendencies to undermine the general effectiveness of our curricula by a too early attention to detail or to burden unduly our financial structure by the multiplication of small special courses. Fortunately the industrial leaders who are raising questions of special training are primarily interested as we are in establishing first a broad fundamental and resourceful education upon which to build and are manifesting a helpful willingness to bear their just share of the added cost of the overlaid specialization.

H. P. TALBOT,
E. F. MILLER,
E. B. WILSON.

DIVISION OF INDUSTRIAL COÖPERATION AND RESEARCH

The Division of Industrial Coöperation and Research, established to fulfil its obligations under the contracts of the Technology Plan has now been in operation for nearly two years. The latter portion of that period has been coincident with such an unusual period of financial depression that it is not possible to estimate accurately the extent of the normal activity of the Division, but sufficient experience has now been had to enable us to estimate, in large part, at least, its opportunities and limitations.

By its effect upon the educational efficiency of the Institute must the plan finally be judged, and from this point its success has, I believe, been proved beyond question. The operation of the Plan, by bringing the men and problems of industry more closely into contact with our instructing staff, has been of great mutual benefit. This has moreover been done without an expenditure of time or effort of such magnitude as to threaten the efficiency of teaching. Under its operation problems in both pure and applied science are being studied under conditions which appear to be helpful to the staff and students. It has been the purpose of the director of the Division to encourage the teaching staff to undertake such research problems as presented themselves to the Division and to seek an equalization of teaching load as would make such arrangements possible rather than to develop special research laboratories or engage special workers for research. The coöperation of the entire Faculty in carrying out the work of the Division, in this way, has been enthusiastic and wholehearted, and a source of constant encouragement and inspiration to the director.

The working out of the Plan from the point of view of the contracting companies has been complicated by the extraordinary industrial depression, causing the postponement of much research and development work. Some of the contractors are in almost daily contact with the officers of the Division for personnel, library work, consultation or research. Others are engaged through

the Division in prolonged research; while some come to the Division only at infrequent intervals for unusual problems. The number of inquiries and problems, and the general closeness of contact with the contractors are increasing. The use of the library, both by personal visit and by mail, is increasing, and more definite arrangements for coöperating with other scientific libraries have been completed.

There are at present some twenty-five serious prolonged research problems being studied through the Division and shorter investigations in large number. Some are researches in pure science for which a fund of $10,000 is available and to which has been added. $4000 for study of a special problem in Physical Chemistry. Not infrequently the investigations have involved work both in the laboratories of the Institute and the plant of the contracting company. Such problems as are most properly undertaken at Technology, because of the peculiar fitness of its equipment or the special knowledge and experience of some of the members of its staff, are worked out in our own laboratories, but there is the fullest coöperation with consulting engineers and chemists to whose laboratories the Division refers problems which may best be so handled and from whom come many of the most interesting and important problems.

In order to properly meet our obligations to the contractors in assisting them to secure information as to alumni who might be available for positions which they were interested in filling the so-called "Who's Who" list of last year was checked by mail so that our files of former students have been brought up to date. The closest coöperation with the heads of the departments is sought in all matters relating to personnel. The Division keeps in close touch with the personnel staff of the Engineering Societies.

The most striking development of the year is the extent to which the Division of Industrial Coöperation and Research has become the real point of contact between Technology and industry on matters relating to science and engineering. As a result of the wide publicity given to the Technology Plan it has become generally known that there is at Technology an organization from which help may properly be sought on industrial problems, that such questions are welcome and that the Division will endeavor to put the questioner in touch with such references or consultants

as may aid him. So far as it may be done without injury to the interests of the contractors these queries are handled by the organization, which cares for the questions coming in under the Plan. The questions from non-contractors are increasing more rapidly than the similar inquiries from the contractors, and they are coming from other countries as well as from all parts of our own. With the return of normal industrial conditions many of these non-contracting firms will undoubtedly become regular contractors under the Plan. The reaction of this branch of the Division's work is of material help to the Institute in that it greatly widens the field in which the Division functions. Further, the existence of the Division centralizes and systematizes the somewhat haphazard treatment of requests and inquiries of the past.

The Division is becoming more and more the clearing house at Technology for those interested in industrial operation. Whether it be the arrangement of the working schedule of the son of one of its officers who comes to Technology as a student, the analysis of some unusual industrial accident or explosion, or the identity of some newly discovered process or mineral, the contractors under the Plan and many others in industry have come to consider the Division of Industrial Coöperation and Research their most natural point of approach, and it has been the effort of the Division to make such response as will extend the field of usefulness and influence of the Institute.

C. L. NORTON, *Director.*

REPORT OF THE LIBRARIAN

Use of the Library. The increased use of the Library which was mentioned in the previous report of the Librarian has been continued. During the year 1920–1921 there were lent from the Central Library for home use 18,084 books and periodicals. This includes 1331 volumes from the Vail Library and 15,979 from the General Collection, an increase of over 2000 volumes above the circulation of the previous year. The departmental libraries from which reports were received show corresponding increase in

use. From the Mathematical Library there were lent 1040 volumes, from the Mining Library 1840, and from the Architectural Library 3428 books and 3782 photographs. Books also were lent to other libraries, 25 volumes being thus lent, and in return we borrowed 16 from other libraries.

With this large circulation there is involved a very considerable amount of clerical work, not only in registering the loans but also in order to insure the return of books borrowed. The superintendent of circulation reports that it was necessary to send out 1321 notices to persons who had failed to return books within the prescribed time.

The lending of books, however, represents only a certain part of the use of the Library. The Reading Room is occupied to nearly its capacity every day, and people are coming and going so constantly that it is impracticable to keep statistics of this use of the Library. It has been the custom, however, for many years to attempt to keep statistics of the use of the Library in the evenings and Saturday afternoons. During the year covered by this report the recorded attendance on 143 evenings averaged from 5 to 10 P.M., 49 persons. The average for the earlier hours from 5 to 7 P.M. was 36 persons. The attendance during 25 Saturday afternoons from 1 to 4 P.M. averaged 48.

Reference Work. The reorganization of the Library staff at the beginning of this year made it possible for the first time to carry on systematically what is known as reference work. By this is meant the work of assisting officers and students of the Institute and other readers in the use of the Library. In order to further this object, early in the first term circulars were sent to members of the teaching staff, contractors of the Technology Plan, and some others, asking for the names of subjects about which information might be desired. Our reference file contains 391 cards, which were returned to the Library with these subjects indicated. The contractors returned 149 of these, and from the Departments of the Institute the greatest number was received from the Departments of Chemistry and Chemical Engineering, 80 cards, and next from the Mechanical Engineering Department, 26 cards. In response to these requests 782 information items were sent out, 20% of these being to members of the Chemical Departments, 18% to the Department of Naval Architecture,

and about 15% to contractors. In addition to these, answers were made to 415 inquiries received from the Division of Industrial Coöperation and Research, and it is estimated that about 3500 inquiries from students were taken care of, and a similar service was done for 13 libraries. In this connection it may be noted that the Curator of the Hoover War Collection at Stanford University has been glad to take advantage of Mr. Van Patten's knowledge of the Dutch and Flemish languages to obtain his assistance in editing items in those languages in the catalogue of that collection.

An important part of the reference work has been the compilation of bibliographies and reading lists. The following have been compiled under the direction of Mr. Van Patten, the Reference Librarian:

Physical constants of petroleum hydrocarbons. 8 pages.
Kelp as a source of fertilizer. 5 pages.
Tractive resistance. Annotated. 62 pages.
Nomenclature of tuberculosis. 2 pages.
Fatigue of steel. Annotated. 2 pages.
Air cooling of internal combustion engines. 7 pages.
Methods of coating steel. Annotated, with list of patents, 26 pages.
Spanish electrical engineering literature in the Institute Library. 10 pages.

In addition to this there are in preparation a number of bibliographies, including one on the spectroscopy of dyes, and one on corrosion of metals that already contains 2400 entries, nearly twice as many as in any previous list on this subject.

In addition to this, similar work is being carried on by the assistant in charge of the Vail Library along the more restricted lines of electrical engineering and related subjects. She has done much work towards making this valuable collection available for officers and students of the Institute; from January, 1921, to June, 1921, having investigated 112 subjects. In order to bring the advantages of the Library to the attention of students, eight lectures were given during the early part of the year by the librarian and assistants.

Accessions. The total number of items received by the Library were about 2500 in excess of those of the previous year, the total being 7536, of which there were received by purchase 1592, by binding 1150, and by gift 4794. After deducting books lost or discarded the net additions to the Library consisted of 5020 volumes, 2069 pamphlets, and 43 maps, making the total contents

of the Libraries June 30, 1921, 145,750 volumes and 53,610 pamphlets and maps. At the same time there were received regularly 875 periodicals, the estimated cost of which is $2976.13. In connection with these accessions there were issued for the purchase of books 1669 orders, and for binding 1107 orders.

The obtaining of new books would be useless, and the reference work would be impossible, without the preparation of suitable bibliographies by which readers can be guided to their subjects of inquiry. For that reason the work in the cataloguing division is regarded as of the highest importance. During the year there were added to the catalogue of the Vail Library 1470 cards, and to the general catalogue 7230 cards, which is an increase of over two thousand above the number added last year. Owing to loss of books it was necessary to remove from the catalogue 1013 cards so that the general catalogue of the Institute now contains a total of 162,122 cards.

Cost Data. The cost of maintaining the Library exclusive of salaries as represented by bills approved by the Librarian amounted during the year for books and binding to $10,190.13. Subscriptions to periodicals $2643.29, supplies, equipment, etc., $1240.01, making a total of $14,073.43. It is estimated that the total amount invested in books in the Library amounts to $278,056. This estimate is based on actual expenditures running through the last twenty-five years, and on the assumption that depreciation is balanced by gifts.

Personnel. The work of the Library was again hampered somewhat by resignations of members of the staff, two of the bibliographers leaving for better positions during the middle of the year. These positions, however, were filled before the end of the year, and the staff is now recruited to the full strength authorized. At the end of the year Mr. Van Patten was promoted to be Assistant Librarian, and through the courtesy of the Department of English and History it was possible to secure the transfer of Miss Mirian S. Smith to the Library, in order that she might serve as Reference Assistant, taking part of the work done during the previous year by Mr. Van Patten, and being entrusted especially with the duty of assisting the students with their work in the Library. For this she is especially fitted through her previous training and her work in the Department of English and History.

Gifts. The most notable gift received during the year is a collection of books from Theodore N. Vail's private library. This consists of 40 volumes on telephone and electric cables and 70 bound volumes and 50 pamphlets containing briefs, testimony, and the like, connected with the litigation over Bell telephone patents. After the death of Mr. Vail this collection was presented to the Institute through the good offices of the American Telephone and Telegraph Company, of which he was for many years president, and it has been added to the Vail Library.

Another notable gift is the Library of Professor William T. Sedgwick, who at the time of his death had been for 38 years head of the Department of Biology and Public Health. This collection has been presented to the Institute by Mrs. Sedgwick with the stipulation that the books on professional subjects shall remain in the rooms of the Biological Department; she has also provided an appropriate bookplate to mark the books of this collection.

From Prof. Carl Stormer of Christiania were received a collection of thirteen of his contributions to mathematics and mathematical physics, especially with relation to the movements of electric corpuscles.

The Latin American Club has presented the Institute with 103 volumes of Spanish and Latin American Literature. This is to be kept as a special collection for the use of members of the Club. Where the books were received unbound the Club very kindly defrayed the expense of binding.

The students who were at the Summer Camp during the summer of 1920 have presented the Institute with 110 volumes for the Summer Camp Library, which they have given in memory of Albert Schagen McAuliffe of the Class of 1922. These books were forwarded to the camp marked with a bookplate commemorating the gift.

A gift of considerable personal and historic interest was made by Professor Charles R. Cross. This consists of two very carefully written sets of notes, one written by his brother when attending lectures on physics by Prof. John Foster at Union College in 1855, and the other, notes taken by himself of lectures by Professor Pickering given at the Institute in the year 1868.

The Earl of Camperdown has continued his gifts as before,

and the Hon. Frederick W. Dallinger has always been responsive to our requests for Government documents.

Among many other gifts received the following could be mentioned:

Donors and Gifts

E. Germain, '20. — Chile al Dia. Tome 1–11.
William Green, Secretary United Mine Workers. — Evans, C: History United Mine Workers of America, 1890–1900.
Paul de Chambrier. — Four Works on Mines and Petroleum of Pechelbronn.
Prof. W. Lindgren. — Grabau: Non-metallic Mineral Deposits.
Ralph Sargent, for his father Frederick Sargent. — Rankine: Cyclopedia of Machine and Hand Tools.
E. V. Shepard '89. — Shepard: Correct auction.-
Prof. C. H. Warren. — Kraus and Hunt: Mineralogy.
W. Kempffert. — Kempffert: Discovering New Facts About Paper
Mrs. Frederick D. Stackpole. — 45 volumes on Chemistry and Mineralogy.
C. E. Knoeppel. — 15 copies Knoeppel: Graphic Production Control.
F. Ravecca. — Montevideo-El Balneario de Carrasco.
Prof. W. Hovgaard. — Hovgaard: General Design of Warships.
P. V. Wells, '11. — Wells: Thesis — A la Faculte des Sciences de Paris.
Prof. D. R. Dewey. — Engelman, J.: Geschichte des Handels u. Weltverkehrs. 1884.
Lt. John A. Tobin, United States Navy, Retired. — Tobin: Report Improvements of Naval Engineering in Great Britain.
Prof. A. H. Gill. — Gill: Gas Fuel Analysis for Engineers.
American Telephone and Telegraph. — Vail, T: Views on Public Questions.
John R. Freeman. — "Ships and Shipmasters of Old Providence."
H. W. Hamilton, '17. — Weinberg & Seguin: La Gangrene Gazeuse.
Prof. A. T. Robinson. — Slosson, E. E.: Creative Chemistry.
Dr. Albert Salomon. — Peru — Potentialities of Economic Development.
Taylor Society. — Taylor, F. W.: A Memorial volume.
Fay, Spofford & Thorndike. — Boston Army Supply Base — Utilities Report and Atlas.
Prof. Tenney L. Davis. — Davis, T. L.: De Profanitate.
Prof. H. P. Talbot. — "New Pearl of Great Price."
Poynting Memorial Fund. — Poynting, J. H.: Collected Scientific Papers.
From the Parents of George M. Spear, Class '01. — 8 volumes, American Society Naval Engineers' Journal; 4 volumes, Peabody: Naval Architecture; 2 volumes, Thearle: Modern Practice of Shipbuilding in Iron and Steel.
Mrs. Frank A. Ware, for her son, Ernest A. Ware, '09 (deceased). — 10 volumes Cyclopedia of Architecture, Carpentry and Building; 8 volumes, Cyclopedia of Civil Engineering.
B. C. Boulton, '16. — Boulton, B. C.: Manufacture and Use of Plywood and Glue.
Frank M. Williams. — Book of Plans, New York State Barge Canal.
John Spargo. — Spargo, J.: The Jew and American Ideals.
Miss Evelyn Walker. — 6 volumes from the Library of Gen. Francis A. Walker.
Charles A. Mitke. — Mitke, C. A.: Standardization of Mining Methods.
Jasper Whiting, Esq. — 15 volumes, *Journal of the American Electrochemical Society.*
Prof. William Emerson. — Plowman: Etching 1914.
John D. Rockefeller. — Altovite Aphrodite, 1920.
James Roscoe Day. — Day: My Neighbor the Working Man.
Toch Brothers. — Toch, M.: The Chemistry and Technology of Paints.

Prof. C. H. Warren. — Bayley, W. S.: Elementary Crystallography; Phillips, A. H.: Mineralogy.
Yone Noguchi (Keio University, Tokyo, Japan). — Noguchi: Japan and America.
M. I. T. Course E52, 1920–1921. — 55 volumes English Literature.

R. P. BIGELOW.

REPORT OF THE DEAN OF STUDENTS

During the past year the Institute has admitted an unusual number of new students, but the number entering with advanced standing from other colleges this year exceeds the number of those entering on examination to the first-year class. The housing problem has been very acute and the need of dormitories for students coming to Boston from a distance cannot be satisfactorily met unless special provision be made for their accommodations.

The new Fifty Per Cent Rule adopted this year by the Faculty, which automatically prevents students continuing any subjects in which they have failed (if they have failed in fifty per cent of their work) has resulted in the dropping of an unusual number of students at the end of the first ten weeks in the first year, and it has appeared to the Dean (who is asked to have a general oversight of first-year work) that a considerable study of the problem of instruction in the first year and of its relation to the Institute curriculum might well be made with reference to the better adjustment of the first-year work. It might help the situation in the first year if a Director, or Dean of First-Year Students, was appointed, whose duty with reference to those students would be somewhat similar to that which the head of a course at the Institute now holds towards instructors and students in his department. He should be consulted in regard to the appointment of instructors, and should arrange to correlate all the first-year work. He should give special attention to the work of instruction in the first year; should have frequent meetings with the instructing corps; and recommend all Faculty votes with reference to first-year students.

It is pleasing to note that the student government at the Institute has been doing effective work during the past year, and is quite back to its old pre-war standard of efficiency. The Intercollegiate Conference on undergraduate government held at the

Institute on April 15 and 16 was the first of its kind to be held in this country. Some forty-two colleges sent representatives. The managers of this Conference were very successful in carrying out quite an elaborate program. A printed report of the Conference has been made and circulated among the colleges interested. It was brought out in the meetings of the Conference that students at Technology take a much larger responsibility in relation to the government of their affairs than is usual in other colleges.

ALFRED E. BURTON.

REPORT OF THE REGISTRAR

The registration for the past year was greater than at any other time in the history of the Institute. The gain over the last year was about 12%, not as great as the extraordinary increase of students in the year previous. The number of students on November first was 3436.

The total number of active members of the Instructing Staff rose to 375. The ratio of the number of instructors to the number of students was 1 to 9; the year before it was one to a little more than ten.

In the student registration, the largest group was the third-year class, which was within five of 1,000 students. The fourth-year and the second-year classes were both larger than the first-year class, which numbered 689. The number of candidates for advanced degrees, 176, was almost double that of the year previous.

Among the professional courses, Mechanical Engineering was larger than any other. It is followed in size by the Course in Electrical Engineering, next by the Course in Engineering Administration and then by that in Chemical Engineering. To include the courses having more than 350 students, Civil Engineering should be added to this group. Among the larger courses, the percentage gain in Electrical Engineering and Chemical Engineering was greater than that of the student body as a whole.

The number of students from other colleges was high; the proportional increase in this number being greater than that in total registration. There were in the past year 1302 students from other colleges, or 38% of the student body. Fifteen per cent

of the student body hold degrees from other colleges. The graduates from other colleges represent 125 American and 87 foreign colleges and universities. Among the professional courses including Chemical Engineering Practice and Naval Construction in which all of the students are college graduates, the courses in which the percentage of college graduates is greater than the percentage of college graduates among the total student body are Civil Engineering, Architecture, Chemical Engineering, Biology, Physics, Sanitary Engineering, Geology, and Electrochemical Engineering. The total number of students in the Engineering Courses gained 11%, while the percentage increase in registration in the Science Courses was 11%. The respective numbers are [illegible] and 318.

The number of women students, in spite of the increase in registration, dropped from [illegible] to 39.

In reviewing the geographical distribution of students for the past year, it is interesting to note that the percentage increase of foreign students was greater than that of the whole student body, the percentage of foreign students being 7.8%.

Among the geographical divisions of the United States, all sections except the North Atlantic have a greater percentage increase in the number of students than the percentage increase of the total student body. The gain from the South Atlantic and the North Central States is 21% in each case. All States and Territories of the United States except Alaska are represented in the student body. As usual, the number of students from Massachusetts is the largest, 1510 in number, but this number is one less than a year ago in spite of the increase in the total registration. Next to Massachusetts, New York sent the greatest number of students with its delegation of 311. Two hundred sixty seven foreign students represent 37 countries, the largest group being 58 from China. By order of number of representatives, Canada is second with 41 and Norway third with 30 students.

While the age of first-year students according to the computation made last year was higher than the average for the past twenty years, the age of the first-year students this year has dropped a little nearer to the former average.

During the past year the Junior Grade of the First-Year Class was omitted, but it is advertised to be renewed in January, 1922.

The Scholarship Committee of the Faculty recommended [illegible] of $[illegible] to undergraduate students. There were [illegible] applicants for scholarships and [illegible] received awards from the [illegible] and [illegible] received State Scholarships. [illegible] of them held [illegible] Scholarships. A total of [illegible] students received aid. [illegible] the list of State Scholarships.

During the past year another study has been made of the [scholastic] standing of students. This year the result shows that the relative standing of the first year class was lowest and that of the third year was highest, the second year class stood next and the fourth year class was third in order. The positions of the several classes differ entirely from those of earlier studies. Again the average standing of members of fraternities is slightly lower than that of the student body as a whole. The purpose of this study was to determine the relative standing of the various fraternity chapters at Technology. The Inter-Fraternity Council awards to the chapter having the highest scholarship standing a certain hall clock which stands in the house of the chapter. The relative standing of fraternities has varied considerably in each study.

During the past few years there has come to the Institute repeated demands from the central organizations of fraternities requesting a report upon the academic standing of their chapters at the Institute.

The usual tables of statistics follow.

WALTER HUMPHREYS

of the student body held degrees from other colleges. The graduates from other colleges represent 137 American and 57 foreign colleges and universities. Among the professional courses excluding Chemical Engineering Practice and Naval Construction in which all of the students are college graduates, the courses in which the percentage of college graduates is greater than the percentage of college graduates among the total student body are Civil Engineering, Architecture, Chemical Engineering, Biology, Physics, Sanitary Engineering, Geology, and Electrochemical Engineering. The total number of students in the Engineering Courses gained 10%, while the percentage increase in registration in the Science Courses was 19%. The respective numbers are 3070 and 318.

The number of women students, in spite of the increase in registration, dropped from 40 to 38.

In reviewing the geographical distribution of students for the past year, it is interesting to note that the percentage increase of foreign students was greater than that of the whole student body, the percentage of foreign students being 7.8%.

Among the geographical divisions of the United States, all sections except the North Atlantic have a greater percentage increase in the number of students than the percentage increase of the total student body. The gain from the South Atlantic and the North Central States is 24% in each case. All States and Territories of the United States except Alaska are represented in the student body. As usual, the number of students from Massachusetts is the largest, 1516 in number, but this number is one less than a year ago in spite of the increase in the total registration. Next to Massachusetts, New York sent the greatest number of students with its delegation of 341. Two hundred sixty-seven foreign students represent 37 countries, the largest group being 58 from China. By order of number of representatives, Canada is second with 41 and Norway third with 30 students.

While the age of first-year students according to the computation made last year was higher than the average for the past twenty years, the age of the first-year students this year has dropped a little nearer to the former average.

During the past year the Junior Grade of the First-Year Class was omitted, but it is advertised to be renewed in January, 1922.

The Scholarship Committee of the Faculty recommended awards of $34,122.50 to undergraduate students. There were 556 applicants for scholarship aid; 220 received awards from the Institute and 132 received State Scholarships; 99 of them held one-half Scholarships. A total of 352 students received aid. This is the last of State Scholarships.

During the past year another study has been made of the relative standing of students. This year the result shows that the relative standing of the first-year class was lowest and that of the third-year was highest, the second-year class stood next and the fourth-year class was third in order. The positions of the several classes differ entirely from those of earlier studies. Again the average standing of members of fraternities is slightly lower than that of the student body as a whole. The purpose of this study was to determine the relative standing of the various fraternity chapters at Technology. The Inter-Fraternity Council awards to the chapter having the highest scholarship standing a certain hall clock which stands in the house of the chapter. The relative standing of fraternities has varied considerably in each study.

During the past few years there has come to the Institute repeated demands from the central organizations of fraternities requesting a report upon the academic standing of their chapters at the Institute.

The usual tables of statistics follows.

WALTER HUMPHREYS.

The Corps of Instructors

November 1	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19
Professors: Emeriti	1	1	1	1	1	1	1	1	3	3	3	4	4	4	5	5	5
Retired	—	—	—	—	1	1	1	1	3	3	3	4	5	7	7	6	6
Non-Resident	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2
Research (Not counted elsewhere)	—	—	—	—	—	—	—	—	4	3	1	1	—	—	—	—	—
Total	3	4	4	4	5	5	5	5	13	12	10	12	12	13	14	13	13
Professors	27	25	32	36	39	39	43	43	40	47	46	59	63	61	59	58	52
Associate Professors	14	17	14	17	17	17	14	18	17	16	23	23	23	30	32	29	33
Assistant Professors	25	19	24	21	24	32	31	30	33	35	33	36	31	36	38	33	39
Active Faculty	66	61	69	74	80	88	88	91	90	98	102	118	117	127	129	120	124
Instructors	66	67	72	69	72	62	69	66	64	67	74	70	79	90	70	67	99
Assistants	51	56	53	52	52	50	51	55	50	49	54	52	58	54	38	35	39
Faculty, Instructors and Assistants	187	184	184	215	204	200	208	212	204	214	230	240	254	271	237	222	262
Research Associates	..	..	6	8	8	6	12	8	5	3	1	3	3	5	4	1	8
Research Assistants	..	..	4	3	3	1	1	5	6	7	8	15	11	14	7	5	10
Lecturers	41	33	39	31	32	31	18	21	25	16	19	23	28	31	29	13	13
Total Active Members	228	217	332	257	247	238	239	246	240	240	258	281	296	321	277	241	293

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		

The Students, 1920–1921

Registration by Classes	Total
Candidates for advanced degrees	176
Fourth year	772
Third year	995
Second year	756
First year	689
School of Public Health	25
Special	23
Total	3436

Students by Courses for the Year, 1920–1921

Year	Civil Engineering	Mechanical Engineering	Mining Engineering and Metallurgy	Architecture	Chemistry	Electrical Engineering	Electrical Engineering VI-A	Biology and Public Health	Physics	General Science	General Engineering	Chemical Engineering	Chemical Engineering Practice X-A	Sanitary Engineering	Geology and Geological Engineering	Naval Architecture	Naval Construction	Electrochemical Engineering	Engineering Administration	Aeronautical Engineering	Mathematics	Total
Graduate	4	13	1	5	8	14	—	3	9	1	—	20	29	—	5	1	20	4	—	7	2	176
Fourth year	124	180	30	26	10	66	27	6	5	—	17	126	—	4	3	22	10	14	103	—	—	772
Third year	87	198	42	49	15	101	53	8	12	2	11	152	—	9	8	26	—	36	186	—	—	995
Second year	87	133	33	35	15	143	—	6	12	4	2	106	—	1	3	25	—	26	125	—	—	756
First year	75	127	34	15	15	157	—	1	4	1	4	99	—	1	—	21	—	20	115	—	—	689
School of Public Health	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25
Special	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23
Total	377	651	140	130	93	481	80	24	42	8	34	497	29	15	19	95	30	105	529	7	2	3,436

TOTALS OF THE SAME CLASSIFICATION* SINCE 1907

Year	Engineering Courses														Science Courses							
	Civil Engineering	Mechanical Engineering	Mining Engineering	Electrical Engineering (Inc. VI-A)	Chemical Engineering (Inc. X-A)	Sanitary Engineering	Naval Architecture	Naval Construction	Electrochemical Eng.	Engineering Administration	Aeronautical Eng.	General Engineering	Total of Engineering Courses	Architecture	Chemistry	Biology	Physics	Geology	General Science	Mathematics	Total of Science Courses	School of Public Health
1907–08	210	227	118	202	59	39	37	16	—	—	—	—	908	84	53	17	21	—	2	—	91	—
1908–09	197	197	104	209	71	52	41	13	—	—	—	—	884	91	60	20	19	2	4	—	101	—
1909–10	207	204	99	203	84	60	41	14	14	—	—	—	926	109	44	22	4	1	4	—	71	—
1910–11	220	198	90	210	128	46	26	9	26	—	—	—	953	113	44	19	7	—	2	—	70	—
1911–12	217	214	79	203	129	57	19	8	35	—	—	—	961	112	56	20	4	2	3	—	82	—
1912–13	212	243	50	201	149	55	29	6	42	—	—	—	987	127	60	33	5	2	4	—	100	—
1913–14	209	279	37	196	141	65	31	7	38	—	—	—	1,003	130	78	36	12	3	3	—	129	—
1914–15	197	271	34	205	146	61	25	16	46	57	—	—	1,057	157	66	44	10	3	5	—	123	—
1915–16	188	279	46	235	157	60	28	23	50	99	—	—	1,165	163	59	48	14	4	4	—	125	—
1916–17	172	270	55	233	173	31	38	26	42	139	—	—	1,179	142	60	61	11	9	4	—	144	—
1917–18	160	210	40	186	164	21	40	—	37	119	6	—	983	80	45	37	10	3	1	1	95	—
1918–19	111	172	40	135	155	9	75	6	16	67	81	—	867	27	33	49	6	1	—	1	116	—
1919–20	255	472	103	305	381	24	66	18	74	375	2	33	2,108	119	66	56	15	15	—	1	152	—
1920–21	377	651	140	561	526	15	95	30	105	529	7	34	3,070	130	93	24	42	19	8	2	318	25

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

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

	1915	1916	1917	1918	1919	1920	1921
Engineering Courses							
Civil	251	234	225	212	240	310	34
Mechanical	329	337	340	270	400	573	60
Mining	49	56	67	63	78	133	13
Electrical	271	282	290	224	252	406	49
Chemical	192	200	267	258	350	428	49
Sanitary	78	69	40	22	16	26	1
Naval Architecture	49	62	74	83	78	96	10
Electrochemical	65	63	55	44	43	108	10
Engineering Administration	102	146	199	150	228	467	51
Aeronautical	—	—	—	—	2	2	
General Engineering	—	—	—	—	—	29	4
Total Engineering	1,386	1,449	1,557	1,326	1,687	2,578	2,84
Architecture	183	173	163	74	67	144	13
Science Courses							
Chemistry	82	72	66	52	58	72	9
Biology	51	51	63	35	19	47	2
Physics	16	15	11	12	15	23	4
Geology	6	5	7	3	4	14	2
General Science	5	4	5	2	2	—	
Total Science Courses	160	147	152	104	98	156	18
Special and No Course Classification	18	17	20	130	8	6	6
School of Public Health	—	—	—	—	—	—	1
Grand Total	1,747	1,786	1,892	1,634	1,860	2,884	3, 24

NUMBER OF STUDENTS IN EACH YEAR, FROM 1910, COMING FROM EACH STATE OR TERRITORY

States and Territories.	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
North Atlantic	1,118	1,152	1,212	1,279	1,394	1,434	1,502	1,316	1,436	2,261	2,415
Connecticut	33	45	44	45	55	61	69	49	59	101	104
Maine	24	25	24	25	32	23	32	26	34	58	66
Massachusetts	840	860	890	954	1,032	1,060	1,110	1,005	1,020	1,517	1,516
New Hampshire	27	29	28	34	34	27	30	26	28	48	41
New Jersey	18	33	34	38	48	54	53	47	58	113	123
New York	106	90	108	102	113	121	122	101	140	264	341
Pennsylvania	37	39	43	42	42	46	57	31	58	113	143
Rhode Island	27	25	33	34	31	35	17	19	26	42	54
Vermont	6	6	8	5	7	7	12	12	11	15	27
South Atlantic:	41	49	45	66	66	72	81	43	50	129	160
Delaware	1	1	2	2	3	5	4	7	3	14	15
District of Columbia	5	13	12	21	18	19	27	10	14	37	37
Florida	1	2	3	5	2	5	7	1	6	10	14
Georgia	5	3	3	4	3	5	5	3	2	8	7
Maryland	14	8	8	16	18	13	9	4	7	13	18
North Carolina	—	1	2	4	2	4	5	4	2	9	11
South Carolina	1	3	—	5	6	9	9	4	3	5	8
Virginia	12	15	13	8	11	8	8	6	9	24	36
West Virginia	3	3	2	1	3	4	7	4	4	9	13
South Central:	37	48	46	43	50	54	49	42	41	79	91
Alabama	4	6	3	5	5	5	5	6	5	12	4
Arkansas	2	2	2	1	2	1	1	—	—	1	6
Kentucky	2	8	7	10	10	8	9	6	5	14	20
Louisiana	5	4	4	5	5	7	7	5	5	10	9
Mississippi	6	8	7	5	6	5	2	4	2	6	5
Tennessee	5	3	2	2	5	5	8	3	3	10	12
Texas	13	17	21	15	17	23	17	18	21	26	35
North Central:	140	141	137	115	115	152	146	124	118	271	337
Illinois	33	30	25	15	27	37	31	27	19	49	67
Indiana	10	9	10	9	7	12	5	9	10	18	27
Iowa	4	9	8	11	10	12	6	1	5	15	18
Kansas	9	7	8	3	4	2	3	1	3	7	6
Michigan	9	9	7	12	14	15	16	14	19	26	29
Minnesota	8	7	14	15	6	5	6	4	5	18	24
Missouri	13	12	13	3	5	10	18	1	14	37	35
Nebraska	6	8	8	8	5	5	5	3	1	4	11
North Dakota	3	3	3	2	3	3	1	—	—	2	4
Ohio	33	37	32	25	28	44	43	42	34	68	85
South Dakota	3	2	2	2	1	3	1	1	—	2	2
Wisconsin	9	8	7	10	5	4	11	7	8	25	29
Western:	53	57	65	63	72	59	52	46	42	120	139
Alaska	—	—	1	1	—	—	—	1	—	—	—
Arizona	1	1	1	—	—	—	1	—	1	2	5
California	21	23	22	23	30	25	22	16	14	41	47
Colorado	9	11	14	13	14	11	8	7	7	26	23
Idaho	—	—	—	1	2	1	2	1	—	1	4
Montana	2	2	4	4	3	2	1	3	6	8	8
Nevada	—	—	—	—	—	—	—	—	—	1	1
New Mexico	—	—	1	1	1	1	—	—	—	4	4
Oklahoma	—	—	1	2	—	—	1	—	2	3	2
Oregon	8	11	14	11	10	5	6	6	7	9	11
Utah	3	3	2	2	—	5	5	5	—	5	10
Washington	9	6	6	5	10	7	4	4	5	15	20
Wyoming	—	—	—	—	—	2	2	3	—	5	4

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Districts	15	11	6	6	5	4	5	4	5	13	27
Canal Zone	1	—	—	—	—	—	—	—	1	1	2
Hawaii	2	3	2	1	2	1	—	1	1	—	3
Philippine Islands	4	3	1	2	1	1	2	—	—	7	11
Porto Rico	8	5	3	3	2	2	3	3	3	5	11
Total for the United States	1,404	1,458	1,511	1,572	1,702	1,778	1,835	1,577	1,692	2,873	3,169

NUMBER OF STUDENTS IN EACH YEAR, FROM 1910, COMING FROM EACH FOREIGN COUNTRY

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Foreign Countries	102	101	100	113	114	125	122	123	127	205	267
Albania	—	—	—	—	—	—	—	1	—	—	—
Argentine Republic	5	2	1	—	—	1	1	1	—	3	5
Armenia	—	—	—	—	—	—	—	—	2	3	2
Australia	—	1	—	—	—	—	—	—	—	2	1
Austria-Hungary	2	1	2	1	2	1	1	1	—	—	—
Belgium	—	—	—	—	—	—	—	—	—	—	2
Brazil	2	3	5	7	4	1	1	4	2	4	7
Bulgaria	—	—	—	—	—	1	—	—	—	—	1
Canada	18	19	13	14	15	14	16	10	10	38	41
Cape Colony	—	1	—	—	1	—	—	—	—	—	—
Chile	3	1	—	1	—	—	8	10	6	7	8
China	27	36	37	42	46	49	40	42	38	40	58
Colombia	—	—	—	1	3	4	3	2	4	6	2
Costa Rica	1	1	—	1	—	—	1	1	1	1	1
Cuba	5	3	6	7	3	2	8	6	5	4	8
Cyprus, Island of	—	—	—	—	—	1	—	—	—	—	—
Czechoslovakia	—	—	—	—	—	—	—	—	—	—	3
Denmark	1	1	—	2	1	1	1	3	1	1	3
Dutch West Indies	—	—	—	—	—	—	—	—	—	—	1
Ecuador	1	1	1	1	—	—	1	1	4	2	1
Egypt	1	2	1	1	1	1	1	1	—	1	—
England	1	1	—	—	1	1	1	—	—	1	3
Finland	1	—	—	—	—	—	—	—	—	—	—
France	2	2	3	4	2	—	—	—	—	2	2
Germany	1	2	3	2	2	3	1	—	—	—	—
Greece	—	1	1	1	1	—	—	2	3	2	4
Guatemala	1	—	1	1	2	1	—	1	—	—	1
Honduras	3	2	—	1	1	2	3	3	—	1	—
India	—	—	2	1	2	2	1	—	—	2	6
Ireland	—	—	—	—	—	—	—	—	—	1	1
Italy	1	—	—	—	—	1	2	—	—	1	—
Jamaica	1	1	—	—	—	—	—	—	—	—	—
Japan	4	3	—	1	1	6	8	11	15	10	12
Korea	—	—	2	—	—	—	—	—	—	—	1
Mexico	9	5	4	7	7	10	9	5	5	9	18
Newfoundland	—	1	1	1	—	—	—	—	—	—	—
New Zealand	1	2	1	—	—	—	—	—	—	—	—
Nicaragua	—	—	—	—	—	2	—	—	—	—	—
Norway	1	—	—	—	—	2	3	6	12	38	30
Palestine	—	—	—	—	—	—	—	—	—	—	1
Paraguay	1	1	1	1	1	—	—	—	—	—	—
Peru	2	1	—	2	3	3	—	2	—	3	3
Portugal	1	—	—	1	—	1	—	—	—	—	—
Russia	2	3	4	4	5	2	2	1	10	8	12
Salvador	1	—	1	1	1	3	1	—	—	—	—
Scotland	—	—	—	1	1	—	—	—	—	1	1
Siam	—	—	—	—	—	1	1	—	—	5	8
Smyrna	—	—	—	—	—	—	—	—	—	—	1
South African Republic	—	—	1	1	—	1	—	—	1	2	4
Spain	—	—	—	—	—	—	—	2	4	2	5
Straits Settlements	—	—	—	—	—	—	—	—	1	—	1
Sweden	—	—	—	—	—	—	—	2	—	—	2
Switzerland	1	1	—	—	—	—	—	—	—	1	—
Syria	1	2	3	2	2	—	1	—	—	—	—
Transvaal	2	—	—	—	—	—	—	—	—	—	—
Turkey	2	1	5	3	6	8	6	5	1	1	1
Uruguay	—	—	—	—	—	—	—	5	2	3	6
Total in School	1,506	1,559	1,611	1,685	1,816	1,900	1,957	1,698	1,819	3,078	3,436

WOMEN STUDENTS, 1920–1921

Year	COURSE								
	Architecture	Chemistry	Electrical Engineering	Biology and Public Health	Physics	General Engineering	Electrochemical Engineering	School of Public Health	Total
First	1	2	2	—	1	—	—	—	6
Second	3	3	—	—	—	—	1	—	7
Third	7	—	—	—	1	1	1	—	10
Fourth	2	—	—	—	1	—	—	—	3
Graduate	1	3	—	1	4	—	—	3	12
Total	14	8	2	1	7	1	2	3	38

TOTAL REGISTRATION AND NUMBER OF NEW STUDENTS, 1920–1921

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
1920–1921	3,436	2,080	1,356	608

GRADUATE STUDENTS, 1920–1921

American Colleges and Universities Represented

	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21
Akron	—	—	3	—	1	1
Alabama	1	2	2	—	—	—
Alabama Polytechnic Inst.	1	2	1	—	2	1
Albany Medical	1	—	—	—	—	—
Alfred	—	—	1	—	1	—
Allegheny	—	—	1	—	1	1
Amherst	6	10	3	1	5	1
Arizona	—	—	1	—	2	—
Arkansas	—	—	—	—	—	2
Armour Institute of Tech.	—	2	1	—	—	—
Assumption	—	—	—	—	1	—
Austin	—	—	—	—	1	—
Baker	—	—	—	—	2	2
Bates	—	4	3	—	2	3
Baylor	1	1	—	—	—	—
Bellevue	—	1	—	—	—	—
Bellevue Hospital, Medical	1	—	—	—	—	—
Beloit	1	2	2	—	1	1
Bethany	—	—	1	—	—	—
Birmingham-Southern	—	—	—	—	—	1
Boston College	—	3	1	1	6	8
Boston University	1	4	2	1	2	—
Bowdoin	—	4	—	1	3	3
Brooklyn Polytechnic Inst.	—	2	1	—	1	—
Brown	1	2	2	—	3	8
Bryn Mawr	—	—	—	—	4	3
Bucknell	—	—	—	—	2	—
Buffalo	—	—	1	—	1	1
California	3	7	4	—	1	3
Campion	—	—	—	—	2	1
Canisius	—	1	—	1	1	1
Carleton	—	—	—	—	1	3
Carnegie Institute of Technology	—	1	1	—	1	1
Case School of App. Science	—	6	1	—	—	—
Catholic University of Am.	—	5	3	1	—	—
Central (Fayette, Mo.)	—	—	—	—	—	1
Centre	—	—	—	—	1	1
Charleston	2	1	—	—	—	—
Chicago	—	1	1	—	1	1
Cincinnati	1	1	1	1	1	—
City of New York	2	3	7	—	5	9
Clark	2	1	1	2	3	4
Clarkson	—	—	—	—	1	—
Clemson Agricultural	—	—	—	—	—	1
Colby	1	3	2	—	2	4
Colgate	2	2	3	1	—	4
Colorado Agricultural	1	1	—	—	—	—
Colorado College	1	1	—	—	—	1
Colorado School of Mines	—	1	1	—	—	—
Colorado University	—	1	1	—	3	2
Columbia	4	6	3	4	4	5
Cooper Union	—	1	—	—	—	1
Cornell University	2	9	8	5	4	5
Cornell (Iown)	1	—	1	—	—	—
Cotner	—	1	—	—	—	1
Creighton	1	—	—	—	—	—
Dakota Wesleyan	1	—	—	—	—	—
Dartmouth	4	22	15	1	11	12
Davidson	—	—	1	1	1	2
Davis and Elkins	—	1	1	—	—	—
Delaware	—	—	1	—	3	4
Denison	4	2	2	—	—	—
Denver	—	2	1	—	—	—
Drake	—	1	—	—	1	1
Drury	—	2	—	—	—	—
Earlham	—	—	—	—	—	1
Fargo	—	1	—	—	—	—
Fordham	—	—	—	—	1	1
Franklin and Marshall	—	1	—	—	2	1
Furman	1	—	1	—	—	—
Geneva	—	1	—	—	—	—
Georgetown	1	2	1	—	—	—
George Washington	—	—	1	—	1	1
Georgia	1	1	—	—	1	1
Georgia School of Tech.	1	4	2	—	1	1
Gonzaga	2	1	—	—	—	—
Goucher	—	—	—	1	—	—
Grinnell	2	2	—	—	2	5
Hahnemann Medical	—	—	—	—	—	1
Hamilton	3	4	2	—	3	3
Hanover	—	—	—	—	—	1
Harvard	44	46	27	4	21	19
Haverford	—	3	—	—	1	4
Hillsdale	—	—	—	—	—	1
Hobart	1	1	—	—	2	1
Holy Cross	1	1	3	—	3	3
Idaho	—	—	—	—	—	1
Illinois	3	5	4	1	1	4
Indiana Medical	—	—	1	—	—	—
Indiana University	—	—	—	—	1	2
Iowa State	1	2	—	1	1	1
Jefferson Medical	—	—	—	—	—	2
John B. Stetson	—	2	—	—	—	—
Johns Hopkins	2	1	—	—	1	1
Kalamazoo	—	2	2	—	1	1
Kansas	1	2	4	—	3	2
Kentucky	1	1	1	1	1	—
Lafayette	—	1	—	—	—	—
Lake Forest	1	1	2	—	—	—
Lawrence	—	1	1	—	1	3
Lehigh	—	4	5	—	—	2
Leland Stanford Junior	1	2	1	—	2	1
Lewis Institute	—	—	—	—	1	—
Lincoln	—	1	—	—	—	—
Lombard	1	1	1	—	—	—
Louisiana State	—	1	1	—	1	1
Louisville	—	1	—	—	—	—
Loyola	1	1	1	—	1	3
McMaster University	—	—	1	—	—	—
Maine	3	7	2	1	1	1
Manhattan	—	—	1	1	1	1
Marietta	1	—	—	—	—	—
Marion Institute	—	—	—	—	1	—
Maryville	1	1	1	—	—	—
Massachusetts Agricultural	1	6	3	—	2	—
Mass. Institute of Tech.	3	16	14	8	16	47
Mercer	—	—	1	—	—	—
Miami	2	2	3	—	—	1
Michigan	4	4	2	2	3	1
Michigan Agricultural	1	—	—	—	1	1
Michigan College of Mines	1	1	—	1	—	—
Middlebury	1	2	—	1	1	2
Millsaps	—	—	1	—	—	—
Minnesota	2	3	2	1	1	3
Mississippi	—	—	1	—	2	2
Mississippi Agricultural and Mechanical	3	2	—	—	—	1
Missouri	1	3	2	—	1	2
Monmouth	1	1	—	—	—	—
Montana	—	—	—	1	—	—
Montana School of Mines	—	—	—	1	—	—
Moore's Hill	1	1	1	—	—	—
Mount Holyoke	—	1	—	1	1	3
National Univ. Law School	1	—	—	—	—	—
Nebraska	—	1	1	—	2	1

GRADUATE STUDENTS, 1920–1921 — *Continued*
American Colleges and Universities Represented

	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21
Nebraska Wesleyan	—	—	—	—	—	2
Newberry	—	1	—	—	—	—
New Hampshire Agricultural and Mechanical	—	1	1	—	—	1
New Mexico	—	—	—	—	—	1
New York University	—	2	1	—	—	—
North Carolina	2	6	4	—	3	3
North Dakota Agricultural	—	—	—	—	1	2
Northwestern	—	3	1	—	2	4
Norwich	—	4	1	—	—	—
Notre Dame	—	2	4	1	—	—
Oberlin	2	5	—	—	1	3
Occidental	1	1	2	—	—	—
Ogden	2	1	—	—	—	—
Ohio State	2	2	—	—	1	2
Ohio University	2	1	—	—	—	—
Ohio Wesleyan	1	1	1	—	1	—
Oklahoma Agr. and Mech.	—	1	—	1	—	—
Oklahoma University	—	—	—	—	—	1
Oregon	1	—	1	1	3	5
Oregon Agricultural	1	1	3	2	3	—
Pennsylvania (Gettysburg)	1	2	—	—	—	2
Pennsylvania State	1	3	—	2	3	1
Pennsylvania University	2	10	5	—	4	2
Pittsburgh	1	—	1	1	—	1
Pomona	—	—	1	—	—	2
Princeton	6	9	4	2	4	11
Purdue	3	3	2	1	—	1
Radcliffe	2	4	4	7	1	1
Randolph-Macon	—	—	—	—	—	1
Reed	1	1	—	—	—	1
Rensselaer Polytechnic Inst.	—	3	1	1	—	—
Rhode Island State	1	1	1	—	—	—
Rice Institute	—	1	1	—	—	4
Rochester	3	7	4	—	—	1
Rose Polytechnic Institute	—	—	4	1	1	1
Rutgers	—	1	—	—	1	—
Rush Medical College	—	—	1	—	—	—
Saint Anne	—	1	—	—	—	—
St. Anselm	—	1	1	—	—	—
St. Elizabeth	—	—	—	—	1	—
Saint Francis Xavier	—	1	1	—	—	—
St. Joseph's (Philadelphia)	—	—	—	1	—	—
St. Louis	—	—	—	—	—	1
Saint Mary's	—	—	—	—	2	2
Saint Olaf	—	1	—	—	2	—
Simmons	—	—	—	1	—	—
Smith	2	—	1	1	—	—
South Carolina	—	2	—	—	1	1
South Carolina Military	1	3	3	—	1	1
Southwestern	—	—	—	1	—	—
Spring Hill	3	1	—	2	2	2
Stevens Institute of Tech.	—	—	—	3	1	—
Syracuse	1	2	1	—	—	2
Tennessee	2	1	1	—	—	—
Texas	2	3	4	1	1	5
Texas, Agr. & Mech. Coll. of	4	4	2	—	1	—
Throop	—	2	—	—	1	1
Transylvania	—	—	—	—	—	3
Trinity (Hartford, Conn.)	2	—	1	—	1	—
Trinity (Washington, D. C.)	2	2	1	—	—	—
Trinity (N. C.)	1	—	—	—	—	—
Tufts	1	14	7	—	3	3
Tulane	1	1	1	—	1	2
Union	1	2	3	—	—	—
U. S. Military Academy	—	3	1	—	5	45
U. S. Naval Academy	15	22	1	6	6	32
University of the South	—	1	—	—	—	—
Ursinus	1	1	—	—	—	1
Utah	—	2	3	—	1	1
Utah Agricultural	—	1	—	—	—	—
Valparaiso	—	1	1	—	—	—
Vanderbilt	—	1	1	1	1	2
Vassar	—	—	—	—	—	1
Vermont	—	2	3	—	—	2
Virginia	4	3	3	—	5	6
Virginia Military	7	5	4	1	3	9
Virginia Polytechnic Inst.	1	—	—	—	1	2
Wabash	—	—	—	—	1	2
Washburn	1	3	—	—	2	2
Washington	—	6	2	—	1	4
Washington (St. Louis)	—	—	1	—	—	—
Washington and Jefferson	—	2	1	—	2	2
Washington and Lee	2	4	3	6	3	2
Washington State	—	1	—	—	1	—
Wellesley	1	—	2	2	1	2
Wesleyan	1	7	5	2	1	—
Western Maryland	—	—	—	—	—	1
Western Reserve	—	1	1	—	—	1
Westminster (Colo.)	—	—	—	—	—	1
West Virginia	1	—	—	—	—	—
Whitman	1	—	1	—	—	2
William Jewell	1	—	1	—	—	—
William and Mary	1	1	—	—	—	—
Williams	12	10	5	—	4	5
Wisconsin	2	4	4	1	—	—
Wittenberg	1	—	—	—	—	1
Wofford	—	1	—	1	—	1
Wooster	3	3	1	—	1	1
Worcester Polytechnic	—	9	11	2	—	—
Wyoming	1	2	4	—	—	1
Yale	25	21	10	1	13	15

NUMBER OF COLLEGES

American	137
Foreign	57
Total	194

NUMBER OF GRADUATE STUDENTS

Candidates for Advanced Degrees	163
Pursuing Undergraduate Work	346
Total	509

NEW STUDENTS FROM OTHER COLLEGES BY YEARS, 1920–1921

Class Joined at Institute	Years Spent at College				Total
	One	Two	Three	Four or more	
First year	82	26	10	15	133
Second year	44	59	28	31	162
Third year	4	35	30	65	134
Fourth year	..	4	4	50	58
Graduate year	..	..	3	118	121
Total	130	124	75	279	608

COLLEGE STUDENTS AMONG THE COURSES, 1920–1921

Graduates and Students from Colleges, 38% of the Total Student Body	Civil Engineering	Mechanical Engineering	Mining Engineering	Architecture	Chemistry	Electrical Engineering	Biology and Public Health	Physics	General Science	General Engineering	Chemical Engineering	Chemical Eng. Practice	Sanitary Engineering	Geology	Naval Architecture	Naval Construction	Electrochemical Eng.	Engineering Administration	Aeronautical Engineering	Mathematics	School of Public Health	Special	Total	Per cent of Student Body
Graduates	77	56	11	21	43	54	5	10	1	1	61	28	3	6	10	30	16	27	8	2	25	14	509	14.8
Non-graduates	77	160	41	52	13	146	4	5	1	12	105	—	5	2	19	—	15	134	—	—	—	2	793	23.1
Total	154	216	52	73	56	200	9	15	2	13	166	28	8	8	29	30	31	161	8	2	25	16	1302	379.

AGES OF FIRST YEAR STUDENTS, OCTOBER, 1920

Under 17	20
17 to 17½	68
17½ to 18	59
18 to 18½	122
18½ to 19	92
19 to 19½	96
19½ to 20	58
20 to 20½	49
20½ to 21	22
21 to 22	40
22 to 23	25
23 to 24	12
Total	663

Over twenty-fo[illegible] 26.

Omitting those under 17, and over 24, on October 1, the average age was 19 years and 2 months.

AGES OF GRADUATING CLASS, JUNE, 1921

19 to 19½	3
19½ to 20	3
20 to 20½	14
20½ to 21	23
21 to 21½	53
21½ to 22	47
22 to 22½	66
22½ to 23	49
23 to 23½	54
23½ to 24	47
24 to 24½	38
24½ to 25	23
25 to 26	48
26 to 27	18
27 to 28	15
28 to 29	14
29 to 30	6
30 and over	9
Total	530

Average age 23 years 5 months.

STATISTICS OF THE SUMMER SESSION

	1920	1921
Total number of students	1233	1487
Number of Institute students enrolled	626	556
Number not previously connected with the Institute	607	931
Registrations to make up failures or deficiencies	691	715
Registrations to anticipate work	2508	3700
Registrations at Summer Surveying Camp	138	123
Summer School students who did not register for the school year following	180	317

Graduates by Years and Courses

Year	Civil Engineering	Mechanical Engineering	Mining Eng. and Metallurgy	Architecture	Chemistry	Electrical Engineering	Natural History or Biology	Physics	General Course or General Science	General Eng.	Chemical Eng.	Sanitary Eng.	Geology	Naval Arch.	Electrochemical Engineering	Engineering Administration	Total	Total by Decades
1868	6	1	6	—	—	—	—	—	1	—	—	—	—	—	—	—	14	
1869	2	2	—	—	1	—	—	—	—	—	—	—	—	—	—	—	5	
1870	4	2	2	—	1	—	—	—	—	—	—	—	—	—	—	—	10	29
1871	8	2	5	—	2	—	—	—	1	—	—	—	—	—	—	—	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	—	—	—	—	—	—	—	—	—	—	—	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	15	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	—	—	—	—	—	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	74	10	28	10	50	7	3	3	1	40	5	1	4	11	29	319*	
1919	45	63	7	16	8	48	9	4	1	3	44	6	—	7	6	28	293*	
1920	50	53	13	18	6	30	2	2	3	1	62	2	—	10	9	45	306*	2,926
1921	61	106	18	10	8	47	3	1	—	4	83	2	3	16	14	64	444*	
Total	1,403	1,751	585	622	532	1,264	118	75	122	14	668	208	20	259	126	203	7,961	

Names counted twice, students graduating in two different years	26
Bachelors of Science	7,935
Masters of Science	511
Master in Architecture	3
Doctors of Philosophy, of Engineering, and of Science	55
Total	8,469*

*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.

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
Total	2	23	8	5	6	44

DOCTOR OF ENGINEERING (*Discontinued after 1918*)

Year	Aeronautical Engineering	Electrical Engineering	Electrochemical Engineering	Total
1910	—	1	—	1
1911	—	1	—	1
1912	—	—	—	—
1913	—	—	—	—
1914	—	1	—	1
1915	—	1	—	1
1916	1	1	—	2
1917	—	1	1	2
1918	—	—	—	—
Total	1	6	1	8

DOCTOR OF SCIENCE

Year	Aeronautical Engineering	Geology	Mining Engineering	Total
1920	1	1	1	3

MASTER IN ARCHITECTURE

Year		Total
1921		3

Master of Science	Civil Engineering	Mechanical Engineering	Mining Engineering	Architecture	Chemistry	Electrical Engineering	Biology and Pub. Health	Physics	General Science	Chemical Engineering	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	1	10	—	1	6	4	—	—	—	29	—	2	—	20	—	—	3	—	17	93
Total	33	41	9	85	41	54	12	7	1	52	10	8	3	102	5	4	20	2	22	511

REPORT OF THE MEDICAL DIRECTOR

At the beginning of the year, 1920–1921, the Medical Department was opened in its new quarters, Room 3–019, with new personnel. Dr. Rockwell had done excellent work for a number of years, but had been handicapped by not having the room and the authority to go ahead with the ideas which he had often mentioned during his years of his service. It was always his idea that the Medical Department should be enlarged and made more efficient, and I think the Institute should be very grateful to Dr. Rockwell for the part in bringing about a more extensive Medical Department.

The principal object of the enlarged Medical Department was to prevent illness, and its resulting loss of time by the faculty, students, and employees. In an effort to do this, larger quarters were opened, and all freshmen were given a physical examination. The following table shows the results of this examination:

Number of examinations, 623.
Number of men with one or more defects, 138.
Nature of defects: Albumin in urine, high blood pressure, deafness, defective eyes, flat feet, defective heart, infected tonsils, defective lungs, scoliosis, and defective teeth.
Average age, 18. Weight, 139 pounds, 4 ounces.
The average eyesight was found poor, but in most cases corrected by glasses.

Each man who was found to have a physical defect was advised to remedy it by proper treatment, and was referred to proper authorities.

Although considerable expense was involved in paying the doctors for these many examinations, the fact that we prevented disease and defects from reaching an incurable stage, and by proper advice and treatment made the men more efficient, makes us feel that the money was well spent.

In addition, three lectures were given to the freshmen, on "Personal Hygiene," "First Aid," and "Sex Hygiene," special stress being given to teaching the men how to live and how to care for themselves.

Every case of illness had to be reported to the Medical Depart-

ment, and in this way isolation of infections and contagious diseases was controlled more efficiently. Isolation of men sneezing or coughing in class during an epidemic of mild influenza probably had some effect in stopping its spread.

I believe that more men should be encouraged to eat at Walker Memorial, where the food is excellent, and where proper diet is given each day. One of the chief defects and causes of indigestion is the fact that the men eat improper food, and irregularly.

The housing conditions are good in the dormitories, and in most of the fraternity houses, but these houses are scattered over a great area, and an effort should be made to bring all the students closer together, near the Institute. In this way better control would be had over all contagious diseases, and the general health of the men. I suggest that some means be found to keep the Medical Director in closer touch with the fraternity houses, and that some method of supervision of these fraternity houses by the Medical Director should be instituted.

In an effort to prevent illnesses or accidents arising from competitive sports, all men entering them were examined. The following table shows the result of this examination:

Number of men examined, 344.
Passed, 338.
Passed provisionally, 4.
Not passed, 2.
Nature of defects: Albumin in urine, high blood pressure, defective heart, hernia.

No man was absolutely refused permission to enter competitive sports, but in a case of serious defect the written consent of his parents was required.

This being the first year that the Medical Department has been in operation under the new arrangement, we have found various defects which we hope to remedy next year. Considerable difficulty was had during the year in getting the men who were entered for competitive sports to come in for their examinations. This difficulty was chiefly due to a misunderstanding between departments, and during the coming year we feel that all the departments will coöperate in every way. We feel that the work of Mr. Frank Kanaly is very valuable to the Institute, and that he is doing a great deal to improve the general condition of the

students. The Medical Department hopes to coöperate with him in every way possible.

During the year three deaths were reported as follows:

Typhoid, 1 Influenza, 1. Cause unknown, 1.

The man who died of typhoid was treated at home, and never came under the observation of the Medical Department; the man who died of influenza was at the Massachusetts General Hospital. The third case was that of a man who dropped dead in the building. His physical examination was negative, and the medico-legal autopsy revealed no cause of death.

During the year a total of 1017 examinations were made. In five cases early tuberculosis was found and proper treatment instituted, thus saving the men from reaching a serious or incurable stage. Contagious diseases were discovered and isolated as follows:

Chickenpox, 6.	Mumps, 9.
Diphtheria, 1.	Scarlet fever, 3.
Influenza, 21.	Tuberculosis, 5.
Measles, 7.	Typhoid, 1.

As no one disease attacked more than twenty-one men, the isolation method seems to have had the desired effect. In addition to our effort to prevent disease, we made a definite effort to treat disease and to shorten the period of disability.

A daily clinic was held from eight-thirty to nine-thirty in the morning, in charge of Dr. Sibley, with the following attendance:

October, 112.	January, 377.	April, 494.
November, 134.	February, 314.	May, 383.
December, 115.	March, 321.	June, 137.

This clinic was open two hundred and fifty-five days, which gave an average of thirty visits per day.

The First Aid Room was open at all hours, with a registered nurse in attendance from 8 A.M. to 5 P.M. The entire personnel of the Medical Department have been extremely conscientious, and have not spared themselves in any way to carry out the plans of the Medical Director, and to relieve suffering and make the patients comfortable in every way possible. No time or money has been spared to do this.

A synopsis of the work is as follows:

Total number of patients, 7643.
Total medical cases, 7589.

Respiratory, 968.
Digestive disturbances, 165.
Total surgical cases, 54.
Nature: Appendicitis, fractures, furuncles, hernia, torn patella.
Cases sent to hospital, 35.
Cases sent home, 115.
Total number requiring hospital care, approximately, 50.
Nature requiring hospital care: Tuberculosis, fractures, burned eyes contagious diseases, malaria, jaundice, influenza, appendicitis, tonsils and adenoids, etc.

The most common cause of illness was infection of the respiratory tract of which we had 968 cases. In this group we include colds, sore throats, bronchitis, influenza and pneumonia.

In every case of serious illness, a telegram was sent at once to the man's parent or guardian who was kept advised of his condition by daily bulletins. As a result of this, we received many grateful letters from parents.

During the year it was found that a number of students required treatment for which they were unable to pay; fortunately the Medical Department was able to secure funds with which to help the most pressing cases.

There were 236 treatments accorded the Instructing Staff.

The following table shows the relative number of cases during the year:

Oct.	*Nov.*	*Dec.*	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May.*	*June*
509	*670*	*549*	*923*	*1113*	*1116*	*1233*	*1054*	*476*

Each student absent on account of illness had to report to the Medical Department before returning to work. In several instances, men reporting for work were found to have let their enthusiasm for study 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 3658 days lost from October to June. If we take the total enrollment as 3482, and divide the number of days lost by it, it shows a loss of more than one day per student, or nine hours taken from each student's work.

Next year we shall examine every new man entering the Institute. This was found advisable, as during the past year a large number of cases of illness were found among men who entered with advanced standing, and were not classed as freshmen.

GEORGE W. MORSE, M.D.

REPORT OF THE SECRETARY OF THE FACULTY

In addition to the usual routine work of the Faculty, the following matters may be mentioned as of special importance:

A Change in the Entrance Requirements. Beginning with the class entering in October, 1922, candidates for admission will be required to present a certificate showing that they have satisfactorily completed a course of not less than 150 hours in Chemistry.

Changes in Undergraduate Course Schedules. In the Department of Civil Engineering the addition of an option in Hydro-electric Engineering. In the Department of Biology and Public Health the introduction of an option in Industrial Biology, particularly relating to the fisheries industry. In the Department of Chemical Engineering the establishment of an undergraduate course in Chemical Engineering Practice (X-B), similar to the present Graduate Course (X-A), and open only to a selected group of students at the close of their third year.

Changes in the Marking System. The reinstatement of the Honor grade (H), representing numerical records of from 90 to 100%, and the abolishment of the grade of "L" (55%) as a final record. Final records of 55% and below are now rated as failures.

Changes in Procedure Relating to the Award of the Bachelor's Degree. Instead of refusing a candidate his degree if he fails in subjects at the close of the fourth year, he may be allowed to take condition examinations in such subjects early in July or in September, and if such examinations are passed satisfactorily, he will be recommended for the degree at the next following meeting of the Faculty. Candidates whose standing is particularly low or who fail to pass condition examinations, are refused their degrees, and will be informed as to further requirements for graduation, such requirements being in general one term of residence, with a schedule of at least 400 hours, including the preparation of a new thesis.

A committee has been appointed to study the problem of a more effective treatment of students who exhibit a considerable degree of professional promise.

During the academic year, 1920–21, the Faculty recommended for the degrees of the Institute 7 candidates for the Degree of Doctor of Philosophy; 96 for the Master's degree; and 530 for the Bachelor's degree.

A. L. MERRILL, *Secretary.*

COMMITTEE ON ADVANCED DEGREES AND FELLOWSHIPS

The number of graduate students registered for advanced work leading to the Doctor's and Master's degrees continues to increase. This is probably due in some measure to the present business depression, as a number of students have returned for graduate work pending the return of industrial prosperity. The indications are, however, that the increase in the number of advanced graduate students is relatively more rapid than that of students working for the Bachelor's degree. The new regulation adopted by the Faculty making it possible for a graduate student of another college to obtain a Master's degree without designation of department, — the prerequisite for which does not include the completion of an undergraduate course equivalent in all respects to one of the Institute courses, — has undoubtedly been responsible for a part of this increase in registration. In June, 1921, the Degree of Doctor of Philosophy was conferred upon 7 candidates and the Master's degree upon 96 candidates. At present there are 48 students pursuing studies leading to the Doctor's degree and 191 taking courses leading to the Master's degree. This rapid growth in numbers during the past two or three years has brought with it an enormous increase in the amount of correspondence in connection with applications for admission and for graduate scholarships. The burden became so great on the Secretary, that the Committee requested that Dr. James L. Tryon, Assistant Registrar, be appointed to act as Secretary of the Committee, thus transferring the above work from a Faculty member of the Committee to an administrative officer. To Prof. F. A. Laws, the retiring Secretary, who has devoted so much of his valuable time during the past two years to the work of the Committee, grateful acknowledgment is due.

The Administrative Committee has during the past year advised the Committee on Advanced Degrees and Fellowships that it is authorized to deal in a comprehensive way with all matters pertaining to the encouragement of graduate work and research, to higher degrees and to the administration of such funds as are authorized for furthering the above purposes. The Committee has also been authorized to make recommendations in connection with travelling fellowships under the Scandinavian

Foundation, the American Field Service Fellowships for French Universities, and the Commission for Relief-in-Belgium Educational Foundation, which heretofore have been referred to the President.

The Committee has to report that during the past year the sum of $4150 was recommended to relieve certain members of the Instructing Staff of a part of their teaching duties in order that they might have more time for research. As a result of such assistance twenty-four important papers have been published and fifteen will be ready for publication in the near future. It is believed that this method of encouraging research, inaugurated by President Maclaurin, is productive of good results and should be continued.

H. M. GOODWIN, *Chairman.*

SUMMER SESSION

The number of students attending the summer session, 1921, was the largest in the history of the Institute, being about 1500. As most of the men took more than one subject, the total registration by subjects was more than 4400.

The courses offered were divided into four groups: 1. Required Courses, which form a part of the schedule of certain of the professional courses for a degree. 2. Elective Courses, subjects of the regular four-year schedule. 3. Courses in Entrance Subjects. 4. Courses differing from the courses of the regular schedules, which were offered for teachers or other persons desiring instruction during the summer months.

In the list of required courses, there were courses for five groups of United States Army Officers as follows: 26 Ordnance Officers, 22 Ordnance Officers (Ordnance School of Technology) and 39 Engineer Officers in three groups. These officers attended special courses which occupied nearly the whole period of the summer session. There were 123 students at the Summer Camp.

The session began June 13 and extended to September 30.

The instructing staff included 52 professors and a long list of instructors and assistants. Five members of the summer faculty were from other institutions, namely: Prof. Arthur H. Blanchard,

C.E., A.M., Professor of Highway Engineering of the University of Michigan; William M. Duffus, A.M., Professor of Economics, College of Business Administration, Boston University; Thomas M. Putnam, Professor of Mathematics and Dean of the Undergraduate Division, University of California; Myles Walker, M.A., Sc.D., Professor of Electrical Engineering, The Victoria University of Manchester, England; and Charles L. Stone, A.B., Assistant Professor of Psychology, Dartmouth College.

The Administration Officers consisted of a Director and three Executive Officers.

The character of the Summer Session, as well as the type of students attending, has changed in a marked degree during the last two years. A large majority of the students are now anticipating their work, while those who are repeating subjects or making up deficiencies are in a small minority. The ratio of these two types of students was more than five to one. There was a large registration of students from other colleges and technological schools.

CHARLES F. PARK, *Director.*

SOCIETY OF ARTS

While the Society of Arts has been organized since the very early history of the Institute, the present form of activity has just completed its fifth season. During the past five years, popular experimental science lectures have been held within the new buildings of the Institute for the benefit of pupils of the high and preparatory schools in Boston and its vicinity. There is no sign of any loss of interest in this type of lecture. The demand for tickets has continued as great as at any time since these lectures have been held. So great has this demand been and so many have had to be refused admission that the Secretary was authorized just before the last lecture to arrange for the repetition of this lecture more nearly to satisfy the demand for tickets.

The past season began with a lecture in January by Prof. Louis Derr. He gave a talk on "Some Facts About the Earth: Something of the Physics of our Planet." His lecture included illustrations of answers to some common geographical and astronomical questions.

The second lecture in February was given by Prof. H. M. Goodwin on "Light, Visible and Invisible, Illustrated by Color Phenomena." This lecture was brilliantly illustrated by many color experiments.

The third lecture in March was given by Professor Edward Mueller upon "Earth, Water, Air and Fire," covering the early conception of the four elements of the earth; from this he derived interesting experiments and modern chemical principles.

The last lecture in April, of a different type than those given previously in the course and one more from the engineering point of view than the others, was given by Prof. Edward P. Warner upon "Airplanes and Airships." Professor Warner performed interesting experiments on models, and further illustrated his talk by films of moving pictures taken by the Government Air Service. On the repetition of Professor Warner's lecture the demand for tickets seemed as great as for the original lecture.

WALTER HUMPHREYS, *Secretary.*

DEPARTMENT OF CIVIL AND SANITARY ENGINEERING

During the past year a considerably larger number of students have received instruction from members of the Civil Engineering staff than ever before in the history of the Institute. This was due not only to the large increase in the number of students at the Institute as a whole but also to the size of the senior class in Civil Engineering, which not only shared in the normal growth of the Institute but had an exceptional increase by the inclusion of about forty officers of the United States Army Engineer Corps.

Through the withdrawal from active work at the end of the year of Prof. Dwight Porter and Prof. Alfred E. Burton, the Department loses the services of two men who have each held professorships for twenty-five years and been members of the instructing staff for nearly forty consecutive years. In addition to their departmental duties, both have occupied positions of general importance on the Institute staff, Professor Porter serving as Chairman of the Faculty during the years 1909–1911, being the second incumbent of this office, while Professor Burton has held the position of Dean since the position was established in 1902. During their entire connection with the Department, both have won the deep respect and affection of students and colleagues, and the loss of their services as teachers, and of their friendly sympathy and advice is deeply regretted by all members of the department staff.

Merited recognition of the services of Associate Professors Harold K. Barrows and George E. Russell has been given during the year by their promotion as Professors of Hydraulic Engineering and of Hydraulics respectively.

Professor Barrows was graduated from the Civil Engineering Course at the Institute in the class of 1895 and served as an Assistant in the Civil Engineering Department from September 1895 to June, 1896, when he resigned to enter professional work. In 1901 he again engaged in teaching, serving from 1901 to 1904 both as Assistant Professor and as Associate Professor of Civil Engineering at the University of Vermont. From 1904 to 1909

he acted as District Engineer for the Water Resources Branch of the United States Geological Survey in New England, and since 1909 he has held the position of Associate Professor of Hydraulic Engineering at the Institute, during which time he has carried on a considerable consulting practice.

Professor Russell was graduated from the Civil Engineering Course in the class of 1900. He then served a year as an Assistant in the Civil Engineering Department, when he resigned to enter professional work. From 1904 to 1905 he was an Instructor in Civil Engineering at Cornell. He has been a member of the instructing staff of the Institute since 1905, having been Assistant Professor of Civil Engineering from 1907 to 1913 and Associate Professor of Hydraulic Engineering from 1913 to date. During his connection with the Institute he has had a considerable amount of professional experience.

Recognizing the remarkable change in methods of transportation due to the development of motor vehicles, the department established during the year a new option entitled Transportation Engineering, which replaces and amplifies the option in Railroad Engineering which has been given since 1886. This new option is divided into two parts, one of which is devoted particularly to Railroad Engineering and is substantially equivalent to the option which has been given in the past, the other is devoted especially to Highway Engineering and includes a new course entitled Highway Transportation which not only deals with engineering and economics of highway construction but also with highway legislation, traffic surveys, types of motor vehicles and economics of motor transport. This new option is given under the general direction of Professor Breed, and it is believed that it is well adapted to the needs of students wishing to give special consideration to matters relating to highway engineering and transportation.

During the coming year another new option is to be given, entitled Hydro-electric Engineering. Students taking this option will be given in addition to fundamental courses in surveying, railway engineering, structures, and theoretical hydraulics, special courses in water power engineering and in electrical engineering. With the approaching extensive utilization of water power it is believed that this option will fill an important field,

which has not up to this time been specially recognized at Technology or other engineering schools in this country.

The tenth session of the Summer Surveying Camp was held during the summer from August 6 to September 23, inclusive. The attendance consisted of 123 students, and the cost per student for meals and miscellaneous expenses necessary for the operation of the camp was $1.47 per day as compared with $1.46 per day in 1920. The total charge for these items for the camp session was $77.91 per man.

The class in Underground Surveying was held at the Replogle Mine near Dover, N. J., which is owned by the Wharton Steel Company. Arrangements for its use were made through the kindness of Mr. Enoch Perkins, Superintendent of the Replogle Division of that company. This course was in charge of Professor Howard.

The thanks of the Department are due to the Holyoke Water Power Company for the use of the Holyoke testing flume by the graduate class in Water Power Engineering, and to the proprietors of Locks and Canals at Lowell for permission to occupy their stream gaging station; also to the Simbroco Stone Company for furnishing samples of artificial stone for exhibition in classes, and to the Raymond Concrete Pile Company for samples of casings used in driving reinforced concrete piles. Further courtesies have been received by the Department from companies and associations engaged in the production of material used in highway construction, consisting in several cases of furnishing, without charge, lecturers to present special phases of highway construction.

CHARLES M. SPOFFORD.

DEPARTMENT OF MECHANICAL ENGINEERING

The Department was fortunate last year in being able to fill the vacancies in its staff. The salaries offered by the industries were so much in excess of those paid by colleges that it was difficult to get new graduates from technical schools to consider positions as teachers.

In addition to the extremely heavy load brought to the Department on account of the large number of undergraduates,

the Department had an exceptionally large number of candidates for the Master's degree and also a number of Naval officers, all of these men requiring special instruction.

The Navy has for two years past sent men of the grade of Senior Leiutenant or Lieutenant Commander for special training in the thermodynamics of mixed gases used in the propulsive machinery of the torpedo. Last year the Navy sent, in addition, two officers who were to specialize on theory of elasticity as applied to Gun Design. One of the officers who completed the work a year ago was detailed by the Navy to undertake research work on the propulsive mechanism of the torpedo. This officer made such progress in the work that the Navy has taken steps to continue this research and has already detailed an officer who is to carry on the work the coming year.

Early in the spring arrangements were made with the Government whereby the Institute agreed to take over the training school, known as the Ordnance School of Application, which the Government has maintained at the Aberdeen Proving Grounds. This school has in the past trained those graduates of West Point, who had had from two to ten years' service in the Ordnance Department, as specialists in explosives and in the design of ordnance equipment. On July 5 two majors, twenty-one captains and four lieutenants were enrolled in this school, the work to continue from July 5, 1921, until June 15, 1922. As these officers are assigned to class work for thirty-eight of the possible thirty-nine hours of the week, it seemed advisable to reserve a classroom especially for their use; and the westerly half of the drafting room formerly used by the Naval Constructors has been assigned to these men. The office adjacent to this room is to be used as a library, in which will be kept books, drawings, reports and material, more or less confidential, furnished by the Ordnance Department.

On July 15 another Ordnance School, known as the Ordnance Officers' School of Technology, was started with an enrollment of twenty-two men. Work in this school has been given in the two summers preceding. In this school there were enrolled four majors, a lieutenant commander of the Argentine Navy, who was admitted by courtesy of the United States Government, eleven captains and six first lieutenants.

Early in the fall the laboratory was supplied, through the

Government, with a large number of airplane engines of American, of French and of German make. The south end of the first floor of the Engineering Laboratory was fenced off so as to properly safeguard these engines. During the coming summer these engines are to be relocated in the space under Building 1, which is now used as a storeroom for office furniture.

Some of the space freed by the Department of Naval Architecture has been used to advantage by the Mechanical Engineering Department as follows:

First. — In the enlargement of the heat treatment laboratory, which has been extremely crowded during the past year. It is likely that this laboratory will be used to a greater and greater extent, especially as the War Department has insisted that all students enrolled in the Ordnance Unit of the Reserve Officers Training Corps shall take one term of work on Heat Treatment. The laboratory was so crowded last year that it would have been impossible to have given instruction to the undergraduates and at the same time accommodate all of the graduate students who were specializing in this work had not the Watertown Arsenal given a number of the graduate students permission to use the heat treatment laboratories and the testing equipment at the Arsenal; and the Department expresses its appreciation of the courtesies extended it by Colonel Dickson, Commandant of the Arsenal, and to Dr. Langenberg, civilian expert, having immediate charge of this branch of the work.

Second. — A space has been found for a small conference room where students taking work on concrete design will have opportunity to study blueprints of concrete structures.

On account of the high cost of material the expenses of running the Foundry, Forge Shop, Machine Tool Laboratory and the Testing Laboratories have been abnormally large. Efforts have been made to keep the costs down as far as possible by having students in the Foundry cast material which would be used later in the Machine Tool Laboratory or in the Testing Laboratory. In the same way the Machine Tool Laboratory has prepared, with the help of the students, screwed-end specimens which were used later in the Testing Materials Laboratory. These screwed-end specimens have in general cost about sixty cents per specimen,

and as each student will average three screwed-end specimens, it has been necessary to provide about 3000 specimens per year.

There have been but few changes in the staff. Assistant Professor Theodore H. Taft has been made Associate Professor; and Irving H. Cowdrey has been made an Assistant Professor. Other changes were below professorial grade.

The Department has received during the year gifts of equipment amounting in value to about $8100, as follows:

Brunner Manufacturing Co., Utica, N. Y. — One No. 105 Air Compressor.
Herbert E. Fales, Newton, Mass. — $500 for special apparatus for the Heat Treatment Laboratory.
Ralph Sargent, graduate of the class of 1921 — $1000 for special apparatus for the Department.
L. S. Starrett Co., Athol, Mass. — Assortment of Fine Machinists' Tools and Power Hack Saw.
Brown & Sharpe Manufacturing Co., Providence, R. I. — New No. 10 Plain Grinding Machine in exchange for an old No. 11 Plain Grinding Machine.
Norton Company, Worcester, Mass. — New 6″ x 32″ Plain Grinding Machine in exchange for an old 6″ x 32″ Plain Grinding Machine.
Taft-Peirce Manufacturing Co., Woonsocket, R. I. — Magnetic Chuck for Surface Grinding Machine.
Lewis-Shepard Co., Boston, Mass. — Lifting Truck.
American Pipe Bending Machine Co., Boston, Mass. — Pipe Bending Machine.
Reid Brothers Company, Inc., Beverly, Mass., New No. 2 Surface Grinding Machine in exchange for old No. 2 Surface Grinding Machine.
Bilton Machine Tool Co., Bridgeport, Conn. — Indefinite consignment of Automatic Gear Cutting Machine.
Precision Truing Machine & Tool Co., Cincinnati, Ohio — One Precision Truing Tool and Bracket.
Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y. — Blank Nuts for use in Classes.
Doehler Die-Casting Co., Boston, Mass. — Display Case of Die Castings.
J. M. Ney Co., Hartford, Conn. — Positive Grip Chuck for Lathes.
The Greb Co., Inc., Boston, Mass. — Pulley and Wheel Puller.
Eastern Tube and Tool Co., Inc., Brooklyn, N. Y. — Two Drill Chucks.
Time Saving Tool Co., Hartford, Conn. — Set of Centering Tools.
Harold A. Wright, Boston, Mass. — One Cleveland Adjustable Lathe Center.
Mayhew Steel Products, Inc., New York City. — Adjustable Reamer and Screw Drivers.

EDWARD F. MILLER.

DEPARTMENT OF MINING, METALLURGY AND GEOLOGY

The beginning of the past academic year marked the consolidation of the Department of Mining Engineering and Metallurgy with that of Geology, Professor Waldemar Lindgren being placed in charge.

Students. During the year the students in the Department numbered about 130, of which 10 were in Course XII, and the remainder were in Course III. Twenty-six men received their degree of B.S.[1] in June, 1921, against seventeen[2] graduated in June, 1920.

Indications for the coming year are for about 135 students in the Department, divided as follows: Course III, 117; Course XII, 18. This shows that Course III is well holding its own; while Course XII with a marked increase has a number of students greater than ever before.

During the year 1920-1921 there were five advanced students in Geology, three of which were candidates for the degree of Ph.D., and one for the degree of S.M. For the ensuing year, there are four candidates for the Doctorate, and two for the Master's degree all in Course XII. There are also seven special students, five from Harvard University, taking advanced economic geology, making a total of thirteen advanced students in Geology.

During the year 1920-1921 there was one candidate for the degree of S.M. in Metallurgy; now there are four candidates for S.M. in Metallurgy.

Instructing Staff. There have been no changes in the Staff above the grade of Instructor.

Prof. Lindgren was absent on leave for professional work from May 10 to the end of the term.

During the first term Mr. Paul Paine of Oklahoma gave a series of lectures on Oil Production, which includes what may be termed the "mining" of petroleum.

During the third term, Mr. Charles A. Mitke of Bisbee, Arizona, gave a series of twenty lectures on mining methods, on mine valuation and on the prevention of mine fires, principally to the third-year students.

Courses of Instruction. At the end of the year 1920-1921 certain changes were made in the courses for III and XII. Course XII was remodelled with considerable latitude for professional studies in mining and civil engineering. In Course III, Option 1 was retained with some changes, making it essentially a mining

[1]Of these 3 in Course XII.
[2]Of these none in Course XII.

option, not, however, neglecting the metallurgical and chemical subjects. Option 2 was made more flexible allowing for specialization of students intending to devote themselves to iron and steel. Option 3 was dropped, Course XII, with professional options in mining and metallurgy, taking its place.

Equipment. A drill press, lathe and milling machine was set up in the shop of the Department with necessary accessories, also a full supply of tools in the shop to replace those worn out. A Wilson Manulein Pyrometer Indicator for the Metallurgical Laboratory was bought as well as two balances for the Assay Room. A gasoline assay furnace was established. The metallographic equipment has been moved to the Mechanical Department, thus offering a much needed space in the drafting and conference room.

At present there are two separate departmental libraries, one in the section of geology, the other in the mining building. It would perhaps be desirable to consolidate these, but just now there is no suitable room available for the purpose. Among the needs of the Department is more reading room for students using the libraries for assigned reading. Lack of storage still continues serious and it has been necessary to use the laboratories in part as storerooms.

Constant accessions in great part by the head of the Department are made to the already large collection of economic geology. New suites from mining districts visited by the graduates of the Department are received almost every month. Accessions have also been received for the mineralogical and petrographic collections. A valuable collection of modern shells in a very fine case has been donated to the section of paleontology by Mr. George A. Hough.

WALDEMAR LINDGREN.

DEPARTMENT OF ARCHITECTURE

Including the Division of Drawing

The Department of Architecture completed the academic year 1920–21 without having to record any event of great importance, and yet with the satisfactory feeling that much had been

accomplished toward making the Department a more effective organization for architectural education than ever before.

With Prof. W. H. Lawrence in charge of the Division of Drawing, definite and substantial progress was made toward adapting first-year mechanical and freehand drawing more directly to our needs, the promise of which was outlined in last year's report. It is a pleasure to add that Professor Lawrence has been selected by President Lowell as Curator of the Lowell Institute in succession to the late Professor Sedgwick.

The five students who followed the fifth-year course gave satisfactory evidence of the advantages to be gained from continuing architectural education into a graduate year. It was beneficial to these particular students, and they in turn established a standard of work that was an inspiration to the rest of the Department.

The ten lectures in Architectural Humanities, a new fifth-year course, that gave the more mature students an opportunity to hear such men as Hon. George McAneny on "Civic Opportunities," Dr. Haven Emerson on "The Architect's Service to Public Health," Mr. William A. Starrett on "The Architect, Engineer and Contractor," Mr. J. Randolph Coolidge on "Professional Standards," Mr. Milton B. Medary on "Town Planning," Mr. Charles H. Whitaker on "The Building Guild Movement," were a revelation to most of those present of the many occasions for public service that lie before the architect.

There were several exhibitions during the year in pursuance of the policy already determined, but by far the most noticeable was that of Architectural Water Colors, which commanded admiration from the public as well as the profession, and served a most useful purpose in the teaching of this most essential subject to the students.

The completed Commons Room was formally opened in the third term with fitting exercises of which a costume masque and reception were the chief features.

The student body has thrown itself into the work of the Department with a spirit and interest that well repay the devoted efforts of the teaching staff to place the Department once more at the head of the Architectural Schools in the country. Hand in hand with the efforts of the staff have been the coöperation and

encouragement of the alumni. The "Bulletin," published by the alumni society, now tells of the Department's activities term by term, and reaches nearly four hundred former students.

The establishment of a compulsory summer course in office practice, carrying out last year's promise, has been widely approved by the alumni as a step toward qualifying our graduates to meet office requirements upon graduation.

Another new move was the participation of the upper grades in design in two of the competitions of the Society of Beaux Arts Architects in New York. This step was taken with the desire to compare our students' work with a wider field than is possible here in Boston. The drawings submitted made a most creditable showing, no other school gaining any higher record. This, together with the joint problems taken with Harvard and the Boston Architectural Club, has given our students and instructors the best possible opportunity to compare our standards with those of other institutions, and to profit accordingly.

Perhaps it is not out of place to mention here the advantage gained by five of our advanced students, together with an equal number of students in other Departments of the Institute, from their experience as members of the American Students Reconstruction Association during the summer. There were some fifty students in all gathered from different American colleges, and divided into three groups working at Verdun, Rheims and Soissons. Their energies were directed by French engineers and architects who, on their departure, paid high tribute to their accomplishment.

During the year 1920-21 the following prizes were awarded: The Traveling Fellowship in Architecture to A. L. Williams; the Rotch prize for regular student to M. F. Farren, the Rotch prize for special student to L. P. Botting; the Boston Society of Architects' regular prize to W. E. Church, special prize to J. J. Stanton; the W. E. Chamberlain prize to H. T. Dennison; the "Class of 1904 Competition Prize" for regular student to A. H. Vignoles, for special student to Miss F. B. Day; the F. W. Chandler prize for fourth-year student to J. J. Stanton, for third-year student to Miss F. B. Day.

Additional prizes were also offered for the best summer sketches, and awarded to W. E. Church and R. Hayward; a prize of $50 was offered by Mrs. Edward Cunningham for the best

work in freehand drawing throughout the year, and awarded to W. E. Church; and a prize for the best cover design for *The Tech Engineering News* was given to S. E. Lunden.

The Department has benefitted from the following gifts: Water-color paintings by F. N. Breed, '12, and by F. R. Witton; a mask of Dante and some photographs from Mrs. W. T. Sedgwick; a bust and several frames from Dr. F. H. Williams; a set of the Nebraska State Capitol competition drawings from the Philadelphia firm of Zantzinger, Borie & Medary, and Paul P. Cret Associated; besides many gifts from former students and friends for the Commons Room. Water color paintings by F. J. Robinson and C. Bill were also purchased for use in connection with the class in water color, as well as several very skillful pencil drawings by Mr. Kenneth Conant.

WILLIAM EMERSON.

DIVISION OF DRAWING

No changes have been made in the staff during the past year and none are anticipated for the coming year. The exchange of instructors between this Division and the Department of Mechanical Engineering has proved stimulating and will be continued. It is hoped that it may be found possible to extend this practice to certain other professional departments in the future.

The experience of last year indicates the desirability of one additional instructor. In case of the absence of any member of the staff through illness or other cause, the remaining members already loaded with their rather heavy normal assignments are unduly handicapped. With the present number on our staff the rigid tabular view may easily preclude the possibility of adequate arrangements in such an emergency.

There have been some changes in the organization of the courses and the details of instruction which are of interest. For a number of years the conduct of the work of the Division and the filing of its records have been materially confused through the fusion of the courses in drawing and descriptive geometry under a single heading, and with but a single record for both courses. The two subjects are distinct in principle and practice. In one, the ability to draw and to read a drawing intelligently and accu-

rately are the sole objects sought; in the other, an exact science is being taught and drawing is only used as a means of solving graphically the many geometrical problems presented. These two subjects have now been given separate titles and separate records will be returned for each.

Some progress has been made in the direction of simplifying the work of the Division and at the same time increasing the efficiency of the instruction. Before beginning the study of descriptive geometry the students will be given five weeks preliminary training in mechanical drawing. The data sheets for this subject have been remodelled. Each plate includes practice in simple engineering lettering, excellent examples of which are constantly before the student. Increased effort is being made to give him a realization of the necessity for acquiring facility in this important accomplishment of a good draftsman.

In the second and third terms the mechanical drawing assumes somewhat of a professional character and will be known as elementary machine drawing or elementary architectural drawing, according to the nature of the work.

The course in descriptive geometry has been revised and the work of all students in the first year of this subject will be uniform. The students of certain departments who continue the subject into the second year will be given additional applications of the principles and their adaptation to problems of a more or less professional nature.

Many short original problems to be solved individually without the aid of instructor or text have been introduced as a means of vitalizing the course and determining more accurately the power of the individual student in the application of the fundamentals.

Difficulty has been experienced in making adequate provision of room and lighting in the Division of Drawing for the group of Architectural students who take freehand drawing, and the complex tabular view has not permitted us to give all these exercises at Rogers. It is a problem which still awaits a satisfactory solution.

Through the interest of Professor R. H. Smith and Major John Mather, the Division has been enabled to obtain a very serviceable equipment of models to be used in connection with the instruction in elementary machine drawing.

W. H. LAWRENCE.

DEPARTMENT OF CHEMISTRY

Including the Research Laboratory of Physical Chemistry

The instructional facilities of the Department for students of the third and fourth years have again been severely taxed to provide for the large number of men taking chemical subjects. This condition, particularly with respect to the fourth-year class, will obtain during the coming year.

The graduate work in the Department, particularly in organic chemistry, has shown a marked and gratifying increase. There are now 23 students who are candidates for the Master's degree, and 18 who are working for the Doctor's degree. Of those, 20 are specializing in organic chemistry, 9 in physical chemistry, 9 in applied chemistry, and 3 in inorganic chemistry. The students in organic chemistry are under the charge of Professors Norris, Moore, and Mulliken, and those in physical chemistry are under Professors Keyes, MacInnes and Gillespie. Professor Norris has also been placed in general charge of the courses of study of the graduate students in the Department.

During the summer of 1920, and during the past summer, and, to a lesser extent during the past academic year, research work has been carried on under the direction of Professor Davis for the Ordnance Department of the United States Government. Ten assistants have been employed in each summer, and the results obtained have occasioned favorable comment from the officers to whom they have been reported. Arrangements have also been made for special instructional work in chemistry during the coming year, to be given to 28 officers from the Ordnance Department who have been detailed to the Institute for study. This work is also under the immediate charge of Doctor Davis, and in connection with it valuable additions to the equipment of the Department have been made possible through the coöperation of the Ordnance Department.

The instructional work in metallography, formerly given in part by members of this Department, and in part by members of the staff of the Departments of Mining Engineering and Geology, and that of Mechanical Engineering, has all been placed under the general supervision of Prof. Henry Fay. A new laboratory, situated close to the laboratory devoted to heat treatment, of the Depart-

ment of Mechanical Engineering, has been fitted up during the summer and the equipment has been materially increased. The new laboratory, which occupies rooms formerly devoted to the Department of Naval Architecture and now transferred to the Pratt Building, will be under the immediate charge of Mr. V. O. Homerburg, who has been promoted to the position of Instructor. This concentration of instructional facilities gives promise of great benefit to both instruction and research in metallography, a field which is of growing interest and importance. Members of the staffs of the departments named above will continue to participate in the work in this branch of instruction. Valuable coöperation and assistance has also been given by Colonel Dixon, Doctor Langenburg, and others at the Watertown Arsenal.

During the year Associate Professor Keyes has been promoted to Professor of Physico-chemical Research, and Assistant Professor MacInnes, to Associate Professor of Physico-chemical Research, both promotions representing deserved recognition of their services to the Institute and to chemical service.

The du Pont Fellowship has been continued this year, and has been held by William R. Hainsworth, M.S. The Grasselli Fellowship has been held by Clifford Banta, A.M., and the Scholarship by Elliott T. Adams. Miss Dortha B. Bailey, A.B., M.S., has been appointed Research Assistant under the Ellen H. Richards Research Fund, and will work under the direction of Prof. H. M. Smith.

During the year Professors Norris, Millard, Williams and Hall have been engaged in the preparation of new text-books, and Professors Sherrill and Talbot in the entire revision of text-books already in use.

The participation of Professor Talbot in the general administration of the Institute has been made possible through the cordial coöperation of the members of the staff, particularly that of Professor Norris.

H. P. Talbot.

RESEARCH LABORATORY OF PHYSICAL CHEMISTRY

To aid in bringing the laboratory to a higher level of usefulness, and for the purpose of becoming acquainted with the instruction and equipment in laboratories abroad, the director

visited, during the summer, laboratories in France, Switzerland, Belgium, Holland and England. He found that our present physical equipment is superior to that of the European laboratories, nevertheless, the American universities have in general failed to produce men capable of contributing to scientific culture to the same degree as European universities. The reasons are, of course, to be sought farther back than the graduate school, but something will be contributed toward bettering the situation if the Research Laboratory can develop and maintain an atmosphere of high scientific ideals which will attract and develop those young men who have a real instinct for scientific pursuits.

One step already taken is the appropriate distribution of the various activities and responsibilities of the laboratory among all members of the staff. In this way no member of the staff is overburdened with administrative duties. The plan promises to develop very satisfactorily, promoting coöperation, interest and enthusiasm in the improvement of the Laboratory and the conservation of its material equipment.

Another phase of the problem is the development of a series of courses given by the Laboratory staff and the correlation of these courses with suitable courses in mathematics and physics which normally constitute the minor requirement for the Doctor's degree. The technical facilities have been considerably improved and, in consequence, the activities of the Laboratory are being carried on with increasing ease, accuracy and expedition.

The work for the Bureau of Mines in connection with the helium extraction process has developed to the point where useful data are being rapidly accumulated. The Laboratory has provided the Bureau of Mines with a standard pressure gauge of the Research Laboratory design and other special apparatus to be used in the new Cryogenic Laboratory. An allotment of funds for continuing the low temperature investigations has been made by the Bureau of Mines for the ensuing year.

Work in connection with the United States Navy Department was done under the direction of the Laboratory and results of value secured.

FREDERICK G. KEYES.

DEPARTMENT OF ELECTRICAL ENGINEERING

The development of the Department continues in the path defined in last year's report. Both Course VI and Course VI-A progress favorably and the number of candidates for advanced degrees and research students taking work in the Department is on the increase.

The past year has provided a severe test of the plan upon which the Coöperative Electrical Engineering Course (VI-A) is being conducted. The fact that, even under the extreme industrial depression the plan proved to have sufficient flexibility to maintain a proper balance of theoretical instruction and practical training for the men in the coöperative years of the course, is a fair indication of the practicability of its present form, and is a tribute equally to the success of Professor Timbie as director of the immediate affairs of the course and to the fine spirit of coöperation of the officers at the Works who are associated in its supervision. A number of students who normally would have been assigned to the plant of the General Electric Company took positions with other concerns where they were able to secure the satisfactory practical training. This enabled the General Electric Company to carry out the training program of the remaining students substantially as scheduled.

For the summer session at the Institute, we were unusually fortunate in being able to secure the services of Dr. Miles Walker, Professor of Electrical Engineering at Victoria University, Manchester, England, and one of the well-known designers of electrical machinery in Great Britain. His work consisted of lectures and a problem course on the design of alternating current machinery, given to an advanced section of VI-A students.

Since the operation of Course VI-A will assure the regular attendance each summer of a large group of senior and graduate students and since there are usually available at that portion of the year men of exceptional engineering ability who are fully occupied at their own institutions during the regular academic year, the Institute can gain many advantages by securing the services of a greater number of such men for the summer session.

The coöperative plan was extended this year to include the training of electrical engineers for public service companies dealing in electric light and power. The company coöperating in this

work is the Edison Electric Illuminating Company of Boston and the plan is identical with the five-year plan adopted in connection with the General Electric Company, for the training of manufacturing electrical engineers. One term's operation of this course has proved it to be as successful as the other. Since the prosperity, comfort, and to a large extent the safety of nearly every community is coming to depend more and more upon the efficient operation of public utility companies supplying means for light, power, and transportation, it is highly desirable that these companies be conducted by engineers of the highest order, thoroughly trained in the fundamental engineering science and experienced in the problems of such enterprises. This new coöperation is a conscious effort to that end.

The sustained interest of the Institute in instruction of Army officers of the various special corps has brought to the laboratories of the Department a substantial addition to equipment shipped from the Aberdeen Proving Ground for the purpose of aiding in the instruction in electrical engineering subjects to be given to officers in the Ordnance School. It has also brought a considerable and interesting contribution of equipment to be used for instruction of the Signal Corps unit of the Reserve Officers Training Corps and general instruction in electrical communication.

The staff of the Department have as usual done their part in the societies and committees associated with the engineering profession and engineering education. Professor Kennelly has been Chairman and Professor Jackson a member of the Committee of Seven Universities who are coöperating with the Ministry of Education of the French Republic in the support of an exchange professorship of engineering and other branches of applied science. Professor Kennelly was the representative of Harvard University on the Committee. Professor Jackson and Professor Laws have been respectively Chairman and Secretary of the Standards Committee of the American Institute of Electrical Engineers; Professor Timbie has given particular attention to the affairs of the Society for the Promotion of Engineering Education; Professor Drisko took in charge an interesting exhibit of desirable illumination which was carried out in the Rogers Building during the spring months. These activities are extra-academic and without compensation, but add so much to the vitality of the academic

work as well as its relations to the electrical industries that the requisite force and energy can be wisely spent in them.

Various researches of interest are under way and certain publications of results were made during the year. Some of the theses completed in June contained results of interest and these will be digested and published.

Professor Kennelly is on a leave of absence for one year, to enable him to fill the post of Exchange Professor to France established by the coöperation of seven institutions of higher education, (of which Technology is one) and the French Republic, referred to earlier in this report. The selection of Professor Kennelly as the first exchange professor from America on this establishment is a tribute to his qualities and reputation.

Mr. Frederick S. Dellenbaugh, Jr., has been promoted from Instructor to Assistant Professor. This is a merited recognition of his ability and accomplishments as both a teacher and an experimentalist.

DUGALD C. JACKSON.

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH

Since the last President's report, the Department has suffered the irreparable loss by death of Prof. W. T. Sedgwick, who had been, since 1883, at its head, and whose service to pure and applied biology and to public health in America cannot be over-estimated. It was he, more than anyone else, who shaped the policy of public health education in America and who, by the character of his teaching, brought deserved recognition to the technically trained worker in this field. The peculiarly intimate and harmonious relations which have always existed among members of the staff in the Department make it possible to continue the work along the lines which he had so carefully thought out and which had received his distinct approval.

As a result of urgent requests on the part of the leaders in the fishing industry, and of the officials of the Bureau of Fisheries at Washington, a new option in Industrial Biology has been developed in the course. The work of this option makes it essentially a course

in Fisheries Engineering, as it embraces technical subjects of biological, administrative and engineering character which seem to be most needed in organizing and building up the fisheries industry. It is desired to do for this important basic industry, which ranks fourth or fifth in the amount of capital employed in the United States, what is done for the lumber industry by the schools of forestry and for certain phases of agriculture by the colleges of agriculture and agricultural engineering. The importance of the fisheries as sources of food has never been fully realized, although through the work of the Food Administration public information on this point was greatly extended. There have been but three schools of fisheries established hitherto in the world — one in Japan, one in Russia, and one, in 1919, at the University of Washington in Seattle. It is believed that a distinct service may be rendered to this important food industry by training men who may be able to consider the problems of food supply and conservation and the economical and sanitary manufacture of food products in a broad way. The course laid out therefore, while essentially biological in general character, includes subjects in Engineering Administration. With certain minor changes, the course is equally applicable to other great food industries. The United States Bureau of Fisheries and the United States Fisheries Association, comprising the leaders in the industry, have guaranteed hearty coöperation with the Institute in the carrying out of this new course. Already the Bureau of Fisheries has detailed a research assistant to work in the laboratories of the Institute, under direction of Professor Prescott, on an important bacteriological problem connected with the preparation of dried fish. More men will be required for work of this character as soon as they can be trained.

To participate to a greater extent in the work of the new option, Professor Bigelow, who has formerly devoted a large part his time to his work as Librarian of the Institute, will, in the future, give nearly all of his time to instruction. The personnel of the Department has been further strengthened by the appointment of Assistant Professor John W. M. Bunker. Dr. Bunker has had an extensive teaching experience and for the past five years has been in charge of bacteriological investigation and the development of commercial bio-chemical products for one of the leading firms in

America. He will now take charge of the work in Physiology and Biochemistry. Professor Turner has been appointed as a representative of the Department on the Administrative Committee of the School of Public Health, maintained jointly by Harvard University and the Institute. Professor Turner, during July gave a summer course on Public Health Education which was largely attended and which was so successful that this subject will be offered during the regular school session as a part of the curriculum of the School of Public Health. During the summer Dr. Horwood carried out a public health survey for the city of Lafayette, Indiana, and has published a volume on "Public Health Surveys" which is receiving high commendation. The work in Public Health Laboratory Methods continues under the effective teaching of Dr. F. H. Slack.

In addition to the research which is being conducted under the supervision of the Department for the Bureau of Fisheries, may be mentioned some comprehensive investigations carried out in conjunction with the American Institute of Baking, as well as the extensive studies on coffee conducted under the auspices of the Division of Industrial Coöperation and Research.

The Department continues to be handicapped by the small number of students electing its work. Opportunities to place men in excellent professional positions have, during the past year as in former years, considerably exceeded the available number of men. It is hoped, however, that with the expanding work of the Department and its association with organizations such as the United States Bureau of Fisheries and the American Institute of Baking, the opportunities for technical training here presented may appeal to a considerably increased number of students.

Through the generosity of Mrs. Sedgwick, the private library of Professor Sedgwick has been presented to the Institute with the proviso that the books remain within the rooms of the Department. These will be housed in the small seminar room where they, with other mementos of the lamented former head of the Department, will serve to aid and inspire the students in the Department.

S. C. Prescott.

SCHOOL OF PUBLIC HEALTH

This school, conducted on a volunteer basis and by special arrangement with Harvard University, has continued its activities as in the past, under the direction of an Administrative Board which represents both institutions. The school trains young men and young women for positions in Public Health service as health officers, laboratorians, sanitary inspectors, statisticians, and workers in Public Health Education. Seventeen candidates were granted the Certificate in Public Health (C. P. H.) in 1921. Twenty-seven students were registered in the school.

The demand for properly equipped workers in this field still exceeds the supply and the school is performing a most useful function in the advancement of Public Health. The Institute still continues to give the greater part of the instruction to candidates for the certificate. An examination of the classroom hours for all students for the year 1919-1920 shows that the Institute gave something over fifty-five per cent of the total amount of instruction, the remaining forty-five per cent of the work being divided between the Harvard Medical School, the Harvard Engineering School, and outside institutions such as hospitals and dispensaries. The arrangement of courses remains practically unchanged.

This year the school has undertaken a new activity, namely, the training of experts in Health Education. A one-year course of study has been provided for specially qualified students and, as with candidates for the Certificate of Public Health, the program of each student is approved by the Administrative Board. This work is the outgrowth of a course in Methods of Teaching Hygiene and Public Health in the Public Schools which was most successfully given at the Institute in the summer of 1921 by Professor Turner. The Harvard Graduate School of Education is coöperating in this enterprise.

The demand for directors of health education for school systems and the demand for special health teachers is so great that this new activity seems likely to serve a most useful purpose.

S. C. Prescott.

DEPARTMENT OF PHYSICS

Including Electrochemical Engineering and Aeronautical Engineering

During the year the Department suffered the loss of most of Professor Norton's services through his transfer to the position of Director of the Division of Industrial Coöperation and Research. He retains, however, his position as Director of the Research Laboratory of Industrial Physics. This laboratory was established October 1, 1920, partly for the purpose of better serving industrial organizations who might seek to have research in Physics undertaken for them but principally with the intention of offering a better opportunity to those members of the teaching staff of the Department, who might not already be engaged upon their own personal research, to enter upon industrial investigations under Professor Norton's experienced guidance. The condition of the industry was so depressed that no fair test of the possibilities of the laboratory could be made.

Major changes in the aerodynamical equipment are being undertaken. The old 4-foot wind tunnel has been rebuilt and its maximum velocity raised from 35 miles to 65 miles per hour. A new 7½-foot tunnel is being constructed with an anticipated wind velocity of 80 miles per hour and should be ready for use early in the ensuing year. With this equipment the Institute should be able to maintain the leadership in aeronautical instruction and investigation which was taken when the wind tunnel was constructed. Contracts with the United States Air Service and tests for commercial aeronautical concerns help in making these improvements possible by reducing their net cost to the Institute. Coincidently, the courses of instruction in aeronautics leading to the S.M. degree have been considerably strengthened.

The equipment in Electrochemical Engineering in the old days on Boylston Street was satisfactory for 16 students in the professional work of the third and fourth years. In the new buildings adequate places were provided for 24 students. The large class of 1922, considerably in excess of 24 in number, is being handled only with some inconvenience to students and teachers alike. It has been shown that the equipment can be made to do for more than 24 in emergencies; but considering the difficult

nature of the course with its insistence on a high degree of proficiency both in Chemistry and in Electrical Engineering, it is a fair question whether the Department and the Institute may not be better off in the long run if only the best 24 applicants are admitted to Course XIV during the next few years and until it shall have become evident that there is a regular annual demand for the work by more than that number of students of more than average ability.

The course in Physics (Course VIII) has a number of students in the upper classes in excess of experience of recent years and it is sincerely hoped that this increase may be permanent. Places are waiting not only in colleges but in various industries for properly trained physicists and past experience has shown that in the industry good physicists rise rapidly. A cheerful sign of the success of our work in physics is seen in the increasing number of candidates for the master's and doctor's degrees in this Department.

The Malcolm Cotton Brown Fellowship has become available. During the past year it was held by Mr. John A. Clark, and for the coming year it has been awarded to Mr. Donald S. Piston.

E. B. WILSON.

DEPARTMENT OF CHEMICAL ENGINEERING

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

Conditions of Instruction. The instructional load of the Department was extraordinarily heavy during the year because the senior class was the largest yet graduated in Chemical Engineering. While the next class is still larger, the following classes are smaller, and we therefore deemed it wise to handle the situation by special expedients rather than by permanent expansion of staff. During the last two terms, when the instructional load was heaviest, the staff at the Institute received the assistance of Professors Haslam and Whitman of the School of Chemical Engineering Practice. They not only helped carry the temporary load but also did work designed to make easier the instruction of the coming year.

Because of the large number of students it has been necessary to adjust the course scheme to equalize throughout the year the utilization of undergraduate laboratory space. It would otherwise be impossible to furnish laboratory accommodations without expansion of facilities.

Course Changes. The Faculty has approved course changes designed to start professional instruction within the Department in the third year and to render available to a larger number of students the opportunities of the School of Chemical Engineering Practice. These changes were put into effect during the year and promise marked increase in instructional efficiency.

Post-Graduate Work. Because instruction in Chemical Engineering must be based upon a thorough foundation in both chemistry and mechanical engineering it is impossible to give a large amount of time to Chemical Engineering itself in the undergraduate course. The student who wishes to prepare for leadership in the profession must plan to return for at least a year of post-graduate work. Realizing this fact the Department has spent unusual effort in developing and perfecting the necessary post-graduate instruction, giving ten new courses during the year. Twenty-nine students received the Master's degree in Chemical Engineering and six, without designation of course.

Research Work. In view of the importance of fundamental research in chemical engineering and applied chemistry the Department has emphasized this part of its work. Every member of the staff was engaged upon one or more broad problems. The facilities of the Research Laboratory of Applied Chemistry and of the School of Chemical Engineering Practice are of great value in enabling us to meet our obligations in this regard.

The Department expresses its appreciation to the Division of Industrial Coöperation and Research for the services of Professor Woodward, who worked from January until June on a number of research problems.

Facilities. Because the space occupied by the Department was planned when the course was relatively much smaller than at present, the department facilities are greatly overcrowded. Indeed it would be impossible to carry on the work except for space generously made available by the Departments of Mining Engineering and of Chemistry, and by the use of Barracks No. 4. This space

being so scattered and not designed for our work seriously hampers efficiency.

Gifts. The Department expresses its appreciation of the gift of a three-foot MacLaurin Scrubber by The American Chemical and Sugar Machinery Co., and of a fifty-gallon rotary pump by the Blackmer Company. These machines have been added to the instructional equipment in the Chemical Engineering Laboratory.

School of Chemical Engineering Practice. The most important development of the year has been the progress made in the School of Chemical Engineering Practice. This experiment in engineering education is novel in three important respects: first, the student undertakes practical work only after completion of adequate theoretical training, second, the student works under thorough instructional supervision, and third, the activities of the student are directed solely from the point of view of educational effectiveness. Another factor found to increase the efficiency of instruction is that the equipment and processes are studied under normal surroundings rather than divorced from the plant of which they are a part and the organization which directs them. The Department believes this method of instruction in the practical side of engineering work is the most effective hitherto developed. Our experience to date also indicates that the instructional cost need be no higher than in work of similar grade at the Institute, while the investment in equipment is negligible.

W. K. Lewis.

THE SCHOOL OF CHEMICAL ENGINEERING PRACTICE

The School of Chemical Engineering Practice, having completed its first year of operation has shown definitely, first, that it is possible to teach effectively the application of Chemical Engineering theory in a factory without interfering with production, and, second, that, although students and factory employees are in close individual contact and in spite of the diversion in point of view, there need be no friction or misunderstanding between them. Although not yet definitely proved, it seems certain that in time the educational work of the students will produce as a by-product technical results sufficient to recompense

the seven companies for their hearty coöperation. It should be pointed out, however, that all seven companies have coöperated with the Institute in the spirit of aiding technical education rather than in the expectation of receiving direct and immediate rewards.

Experience to date confirms our opinion that the fundamental theory of the science should be taught the student previous to his application of it in the plant. The difficulties encountered in a factory in the successful application of apparently simple principles are so numerous that teaching theory simultaneously tends to confusion. Since a chemical factory offers innumerable educational opportunities, in order to utilize these to the fullest extent the time allowed each problem, test or investigation is carefully considered in order to give the student the maximum educational value per unit of time. To further conserve the valuable time in the plant the policy has been adopted of teaching nothing that can be done at the Institute as well or better. As a result of this policy, arrangements are being made with the Department of Chemistry to give to X-A men in the third term of the fourth year, just prior to their entrance in the Practice School, a special course in analytical chemistry.

In the Practice School attention is being given, not only to the application of theory to the manufacturing process, but also to the correlated problems of labor and management. From the following list of major plant tests carried out during this year, something of the character and scope of the technical work may be obtained:

(1) Soda Losses in the Soda Pulp Mill.
(2) Caustic Soda Evaporation in Four-Effect Swenson Evaporator.
(3) Efficiency and Losses in an Electrolytic Caustic Soda and Chlorine Plant.
(4) Tower and Packing Efficiencies in the Manufacture of Acid Sulphite Liquor.
(5) Decolorizing Sugar and the Sweetening-off of Char Filters.
(6) Filtration of Defecated Sugar Syrups under conditions of Constant Pressure and Constant Rate of Flow.
(7) Material losses in the Manufacture of Sodium Sulphite.
(8) Determination of Constants for Tower Design in Hydrochloric Acid Absorption Towers.
(9) Glycerine Losses during Evaporation.
(10) Efficiency Test on a Blast Furnace Stove.
(11) Determination of the Useful Heat of an Open-Hearth Steel Furnace.
(12) Application of Laws of Drying to Continuous Belt and Rotary Driers.

In the school the Department has an excellent opportunity to test the proficiency of its students in practical work and, on the

basis of such information, modify its instruction where necessary. Furthermore, Chemical Engineering is a new profession and the opportunity offered by the Practice School of testing the scope and adequacy of new developments in this field is of broad scientific value.

During the past year, 29 students entered the Practice School and 25 satisfactorily finished, receiving the Degree of Master of Science in Chemical Engineering. For the coming year there were 52 applicants, of which 34 were accepted. Of these 34, 23 have received their bachelor degrees from the Institute and 11 from other colleges. There are already 51 applications for the school year of 1922-1923. During the next few years our chief endeavor will be to attract and select the very best type of student.

As a whole the living conditions at the three stations are satisfactory. At Buffalo a club house has been leased and furnished for the students, and at Woburn arrangements have been made for quarters during the students' stay at the plant of the Merrimac Chemical Company. These changes are a great improvement over former conditions.

At the end of the present year, Professor Woodward, Director of the Everett Station, resigned to go into industrial work and Professor Whitman was transferred from the Bangor Station to take his place. Mr. William P. Ryan, Assistant Director of the Bangor Station during the past year, was appointed Director of the Bangor Station.

In order to expand the facilities of the Practice School the faculty has approved its extension into the undergraduate field, resulting in the establishment of Course X-B. This course is the same as Course X for the first three years. Following this there is a summer school of ten weeks and a full term at the Institute, after which the students spend from January to June in the Practice School, receiving at the end of this course the Bachelor of Science Degree. For the coming year there have been twenty-two applications for this course and eighteen have been accepted. It will be noticed that a far larger number of men applied for the five-year Master of Science Course. The advantages secured in establishing X-B were as follows: First, the opportunities of the Practice School are available to approximately twice the number

of students, second, the staff of the Practice School is employed and contact with the factory organizations is maintained throughout the year, and third, instructional costs are lowered so that the exceptional opportunities of the school may be offered by the Institute at a cost per student not greater than that of ordinary post-graduate instruction.

R. T. HASLAM.

RESEARCH LABORATORY OF APPLIED CHEMISTRY

The laboratory has been particularly fortunate during the past year of industrial depression in renewing nearly all of its contracts with industrial firms, securing in this way its chief source of income for financing *pro bono publico* research. Although no new problems have been assigned to the laboratory under the Technology Plan, major research work has been performed for sixteen concerns, as compared with eleven for the previous year. At present, work is being carried on for some twelve outside companies, eight of which may be classed as major consultants.

At present the following major problems are being conducted for industrial concerns:

Angier Mechanical Laboratories: Development of Waterproof Paper.
Cocoa Products Company of America (2 men): Utilization of By-products from the Cocoa Industry.
General Motors Research Corporation: Investigation of the Mechanism of Lubrication.
Goodyear Tire and Rubber Company (2 men): (1) Studies on the Mechanism of Vulcanization; (2) Methods of Producing High-Grade Compounding Ingredients for the Rubber Industry.
Vacuum Oil Company (2 men): (1) Drying of Wood for Oil Barrels; (2). Decolorization of Heavy Mineral Oils; (3) Causes of Failure of Tin Plate
National Electrolytic Company: Certain Important Organic Syntheses.
The Papercan Corporation: Development of Improved Waterproof and Greaseproof Containers.
National Tube Company (2 men): (1) Fundamental Factors in the Corrosion of Iron and Steel; (2) The Electro-deposition of Zinc.

During the past year five of the regular members of the laboratory staff left to accept industrial research positions, three to undertake teaching and research in other institutions and two to work for advanced degrees. While the laboratory regrets to lose experienced workers, it realizes that one of its major functions is the training of men in research for the chemical industries of the country.

Four new members have been added to the staff during the year, two have been promoted from Research Assistants to Research Associates, and the two Assistant Directors, Dr. Leon W. Parsons and Dr. Charles S. Venable, have received merited promotion to Assistant Professorships.

During the past year especial emphasis has been placed on the educational functions of the Laboratory. The instruction work given by members of the Laboratory has been expanded so that in addition to thesis supervision and regular research conferences, formal instruction is now given in various branches of applied chemistry to post-graduate and undergraduate students by six members of the laboratory staff.

During the past year the thesis work of thirty-six men has been supervised by various members of the Laboratory; one for the Ph.D. degree, thirteen for the S.M. degree, and twenty-two for the S.B. degree.

There are two ways in which data is obtained for publishable articles — from *pro bono publico* problems financed by the Laboratory, and from certain problems financed by outside companies who give permission for the publication of the results obtained on certain phases of their investigations. That distinct progress has been made in making such information available to the public is indicated from the following table:

	Pro Bono Publico	Financed by Outside Companies
Total Number of Problems	*20*	*12*
(a) Number of published articles	2	2
(b) Accepted for publication	1	3
(c) Investigation finished in preparation for publication	6	5
(d) Under investigation	11	2

In addition to the above fundamental research work which is being made available to the industries as rapidly as possible through publication in the chemical journals, scientific papers have been presented by various members of the Laboratory at the spring and fall meetings of the American Chemical Society. Eight papers were presented at the spring meeting at Rochester, and eleven papers at the fall meeting at New York. Six of these papers resulted from thesis work supervised in the Laboratory.

Special attention is being given to the development of the

field of colloid chemistry, including the offering of a new course in this subject, the assignment of a large number of thesis problems in this field, and an attempt to focus the *pro bono publico* work of the laboratory onto the fundamental problems in theoretical and applied colloid chemistry which are pressing for solution in various industries.

From the income of the Charlotte Richardson Fund and the Cabot Fund, the Laboratory has been able to purchase much needed equipment to aid in the prosecution of fundamental research carried on by thesis men and by men engaged in *pro bono publico* research.

ROBERT E. WILSON.

DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING

Notwithstanding the depression in the shipbuilding industry and the poor prospect which it offered of employment, the number of students in the civilian classes was fully maintained. On the suggestion of the visiting committee a new course of lectures was given on the subject of Shipyard Organization and Management. These lectures were well attended by the senior students, who took a very great interest in the subject. With regard to the corps of Naval Constructors, the effects of the war disorganization were still felt. A class of twenty officers, who had been one year at the Institute and then withdrawn for service, returned and completed the course for the Master's degree. In addition, there was a senior class of ten officers who entered for the two-year course of continuous training in accordance with the program.

The new head of the Department took up the duties at the beginning of the session and desires to express here his appreciation of the loyal support received from all members of the instructing staff. Owing to the large number of Naval Constructors, it was necessary to strengthen the staff and Professor Keith was reappointed to assist Professor Hovgaard.

The new Pratt Building should have been ready for occupation during the session, but owing to labor troubles this did not occur. It is greatly to be regretted that this building was not

completed during Professor Peabody's term of office, as it would have been only fitting that his long and arduous work in building up the course in Naval Architecture should have been crowned by his taking possession of the new building.

J. P. JACK.

DEPARTMENT OF ECONOMICS AND STATISTICS

The work of the Department has greatly increased this past year owing first, to the exceptionally large enrollment in the third-year class taking political economy, and second, to the increase in students taking the course in Engineering Administration in the three upper years. The enrollment in Economics was approximately 700 as compared with 550 in the previous year; and the enrollment in the second, third and fourth years in Engineering Administration rose to 429. A part of this increase was due to the transfer of students from other colleges.

It was necessary to enlarge the staff of the Department. Professor D. S. Tucker of Wellesley College, who gave part time in the preceding year, was appointed Assistant Professor, and three instructors were added, including Professor R. M. Jameson of Boston University on part time.

In order to make the instruction of students in the second year more efficient the classes in political economy and accounting were divided. Students in Options 1 and 3 took accounting in the first term and political economy in the second and third terms, and students in Option 2 took political economy in the first and second terms and accounting in the third term. This arrangement proved satisfactory and spread the teaching load more evenly over the year.

Instruction by coöperating lecturers from outside of the staff of the Institute has been further developed. In Business Management there were forty-seven such lectures, giving the students a wide opportunity to be brought closely in touch with current business experience. Professor Schell further developed his course by giving ten lectures in the third term on Executive Control. Helpful notes on time study were prepared by Mr. Reed, who spent a considerable part of the summer of 1920 in visiting and

working in several industrial plants where time studies have been highly developed. Professor Shugrue continued his instruction of a class of the American Institute of Banking.

DAVIS R. DEWEY.

DEPARTMENT OF ENGLISH AND HISTORY

The fundamental courses in English and History required of all students in the first two years were carried out in full according to the plan authorized by the Faculty in the spring of 1919. Improvement in the texts used, the introduction of one lecture a week throughout the year in each course, and the formation of credit sections for the better men were some of the changes made in the direction of more effective organization, with very satisfactory results.

In two sets of General Study options, the so-called "contact courses," by Professor Robinson, and the courses in contemporary English and American Literature by Professor Rogers, the Department has carried out the plan prepared at the same time of a series of courses running through the year, which, if taken in succession, would constitute a substantial accomplishment in a single field of effort. The large registration in these courses and the excellent work done by the students is a tribute to the soundness of the plan, and the skill with which the work of instruction has been carried on by Professors Robinson and Rogers. Further development in the "contact courses" will undoubtedly result from Professor Robinson's trip this summer to various industrial centers.

In regard to other third-year work, the courses in Business English and Committee Reports have been successfully conducted at Lynn by Mr. Sears during the summer, as well as through the terms of the school year; in Report Writing some twenty-five men prepared, under Mr. Prescott's direction, a joint report on the organization of undergraduate activities which required considerable investigation on the part of individuals and careful coöperation in bringing the material together and putting it into proper shape. The result was a most creditable piece of work.

For the third term, Professor Seaver was given leave of absence, in order that he might travel in Spain, in connection with

his studies in Spanish History. For the same term Professor Aydelotte was also given leave of absence, and later his resignation as a member of the Institute Faculty was accepted. This fall he takes over his new duties as President of Swarthmore. During the six years in which he has been associated with the Department, Professor Aydelotte has made a marked contribution to it in fresh ideas, enthusiasm, and skill as a teacher. As a member of the Faculty, he has done valuable work on committees, particularly as chairman of the recently organized Committee on Admissions. As American Secretary to the Rhodes Trustees and as Director of the War Issues Course during the period of the Students' Army Training Corps, he was engaged in educational work outside the Institute that was of national importance. His loss will be felt by Faculty and students, who cordially wish him success in his presidential duties.

The Department has been fortunate in the arrangements that it has been able to make in procuring lecturers from outside the Institute. Especial mention should be made of the lectures on government given during the third term in connection with the course in American History by Dr. A. N. Holcombe, Professor of Government at Harvard. To him and to men who have given single lectures in the first-year and third-year courses, the Department expresses its appreciation.

HENRY G. PEARSON.

DEPARTMENT OF MATHEMATICS

The main change in the program for the past year has been the omission of trigonometry consequent on the operation of the new entrance requirement in that subject. This has made it possible, advantageously, to devote the entire first term to the introductory course in calculus, which aims to familiarize the students as promptly as possible with the three fundamental notions of derivative, differential and definite integral as the limit of a sum in order that these may be utilized more freely and more habitually in physics and other dependent subjects. Careful proofs and manipulative skill are necessarily subordinated or postponed, attention being focussed on the algebraic polynomial and on simple

applications to problems of area, volume, rectilinear motion and pressure. A number of other institutions are at present developing similar introductory courses in calculus, and such experiment cannot fail to have far-reaching and important reaction on the general mathematical curriculum for academic as well as for engineering students.

In the other terms of the general course in mathematics, changes have been of a minor character, but a change in the method of instruction has been tried in the third term, based on the segregation of superior students. In the first and second year sections are grouped in blocks of four or more having identical hours. In each of these blocks one "A" section has been formed by selection of students having superior records. It has not seemed expedient to modify the program of required work for the "A" sections in any way but the teacher's point of view and manner of attack have been appreciably different. In the ordinary ungraded section the teacher, aiming to make the work intelligible to the weaker students, will often spend time in explanation which more capable men do not need and find uninteresting. With an "A" section the teacher is in a position to make the students more self-reliant and to focus class attention on questions of greater difficulty, which are more worthy of the capacity of the abler students. The reaction of the plan on the residual sections is somewhat complicated, and whether in the long run this may render the continuance of the plan inadvisable remains for the present an open question.

A change of program, not yet in effect but considerably discussed in department meetings during the year, is the introduction in the second year of work on Nomography and Empirical Equations. Professor Lipka has for several years conducted electives in Mathematical Laboratory covering both of these subjects. The Department of Mechanical Engineering, having requested that its students be given the nomographic work, an inquiry was addressed to professional departments generally, in order to ascertain how many might be similarly interested. On the basis of the replies received students in certain departments will devote about six exercises in the second term of the second year to nomographic-chart work, while those in other departments will spend the same amount on empirical equations.

Two mathematical subjects, intermediate in character between the general program and the specialized electives, deserve mention. Mathematics 35, formerly a course in the elements of ordinary differential equations, has been recently remodelled by Professors Moore and Phillips with a view to adapting it more closely to the needs of students in Electrical Engineering. Mathematics 41, which replaces the third term, second-year work for students in Chemical Engineering, represents a similar undertaking carried out by Professor Hitchcock to relate the mathematics more closely to professional needs.

Elective and graduate courses have been conducted during the year as follows: Aeronautics by Professor Moore, Mathematical Laboratory by Professor Lipka, Thermodynamics by Professor Phillips, Relativity by Professors Moore and Phillips, Modern Algebra by Doctor Rutledge, Advanced Calculus and Modern Analysis by Professor Woods.

Professors Moore and Phillips have taught sections in physics, Mr. Lindsay, of the latter department, taking sections in exchange, with mutual advantage.

Research and Publications. Recent development of our work on this side has been gratifying. Professors Phillips, Lipka, Hitchcock and Dr. Wiener have had research grants during the year and the favorable effect on scientific production is notably shown in the list of publications by members of the Department. Serial reprints, 1 to 23, have been circulated to a large number of institutions in the United States and abroad. In view of the volume of present and anticipated material and the present difficulty and uncertainty of publication through ordinary channels, the Department, in coöperation with the Department of Physics and the Research Laboratory of Physical Chemistry, and with the aid of a grant from the Corporation, has arranged for the publication, beginning this fall, of a journal of mathematics and physics, which should prove a valuable stimulus to further scientific production.

Assistant Professor Phillips has been promoted to Associate Professor. Assistant Professor Lipka has been granted leave of absence for study in Europe. Professor T. M. Putnam, of the University of California, has been a valued accession to the summer staff of the Department on the basis of an exchange with Professor

Tyler. Doctor Taylor has been awarded a Belgian Fellowship and will spend the year in Belgium.

H. W. TYLER.

DEPARTMENT OF MILITARY SCIENCE AND TACTICS

Object of the Reserve Officers Training Corps. To supply leaders, *i.e.* non-commissioned officers and officers for use in war or other emergency expressly recognized as such by Congress.

Kind and Numbers of Officers Furnished.

Unit	*Graduated in 1921*	*To graduate in 1922*
Coast Artillery	22	36
Signal Corps	0	10
Engineers	0	51
Ordnance	15	38
Air Service	2	4
Total	39	139

The Institute has undertaken to provide officers for branches which need leaders with technical training. An Air Service Unit was added in 1921. The advisability of adding a Chemical Warfare Unit (Gas Service) is being considered.

Total Enrollment by Units.

Unit	*Basic Course, Compulsory*	*Advanced Course, Voluntary*
Coast Artillery	288	112
Signal Corps	114	41
Engineers	294	113
Ordnance	181	83
Air Service	140	28
Total	1017	377

On account of the special physical examination recently given the enrollment in advanced course Air Service Unit was reduced from 63 to 28.

Voluntary enrollment was 189 in October, 1920; there are indications of an increase of 100 per cent for the coming year. The voluntary enrollment, the total enrollment and the commissioned Reserve Officers being provided are greater than those of any other similar, *i.e.* non-military, educational institution in the United States.

Instructors. Ten commissioned officers, six non-commissioned officers, one private, first class.

Summer Camps. From reports received it is concluded that in deportment and in character of work done at summer camps the men from the Institute excelled those from other educational institutions.

The men of the Coast Artillery Unit at Fort Monroe, Virginia, won a silver cup engraved "Coast Artillery, R. O. T. C. Camp 1921, For Excellence in Artillery Firing and Infantry Drill, Won by Massachusetts Institute of Technology."

The company composed of students from the Massachusetts Institute of Technology and Virginia Polytechnic Institute and commanded by a Technology student in competition with four other companies won the prize for excellency in Infantry Drill.

Students of the Engineer Unit at Camp Humphreys won the cup given for the highest number of points in the Camp Track Meet.

The Air Service Unit at Fort Sill won the first three places in standing of students in rating on all work required. The only unit of which all students passed the final radio examination was that from Massachusetts Institute of Technology.

Equipment. Five hundred Springfield rifles, model 1903, were obtained to replace the Enfield rifles furnished during the War.

An 8-inch Howitzer, a 155 mm. G. P. F., a Puff Board and a Terrain Board were added to the equipment of the Coast Artillery Unit.

The Air Service Unit uses nineteen Airplane Motors and accessories furnished by the Air Service Division, Engineering Section of the Regular Army.

The Signal Corps Unit added an automatic switchboard to its equipment.

General. About three hundred of the better students of the junior and senior classes are voluntarily adding three hours per week to their Institute courses by enrolling for advanced courses in Military Science.

The Institute permits and encourages such enrollment. Effort is being made by this Department to obtain credit toward graduation for such of these advanced courses as are believed by the Institute authorities to have real merit.

The Department has been instrumental in furnishing from among students and graduates of the Massachusetts Institute of Technology, cadets for the Military Academy, commissioned officers for the Regular Army and it hopes to persuade several professors and instructors to accept during the year 1922, commissions in the Reserve Corps.

J. B. CHRISTIAN, *Colonel*, C. A. C., (DOL).

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

TREASURER'S REPORT

FOR THE YEAR ENDED JUNE 30, 1921

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, 1921, 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:

Subscriptions to M. I. T. Educational Endowment Fund	$457,793.79	
Subscriptions to M. I. T. Alumni Fund	2,469.25	
Estate of Charles C. Drew	241,171.52	
Estate of Frank E. Peabody	51,716.67	
Estate of Maria A. Evans	35,300.00	
Estate of Anna B. Rogers for Henry Bromfield Rogers Fellowship	10,000.00	
Estate of Moses W. Oliver	8,220.49	
Estate of Albert H. Munsell	7,378.24	
Estate of Robert A. Boit	5,000.00	
Estate of Horace W. Wadleigh	2,143.14	
Subscriptions for Maclaurin Memorial Fund	1,470.00	
Estate of William E. Chamberlain	1,309.77	
Estate of Margaret A. Munsell	1,105.32	
		$825,078.19

Gifts for Research (Schedule B), Minor Fund Earnings:

American Telephone and Telegraph Company for Research	$10,000.00	
American Telephone and Telegraph Company, Library Fund	2,000.00	
Subscriptions to Technology Plan Research Fund	4,600.00	
		16,600.00

Miscellaneous Gifts:

General Electric Company for Course VIa	$5,000.00	
Grasselli Chemical Company for Fellowships and Scholarships	1,250.00	
Estate of Henry L. Pierce for General Purposes	1,021.63	
E. I. du Pont de Nemours Co. for Fellowships	750.00	
Herbert E. Fales for Department of Mechanical Engineering	500.00	
Paul Pami for Department of Geology	400.00	
Estate of Francis E. Weston for Scholarships	400.00	
Howard Coonley for Course XV Fund	25.00	
R. W. Babson for Course XV Fund	20.00	
George B. Baker for Course XV Fund	20.00	
Frank A. Merrill for Course XV Fund	20.00	
E. P. Turner for Course XV Fund	20.00	
Latin American Club for General Library	10.99	
		9,437.62
		$851,115.81

Of the above total $851,115.81, the sum of $26,037.62 was given for current expenses or research, and has been carried into the income for the year.

The M. I. T. Educational Fund on June 30, 1921 amounted to $5,998,253.29. A condensed statement follows herewith:

Subscriptions		*Payments*
$4,000,000.00	George Eastman	$4,000,000.00
2,927,649.00	Alumni and Others	1,429,851.29
1,082,330.00	Technology Plan Contracts	568,402.00
$8,009,979.00	Total.	$5,998,253.29

Attention is called to the cost of fuel during the past year (Page 11 — Schedule **C-5**) and to the importance of this item in the ordinary running expenses of the Institute. The costs of the fuel bought for the past five years were as follows:

1916–17	$ 49,641.83
1917–18	98,815.02
1918–19	127,388.02
1919–20	103,307.62
1920–21	128,765.15

Respectfully submitted,

FRANCIS R. HART,
Treasurer.

November 1, 1921.

SCHEDULE A

FINANCIAL RESULT OF THE YEAR ENDED JUNE 30, 1921 COMPARED WITH THE PREVIOUS YEAR

	1920–1921	*1919–1920*
Current Income, Schedule **B**	$2,147,068.22	$1,684,297.13
Current Outgo, Schedule **C**	2,177,878.19	1,659,096.71
Excess — Income		$25,200.42
Excess — Outgo	$30,809.97	
Income transferred to Funds		58,942.59
Excess expenses of Funds	6,308.94	
Net Deficit	$24,501.03	$33,742.17

LOSSES AND GAINS DURING YEAR

Gains and Credits, Schedule S	$27,181.56	$64,652.70
	$2,680.53	$30,910.53
Losses and Charges, Schedule S	37,843.66	1,200.63
Increase of Current Surplus		$29,709.90
Decrease of Current Surplus	$35,163.13	

SCHEDULE B

INCOME

	Regular courses	*Research and funds*	*Total*
INCOME FROM STUDENTS:			
Tuition fees	$917,893.74		
Entrance examination fees	5,885.00		
Condition examination fees	8,626.00		
Sale of lecture notes, etc.	5,447.05		
Registration fees	2,799.16		
Dormitory rentals (Schedule C-7)	35,353.66		
Walker Memorial (Schedule C-9)	18,508.51		
	$994,513.12		$994,513.12
INCOME FROM INVESTMENTS:			
Endowments for general purposes, Schedule P	$513,428.34	$911.18	
Endowments for scholarship purposes, applied	34,122.50		
Endowments for other designated purposes	38,948.80	104,382.53	
	$586,499.64	$105,293.71	
Other income not applied to funds	34,786.64		
	$621,286.28		
Less:			
Accrued interest on purchases, etc.	34,786.64		
Net (Schedule Q)	$586,499.64	$105,293.71	691,793.35
GRANTS BY NATION AND STATE:			
Annual Grant from Commonwealth of Massachusetts	$100,000.00		
Federal Aid Income from Land Grant,			
Act 1862	$5,306.68		
Act 1890	16,666.67		
	$121,973.35		121,973.35
GIFTS FOR			
Course VIa	$5,000.00		
Current Expenses	1,021.63		
Technology Plan Research		$4,600.00	
	$6,021.63	$4,600.00	10,621.63

	Regular courses	*Research and funds*	*Total*
MINOR FUND EARNINGS:			
Total (Schedule R)		$137,919.06	$137,919.06
INCOME FROM OTHER SOURCES:			
Interest	$13,397.78		
Huntington Hall, etc.	6,675.00		
U. S. Government Schools	1,532.34		
Walker Building	8,000.00		
Dining Service, Walker Memorial (Schedule **C-8**)	135,726.73		
Bursar's Fund reimbursements		353.43	
Summer Camp, 1920	24,562.43		
	$189,894.28	$353.43	190,247.71
Total Income (Schedule A)	$1,898,902.02	$248,166.20	$2,147,068.22

SCHEDULE C

OUTGO

	Regular courses	*Research and funds*	*Total*
SALARIES OF TEACHERS	$848,132.63	$86,282.89	$934,415.52
BONUS TO TEACHERS	$16,384.50		$16,384.50
WAGES ACCESSORY TO TEACHING:			
Stenographers and Assistants	$23,819.42	$7,493.68	$31,313.10
DEPARTMENT SUPPLIES AND REPAIRS:			
(Schedule **C-2**)	$106,258.45		$106,258.45
DIVISION OF INDUSTRIAL CO-OPERATION AND RESEARCH . . .	$29,575.96		$29,575.96
ADMINISTRATION AND GENERAL EXPENSE:			
Salaries of Officers	$47,112.33		
Salaries of Assistants, Stenographers, etc.	55,052.45		
Salaries of Library Assistants	14,736.93		
Lecture Notes	2,953.81		
Advertising and Printing (Schedule **C-3**)	35,414.02		
Fire Insurance	4,693.17		
General Expense (Schedule **C-4**)	98,268.91		
	$258,231.62		$258,231.62
OPERATION AND MAINTENANCE OF PLANT:			
Power Plant Operation (Schedule **C-5**)	$189,668.69		
Building Service, Salaries .	143,473.53	$6,731.68	
Repairs (Schedule **C-6**) . .	43,209.99		
	$376,352.21	$6,731.68	$383,083.89
EXPENSES OF MINOR FUNDS (excluding salaries):			
Total (Schedule R)		$57,077.20	$57,077.20
*AWARDS:			
Edward Austin Fund		$15,372.84	
Teachers' Fund		3,573.39	
Bursar's Fund		1,656.00	
Fellowship		4,429.00	
Whitney Fund, Dormitory .		178.00	
Whitney Fund, T. C. A.. . .		1,000.00	
Whitney Fund, Students' Fees		2,166.69	

*Other than for Undergraduate Scholarship.

	Regular courses	*Research and funds*	*Total*
AWARDS — *Continued:*			
Student Tax awards (Whitney Fund)		$3,189.00	
Architectural Prizes		400.00	
		$31,964.92	$31,964.92
PREMIUMS CHARGED OFF:			
General Investments	$5,550.00		
Rogers Memorial Investments	166.00		
Draper Fund Investments	24.00		
	$5,740.00		$5,740.00
EXPENSES:			
T. W. Bailey Fund		$352.00	
Pratt Naval Architectural Fund		40,292.00	
Chemical Engineering Practice Fund		10,787.44	
*Jonathan Whitney Fund		466.00	
Edna Dow Cheney Fund		118.35	
Technology Matrons' Teas Fund		89.01	
Cilley Fund		178.30	
F. W. Boles Memorial Fund		1,253.65	
Samuel Cabot Fund		3,347.20	
Charles Flint Fund		170.65	
Charlotte B. Richardson Fund		2,198.07	
Arthur Rotch Fund		5.25	
Technology Plan Research		3,456.73	
John Hume Tod Fund		170.12	
E. K. Turner Fund		2,040.00	
Dormitories (Schedule C-7)	$32,133.36		
Summer Camp, 1920	29,250.37		
Dining Service (Schedule C-8)	155,108.83		
Walker Memorial (Schedule C-9)	26,723.76		
APPROPRIATIONS:			
Applied Chemical Research	$2,000.00		
Industrial Physics	6,400.00		
Medical Department Special	5,500.00		
Physico-Chemical Research	502.82		
INTEREST PAID	570.80		
SOCIETY OF ARTS. Expenses	718.32		
	$258,908.26	$64,924.77	$323,833.03
Total Outgo (Schedule A)	$1,923,403.05	$254,475.14	$2,177,878.19

*Other than scholarship or awards.

SCHEDULE C-2

DETAIL OF DEPARTMENT EXPENSES (Net)

Aeronautics	$1,348.85
Architecture	3,742.19
Biology	2,012.22
Chemical Engineering	3,444.39
Chemical Engineering, Special No. 1	794.25
Chemical Engineering, Special No. 2	634.17
Chemistry	10,435.71
Civil Engineering, Special	442.25
Civil and Sanitary Engineering	2,684.48
Drawing	591.77
Economics and Engineering Administration	2,005.39
Economics, Special	1,255.34
Electrical Engineering	6,383.67
Engineering Administration, Special	1,432.64
English and History	1,321.47
General Library	5,632.61
Geology	2,100.75
Mathematics	1,129.65
Mechanical Engineering	16,035.80
Mechanical Engineering, Special	309.78
Metallurgy	979.20
Medical Department	2,801.27
Military Science	1,701.41
Mining Engineering	4,301.48
Modern Language	620.63
Naval Architecture	2,894.46
Physical Chemistry	4,441.20
Physical Training, Gymnasium	317.47
Physical Training, Athletic Field	11,415.58
Physics	11,107.45
Physics, Special	1,940.92
Total (Schedule C)	$106,258.45

SCHEDULE C-3

DETAIL OF EXPENSE OF PRINTING AND ADVERTISING (Net)

For Administration Offices	$9,473.41
Advertising in Technology Publications and other Publicity	1,470.21
Register of Former Students	7,957.57
President's and Treasurer's Reports	944.50
Catalog	1,777.47
Courses of Study	3,245.00
Examinations	2,943.34
Circular of General Information	1,928.64
Directory of Students	1,762.50
Summer Courses and Summer Camp Circulars	2,013.58
Tabular View	1,641.93
Miscellaneous	255.87
Total (Schedule C)	$35,414.02

SCHEDULE C-4

DETAIL OF ITEMS OF GENERAL EXPENSE (Net)

Administration Expense	$7,542.43
Buildings and Janitors' Supplies	5,633.43
Express, Freight, Telegrams, etc.	428.30
Fees, Dues, Commissions, etc.	20,857.94
Furniture and Office Equipment	3,718.86
General Office Supplies	441.63
Expenses of Graduation, Inauguration, etc.	7,858.94
Grounds	19,206.62
Ice, Spring Water	1,489.22
Neostyle Service	2,038.16
Postage	1,958.90
Traveling Expenses	1,152.11
Telephone Service	11,323.72
Trucking	4,096.23
Laundry	2,302.59
Collection of Endowment Fund	793.27
Miscellaneous	7,426.56
Total (Schedule C)	$98,268.91

SCHEDULE C-5

DETAIL OF POWER PLANT OPERATION (Net)

Coal	$128,765.15
Water	16,463.23
Gas	2,814.03
Power Plant and Boiler Room Supplies	14,241.11
Repairs	7,936.64
Trucking	382.34
Salaries	30,097.11
Miscellaneous	39.17
	$200,738.78
Less Sales of Electricity	11,070.09
Total (Schedule C)	$189,668.69

SCHEDULE C-6

DETAIL OF PLANT REPAIRS (Net)

Rogers Building, Boston	$7,687.19
President's House	1,405.16
General Educational Building, Group No. 1	2,708.83
General Educational Building, Group No. 2	4,988.62
General Educational Building, Group No. 3	8,211.59
General Educational Building, Group No. 4	5,257.98
General Educational Building, Group No. 8	2,183.41
General Educational Building, Group No. 10	3,930.10
Gas Engine Laboratory	886.68
Elevators	263.09
Shop Maintenance	1,311.27
Mechanic Arts Building	1,205.25
Service Building	549.09
Barracks No. 3	264.93
Barracks No. 4	342.05
Hangar	476.42
Airdrome	519.96
Rifle Range	135.55
Compressor House	165.70
Undistributed	717.12
Total (Schedule C)	$43,209.99

SCHEDULE C-7

DORMITORY ACCOUNT (Net)

Income:

Cash	$35,913.47	
Less Rental Refunds	559.81	
Total Income (Schedule B)		$35,353.66

Expense:

Salaries	$9,975.05	
Laundry	786.85	
Heat, Light and Power	7,349.25	
Water	847.45	
Repairs	4,669.58	
Supplies	1,142.97	
Insurance	425.00	
Trucking, etc.	29.60	
Printing, etc.	157.61	
Interest on Mortgage Loan (Whitney Fund)	6,750.00	
Total Expense (Schedule C)		$32,133.36
Net Income for year		$3,220.30

SCHEDULE C-8

DINING SERVICE ACCOUNT (Net)

Income:

Cash, Dining Room	$129,168.15	
Cigars and Candy	6,558.58	
Net Income (Schedule **B**)		$135,726.73

Expenditures:

Food	$68,610.25	
Cigars and Candy	6,372.49	
Salaries	55,437.81	
Light, Heat, Power, etc.	5,118.50	
Laundry	2,524.56	
Printing and Advertising	737.87	
Flowers, Music	96.50	
Ice, Refrigeration, etc.	2,341.06	
Repairs, Telephone, Trucking	3,830.49	
Administration Expense	310.44	
Dining Room and Kitchen Equipment	8,195.44	
Soap, Cleansers, etc.	825.90	
Insurance	365.00	
Miscellaneous	342.52	
Net Expense (Schedule **C**)		$155,108.83
Net loss for year		$19,382.10

SCHEDULE C-9

WALKER MEMORIAL ACCOUNT (Net)

Income:

Student Tax	$12,340.00	
Games	6,025.51	
Miscellaneous	143.00	
Net Income (Schedule **B**)		$18,508.51

Expenditures:

Salaries	$9,703.63	
Light, Heat, Power, etc.	7,776.85	
Repairs and Upkeep	6,606.91	
Telephone, Trucking and Administration Expense	368.11	
Building and Janitors' Supplies	815.66	
Insurance	340.00	
Books, Games, Magazines, etc.	417.28	
Equipment	695.32	
Net Expense (Schedule **C**)		$26,723.76
Net loss for year		$8,215.25

SCHEDULE D

TREASURER'S BALANCE SHEET

1

INVESTMENT ASSETS

Securities and Real Estate (Schedule H)	$14,695,549.56
Cash: In Banks for Investment (Schedule E)	144,025.05
Cash: Advanced (carried down per contra)	62,701.71
Total	$14,902.276.32

2

CURRENT ASSETS

Cash available for General Purposes (Schedule E)	$8,914.19
Accounts Receivable (Schedule D-1)	71,595.36
Students' Fees Receivable	3,682.43
Students' Deposits Receivable	1,880.07
Unexpired Insurance	16,548.59
Inventories and Advances for 1921-22 (Schedule D-2)	139,626.19
Total	$242,246.83

3

EDUCATIONAL PLANT ASSETS

Lands, Buildings and Equipment. Book Values

Total Book Value, June 30, 1920	$10,792,758.32
Additions during year	629,676.16
Cash: To meet Pratt School Contracts (Schedule E)	85,140.84
Cash: For New Equipment (Schedule E)	6,116.65
	$11,513,691.97

SCHEDULE D

JUNE 30, 1921

1

ENDOWMENT FUNDS

Funds, Schedule Q Recapitulation	$14,902,276.32
	$14,902,276.32

2

CURRENT LIABILITIES

Minor Funds (Schedule R)	$51,843.85
Borrowed from Investment Assets (per contra)	62,701.71
Accounts Payable	6,295.55
Tuition in Advance — Summer School	34,255.00
Summer Camp, 1921, Deposits	1,403.18
Summer Camp, Outside Students' Fees	210.00
Students' Fees Returnable	174.00
Students' Deposits	9,162.90
Students' Deposits in Advance	6,151.00
Dormitories, Income in Advance	3,489.00
Student Tax	3,339.83
Deposit by Knights of Columbus	2,669.42
Dining Room Coupons, Outstanding	275.29
Gift, Anticipated	1,000.00
Total	$182,970.73
Surplus available for Current Expense (Schedule S)	59,276.10
Total	$242,246.83

3

EDUCATIONAL PLANT AND CAPITAL ACCOUNTS

Endowment for Educational Plant (Schedule K)	$11,363,691.97
Mortgage Loan, Dormitories	150,000.00
	$11,513,691.97

SCHEDULE D-1

DETAIL OF ACCOUNTS RECEIVABLE

For Account of Research Lab. of App. Chemistry	$23,184.18
Harvard Co-operative Society	3,125.93
United States Naval Academy	5,399.80
Boston University	16,122.81
Lowell School for Industrial Foremen	1,201.09
Lowell Institute	3,500.00
Federal Board for Vocational Education	9,927.76
United States Army Contract	1,125.00
Miscellaneous Accounts	8,008.79
Total (Schedule D)	$71,595.36

SCHEDULE D-2

DETAIL OF INVENTORIES AND ADVANCES FOR 1921-1922

Advanced to Summer Camp, 1921	$3,269.55
Summer School Salaries	675.50
Inventories — Dining Room	23,966.38
Walker Memorial, Games	273.15
Architectural Supply Room	1,332.28
Building and Janitors' Supplies	3,134.42
Office Supplies	3,039.37
Photostat Equipment	851.59
Electrical Equipment	6,264.13
Pipe, Valves, Fittings, etc.	16,068.97
Lumber, Hardware, etc.	3,518.25
Shades, Locks, etc.	1,185.87
Paint, Glass, etc.	929.86
Division of Laboratory Supplies	75,116.87
Total (Schedule D)	$139,626.19

SCHEDULE E

CASH RECEIPTS AND DISBURSEMENTS

FOR THE YEAR

Total Cash Receipts (less transfers)	$3,403,075.42
Total Cash Disbursements (less transfers)	3,697,985.29
Excess of Disbursements	$294,909.87
Cash, July 1, 1920	539,106.60
Cash, June 30, 1921	$244,196.73

CASH BALANCE

Cash on Deposit at Banks	$238,600.18
Cash at Office	5,596.55
Cash Balance as above	$244,196.73

SCHEDULE H

SECURITIES; BONDS, STOCKS

Bonds	*Description of Securities*	*Due*	*Balance at beginning of year*
$50,000.00	Am. Ag. Chem. Co. 7½%	1941	.....
115,000.00	Am. Tel. & Tel. Co. 4%	1929	$114,025.00
75,000.00	Am. Thread Co. 6%	1928	73,500.00
50,000.00	Am. Tobacco Co. 7%	1923	50,750.00
75,000.00	Atch., Topeka & Santa Fe R.R. Co. 4%	1995	72,000.00
75,000.00	Atch., Topeka & Santa Fe R.R. Co. 4½%	1962	73,143.75
94,000.00	Baltimore & Ohio R.R. Co. 3½%	1925	86,490.00
500.00	Beaumont Gas Light Co. 6%	1944	500.00
50,000.00	Blackstone Valley Gas & Elec. Co. 5%	1939	50,195.00
15,000.00	Boston, City of, 4%	1924	.....
20,000.00	Boston, City of, 4%	1935	.....
70,000.00	Brooklyn Rapid Transit Co. 7%	1921	70,000.00
2,000.00	Campbell's Creek R.R. Co. 5's	1924	.....
5,050.00	Canada, Dominion of, 5½%	1934	50.00
200.00	Canada, Dominion of, 5½%	1937	200.00
50,000.00	Central Pacific Ry. Co. 4%	1954	40,918.75
93,000.00	Chesapeake & Ohio Ry. Co. 5%	1939	99,234.00
25,000.00	Chesapeake & Potomac Tel. Co. 5%	1943	24,500.00
48,000.00	Chicago, Burlington & Quincy R.R. 4%	1958	47,307.00
16,000.00	Chicago, Ill., City of, 4%	1930	16,171.00
50,000.00	Chicago City Railway 5%	1927	49,750.00
50,000.00	Chi. Junc. Rys. and Union Stock Yds. 4%	1940	49,250.00
35,000.00	Chi. Junc. Rys. and Union Stock Yds. 5%	1940	34,743.75
25,000.00	Chi. Mil & St. Paul Ry. Co. 4%	1934	23,406.25
55,000.00	Chi. Mil & St. Paul Ry. Co. 5%	2014	56,065.00
100,000.00	Chicago & Northwestern Ry. Co. 4%	1987	96,500.00
65,000.00	Chicago Union Station 4½%	1963	65,447.00
1,500.00	Cincinnati, City of, 4½%	1935	1,609.00
50,000.00	Cincinnati, City of, 4¼%	1936	52,465.00
6,500.00	Cincinnati, City of, 4½%	1945	7,170.00
1,000.00	Cincinnati, City of, 4½%	1933	1,023.00
100,000.00	Cleveland Elec. Ill. Co. 5%	1939	101,726.00
25,000.00	Cleveland & Pittsburgh R.R. Co. 4½%	1942	25,624.00
100,000.00	Columbus, Ohio, City of, 4½%	1944	107,868.00
20,000.00	Commonwealth Edison Co. 7%	1925	.....
50,000.00	Conn. Light & Power Co. 7%	1951	.....
68,000.00	Cons. Gas, Elec. Light & Power 4½%	1935	63,630.00
50,000.00	Consumers Power Co. 5%	1936	50,000.00
100.00	Cont. Gas & Elec. Corp. 5%	1927	100.00
51,000.00	Cumberland Tel. & Tel. Co. 5%	1937	50,305.75
17,000.00	Delaware & Hudson Co. 4%	1943	17,220.00
100,000.00	Delaware & Hudson Co. 5%	1935	105,187.00
25,000.00	Detroit Edison Co. 5%	1933	25,400.00
50,000.00	Detroit Edison Co. 5%	1940	50,105.00
1,750.00	Eastern Mass. St. Ry. Co. 6%	1925	1,750.00
35,000.00	Eastern Mass. St. Ry. Co. 4½%	1948	35,000.00
100,000.00	Edison Electric Ill. Co. 5%	1922	100,444.00
25,000.00	Edison Elec. Ill. Co. 7¾%	1921	.....
100,000.00	Edison Electric Ill. Co. 7¾%	1922	.....
17,000.00	Electrical Securities Corp. 5%	1940	16,830.00
1,000.00	Electrical Securities Corp. 5%	1942	990.00
25,000.00	Electrical Securities Corp. 5%	1943	25,000.00
25,000.00	Empire Gas & Elec. Co. 5%	1941	18,250.00

SCHEDULE H

REAL ESTATE AND MORTGAGES

Purchases and charges during year	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
$48,500.00	.....	$48,500.00	$875.00	.....
.....	.....	114,025.00	.....	$4,600.00
.....	.....	73,500.00	.....	4,500.00
.....	$375.00	50,375.00	.....	3,500.00
.....	.....	72,000.00	.....	3,000.00
.....	.....	73,143.75	.....	3,375.00
.....	.....	86,490.00	.....	3,290.00
.....	.....	500.00	.....	30.00
.....	11.00	50,184.00	.....	2,500.00
15,000.00	.....	15,000.00	.....	600.00
20,000.00	.....	20,000.00	.....	800.00
.....	.....	70,000.00	.....	.....
2,000.00	.....	2,000.00	.....	50.00
5,000.00	.....	5,050.00	.....	277.75
.....	.....	200.00	.....	11.00
.....	.....	40,918.75	.....	2,000.00
.....	347.00	98,887.00	.....	4,650.00
.....	.....	24,500.00	.....	1,250.00
.....	.....	47,307.00	.....	1,920.00
.....	18.00	16,153.00	.....	640.00
.....	.....	49,750.00	.....	2,500.00
.....	.....	49,250.00	.....	2,000.00
.....	.....	34,743.75	.....	1,750.00
.....	.....	23,406.25	.....	1,000.00
.....	11.00	56,054.00	.....	2,750.00
.....	.....	96,500.00	.....	4,000.00
.....	10.00	65,437.00	.....	2,925.00
.....	7.00	1,602.00	.....	67.50
.....	165.00	52,300.00	.....	2,125.00
.....	28.00	7,142.00	.....	292.50
.....	2.00	1,021.00	.....	45.00
.....	96.00	101,630.00	.....	5,000.00
.....	30.00	25,594.00	.....	1,125.00
.....	342.00	107,526.00	.....	4,500.00
20,000.00	.....	20,000.00	1,438.89	1,563.33
47,250.00	.....	47,250.00	165.28	.....
.....	.....	63,630.00	.....	3,060.00
.....	.....	50,000.00	.....	2,500.00
.....	.....	100.00	.....	5.00
.....	.....	50,305.75	.....	2,550.00
.....	10.00	17,210.00	.....	680.00
.....	370.00	104,817.00	.....	5,000.00
.....	30.00	25,370.00	.....	1,250.00
.....	5.00	50,100.00	.....	2,500.00
.....	.....	1,750.00	.....	.....
.....	.....	35,000.00	.....	.....
.....	444.00	100,000.00	.....	5,000.00
25,000.00	.....	25,000.00	.....	963.37
100,000.00	.....	100,000.00	43.05	.....
.....	.....	16,830.00	.....	850.00
.....	.....	990.00	.....	50.00
.....	.....	25,000.00	.....	1,250.00
.....	.....	18,250.00	.....	1,250.00

Schedule H. (*Continued*)

Bonds	*Description of Securities*	*Due*	*Balance at beginning of year*
$5,000.00	Empire Gas & Fuel Co. 6%	1926	$4,475.00
4,000.00	Everett, City of, 4%	1922–25	.....
1,000.00	Franklin, Town of, 4%	1921	1,000.00
112,000.00	General Electric Co. 6%	1940	105,840.00
63,000.00	General Electric Co. 5%	1952	64,953.00
47,000.00	Georgia Ry. & Electric Co. 5%	1932	47,781.00
100.00	Georgia and Southern Utilities 6%	1932	100.00
1,000.00	Georgia and Southern Utilities 8%	1921	1,000.00
85,000.00	Great Britain and Ireland 5½%	1937	86,253.00
50,000.00	Hydraulic Power Co. 5%	1951	.....
68,000.00	Illinois Central R.R. Co. 4%	1951	62,817.50
75,000.00	Illinois Central R.R. Co. 4%	1952	67,875.00
7,000.00	Illinois Gas Co. 6%	1933	5,460.00
25,000.00	Indianapolis Union Ry. Co. 5%	1965	24,906.25
50,000.00	Interboro Rapid Trans. Co. 5%	1966	49,562.50
5,000.00	Intermountain Ry. Lt. & Pr. Co. 6%	1921	4,968.00
5,000.00	Intermountain Ry. Lt. & Pr. Co. 6%	1921	4,964.00
10,000.00	Intermountain Ry. Lt. & Pr. Co. 8%	1922	.....
2,000.00	Iowa Falls Elec. Co. 6%	1922	1,959.00
50,000.00	Kansas City, Mo., 4½%	1935	53,327.00
7,000.00	Kan. City, Clinton & Spfd. Ry. Co. 5%	1925	6,289.21
50,000.00	Kan. City, Ft. Scott & Mem. R.R. 6%	1928	52,543.00
8,500.00	Kan. City, Mem. & Birming. R.R. 4%	1934	8,287.50
37,000.00	Kan. City, Mem. & Birming. R.R. 5%	1934	34,225.00
50,000.00	Kan. City, Terminal 4%	1960	44,187.50
18,000.00	Kentucky Central Ry. Co. 4%	1987	17,910.00
85,000.00	Lake Shore & Mich. So. Ry. Co. 4%	1931	84,087.50
7,000.00	Laurentide Power Co., Ltd., 5%	1946	5,740.00
100,000.00	Long Island R.R. Co. 4%	1949	96,137.50
50,000.00	Los Angeles, City of, 4½%	1942	52,685.00
25,000.00	Los Angeles, City of, 4½%	1943	26,026.00
75,000.00	Maine Central Ry. Co. 4½%	1935	75,073.00
100,000.00	Massachusetts Gas Cos. 4½%	1931	96,812.50
5,000.00	Mattagami Pulp & Paper Co., Ltd. 6%	1937	4,000.00
66,000.00	Milwaukee Gas Light Co. 4%	1927	61,932.50
100,000.00	Milwaukee County 4½%	1927–32	103,750.00
50,000.00	Minneapolis Gen. Elec. Co. 5%	1934	50,385.00
100,000.00	Minn., St. Paul & Sault St. Marie 4%	1938	93,425.00
25,000.00	Mississippi River Power Co. 5%	1951	18,531.25
21,000.00	Missouri & Ill. Bridge & Belt R.R. Co. 4%	1951	13,650.00
25,000.00	Montreal, City of, Canada 5%	1936	25,000.00
50,000.00	New England Tel. & Tel. Co. 4%	1930	50,196.00
50,000.00	New England Tel. & Tel. Co. 5%	1932	50,731.00
52,000.00	N. Y. C. & H. R.R. Co. 4%	1998	46,046.65
14,000.00	New York Central R.R. 6%	1935	12,180.00
60,000.00	New York City 4¼%	1964	41,617.00
5,000.00	New York City 4½%	1967	4,625.00
100,000.00	N. Y. Connecting R.R. Co. 4½%	1953	98,625.00
31,200.00	N. Y., N. H. & H. R.R. Co. 6%	1948	34,212.00
55,000.00	N. Y. Telephone Co. 4½%	1939	53,130.86
33,000.00	Norfolk, Va., City of, 4%	1954	33,000.00
	Northern Pacific Gt. No. R.R. Co. 4%	1921	155,437.50
100,000.00	Northern Pacific Gt. No. R.R. 6½%	1936	.....
75,000.00	Northern Pacific Ry. Co. 4%	1997	67,875.00
25,000.00	Northwestern Bell Tel. Co. 7%	1941	.....

Schedule H. (*Continued*)

Purchases and charges during year	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
.....	.....	$4,475.00	.....	$300.00
$5,000.00	$1,000.00	4,000.00	.....	200.00
.....	.....	1,000.00	.....	40.00
.....	.....	105,840.00	.....	6,720.00
.....	63.00	64,890.00	.....	3,150.00
.....	71.00	47,710.00	.....	2,350.00
.....	.....	100.00	.....	6.00
.....	.....	1,000.00	.....	85.00
.....	78.00	86,175.00	.....	4,675.00
42,500.00	.....	42,500.00	$225.00	.....
.....	.....	62,817.50	.....	2,720.00
.....	.....	67,875.00	.....	3,000.00
.....	.....	5,460.00	.....	210.00
.....	.....	24,906.25	.....	1,250.00
.....	.....	49,562.50	.....	2,500.00
32.00	5,000.00	.....	.....	300.00
36.00	5,000.00	.....	.....	300.00
10,000.00	.....	10,000.00	.....	233.33
.....	.....	1,959.00	.....	120.00
.....	237.00	53,090.00	.....	2,250.00
.....	.....	6,289.21	.....	350.00
.....	362.00	52,181.00	.....	3,000.00
.....	.....	8,287.50	.....	340.00
.....	.....	34,225.00	.....	1,850.00
.....	.....	44,187.50	.....	2,000.00
.....	.....	17,910.00	.....	720.00
.....	.....	84,087.50	.....	3,400.00
.....	.....	5,740.00	.....	350.00
.....	.....	96,137.50	.....	4,000.00
.....	128.00	52,557.00	.....	2,250.00
.....	48.00	25,978.00	.....	1,125.00
.....	5.00	75,068.00	.....	3,375.00
.....	.....	96,812.50	.....	4,500.00
.....	.....	4,000.00	.....	300.00
.....	.....	61,932.50	.....	2,640.00
.....	419.00	103,331.00	.....	4,500.00
.....	30.00	50,355.00	.....	2,500.00
.....	.....	93,425.00	.....	4,000.00
.....	.....	18,531.25	.....	1,250.00
.....	.....	13,650.00	.....	840.00
.....	.....	25,000.00	.....	1,250.00
.....	21.00	50,175.00	.....	2,000.00
.....	66.00	50,665.00	.....	2,500.00
.....	.....	46,046.65	.....	2,080.00
.....	.....	12,180.00	.....	840.00
20,840.00	57.00	62,400.00	.....	2,550.00
.....	.....	4,625.00	.....	225.00
.....	.....	98,625.00	.....	4,500.00
200.00	122.00	34,290.00	.....	1,866.00
.....	.....	53,130.86	.....	2,475.00
.....	.....	33,000.00	.....	1,320.00
3,562.50	159,000.00	.....	10.00	7,226.11
96,500.00	.....	96,500.00	.....	2,312.50
.....	.....	67,875.00	.....	3,000.00
24,151.88	.....	24,151.88	51.04	17.50

Schedule H. (*Continued*)

Bonds, shares	*Description of Securities*	*Due*	*Balance at beginning of year*
$50,000.00	Omaha, Neb., City of, 4½%	1934	$53,073.00
50,000.00	Omaha, Neb., City of, 4½%	1941	53,959.00
50,000.00	Province of Ontario 5%	1926	50,000.00
84,000.00	Oregon R.R. & Navigation Co. 4%	1946	82,668.25
50,000.00	Oregon Short Line R.R. Co. 4%	1929	48,500.00
14,500.00	Oregon Short Line R.R. Co. 5%	1946	15,241.00
41,000.00	Ottawa, P. Q., City of, 4½%	1930	39,003.30
75,000.00	Pacific Tel. & Tel. Co. 5%	1937	73,915.10
18,000.00	Pennsylvania R.R. Co. 4½%	1960	18,585.00
100,000.00	Pennsylvania R.R. Co. 4½%	1965	101,029.00
117,900.00	Pere Marquette R.R. Co. 5%	1956	104,719.59
50,000.00	Philadelphia, City of, 4%	1947	51,518.00
25,000.00	Portland General Electric Co. 5%	1935	25,382.00
50,000.00	Portland, Ore., City of, 4½%	1945	50,830.00
1,000.00	Quincy Market Realty Co. 5%	1964	1,000.00
51,000.00	Rio Grande Western Ry. Co. 4%	1939	49,935.00
16,000.00	St. Louis & San Francisco Ry. Co. 4%	1950	.....
32,000.00	St. Louis & San Francisco Ry. Co. 5%	1950	.....
16,000.00	St. Louis & San Francisco Ry. Co. 6%	1955	.....
9,000.00	Salem, City of, 4%	1922–24	.....
11,000.00	Salem, City of, 4%	1921–24	.....
40,000.00	Salt Lake City, Utah, 4½%	1934	41,578.00
15,000.00	San Francisco, City of, 5%	1937	16,103.00
10,000.00	San Francisco, City of, 5%	1939	10,794.00
100,000.00	Savannah, Ga., City of, 4½%	1934–40	105,268.00
19,000.00	Seattle Electric Co. 5%	1929	18,430.00
1,000.00	Somerset Ry. Co. 4%	1955	850.00
100,000.00	Southern Bell Tel. & Tel. 5%	1941	101,197.00
45,000.00	Southern Calif. Edison Co. 5%	1939	44,550.00
25,000.00	Southern Ry. Co. 4%	1951	24,875.00
5,000.00	Southern Utilities Co. 6%	1933	3,900.00
50,000.00	St. Paul, City of, 4¼%	1936	51,925.00
25,000.00	Swift & Co. 5%	1944	22,625.00
200.00	Technology Club of N. Y. 5%	.....	.....
100,000.00	Terminal R.R. Assn. of St. Louis 4½%	1939	100,307.00
25,000.00	Terre Haute Traction & Light Co. 5%	1944	25,000.00
100.00	Toledo Terminal R.R. Co. 4½%	1957	75.00
50,000.00	Toronto City, of, 5%	1932	50,000.00
48,000.00	Trinity Buildings Corp. of N. Y. 5½%	1939	49,250.00
100,000'00	Turner's Falls Power & Electric Co. 7%	1925	100,000.00
100,000.00	Union Pacific R.R. Co. 4%	1947	100,986.00
8,000.00	United Gas & Elec. Corp. 6%	1945	4,240.00
	U. S. A. Ctf. of Indebtedness 5¾%	1921	.....
87,000.00	U. S. A. Ctf. of Indebtedness 5½%	1921	.....
671,400.00	U. S. A. Liberty and Victory Loans (All Issues)		619,500.00
94,000.00	U. S. Steel Corp. 5%	1963	98,564.00
1,000.00	Washington Co. R.R. Co. 3½%	1954	750.00
75,000.00	Western Tel. & Tel. Co. 5%	1932	75,777.00
25,000.00	Western Electric Co. 5%	1922	24,875.00
10,000.00	Western Pacific R. R. Co. 5%	1946	8,000.00
2,000.00	Winchester, Town of, 4%	1922–23	.....
2,000.00	Winchester, Town of, 4%	1900–23	.....
40,000.00	Winnipeg, Man., City of, 5%	1926	39,350.00
50,000.00	Winston-Salem Southbound Ry. 4%	1960	43,875.00
588 shares	Alaska Building Trust		58,800.00

Schedule H. (*Continued*)

Purchases and charges during year	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
.....	$236.00	$52,837.00	.....	$2,250.00
.....	198.00	53,761.00	.....	2,250.00
.....	.....	50,000.00	.....	2,500.00
.....	.....	82,668.25	.....	3,360.00
.....	.....	48,500.00	.....	2,000.00
.....	30.00	15,211.00	.....	725.00
.....	.....	39,003.30	.....	1,845.00
.....	.....	73,915.10	.....	3,750.00
.....	15.00	18,570.00	.....	810.00
.....	23.00	101,006.00	.....	4,500.00
.....	.....	104,719.59	.....	5,895.00
.....	58.00	51,460.00	.....	2,000.00
.....	27.00	25,355.00	.....	1,250.00
.....	34.00	50,796.00	.....	2,250.00
.....	.....	1,000.00	.....	50.00
.....	.....	49,935.00	.....	2,040.00
$9,600.00	.....	9,600.00	.....	320.00
32,000.00	.....	32,000.00	.....	800.00
16,000.00	.....	16,000.00	.....	480.00
10,000.00	1,000.00	9,000.00	.....	400.00
11,000.00	.....	11,000.00	.....	440.00
.....	121.00	41,457.00	.....	1,800.00
.....	69.00	16,034.00	.....	750.00
.....	44.00	10,750.00	.....	500.00
.....	353.00	104,915.00	.....	4,500.00
.....	.....	18,430.00	.....	950.00
.....	.....	850.00	.....	40.00
.....	60.00	101,137.00	.....	5,000.00
.....	.....	44,550.00	.....	2,250.00
.....	.....	24,875.00	.....	1,000.00
.....	.....	3,900.00	.....	300.00
.....	128.00	51,797.00	.....	2,125.00
.....	.....	22,625.00	.....	1,250.00
200.00	.....	200.00	.....	10.00
.....	17.00	100,290.00	.....	4,500.00
.....	.....	25,000.00	.....	1,250.00
.....	.....	75.00	.....	4.50
.....	.....	50,000.00	.....	2,500.00
.....	2,000.00	47,250.00	.....	2,750.00
.....	.....	100,000.00	.....	7,000.00
.....	38.00	100,948.00	.....	4,000.00
.....	.....	4,240.00	.....	480.00
38,000.00	38,000.00	.....	$971.77	1,098.58
87,000.00	.....	87,000.00	904.56	.....
65,150.00	13,250.00	671,400.00	.....	28,499.91
.....	14.00	98,550.00	.....	4,700.00
.....	.....	750.00	.....	35.00
.....	77.00	75,700.00	.....	3,750.00
.....	.....	24,875.00	.....	1,250.00
.....	.....	8,000.00	.....	500.00
2,000.00	.....	2,000.00	.....	80.00
2,000.00	.....	2,000.00	.....	80.00
.....	.....	39,350.00	.....	2,000.00
.....	.....	43,875.00	.....	2,000.00
.....	.....	58,800.00	.....	3,234.00

Schedule H. (*Continued*)

Shares	*Description of Securities*	*Balance at beginning of year*
15	American Bosch Magneto Corp.	$9,225.00
50	American Linen Co.	.....
5	American Public Utilities Co.	.....
50	American Sugar Ref. Co. Pfd.	.....
82	American Tel. & Tel. Co.	6,113.12
330	Amoskeag Mfg. Co. Pfd.	7,890.00
342	Amoskeag Mfg. Co. Com.	3,266.00
608	Atch., Top & S. F. Ry. Co. Com.	.....
336	Atch., Top & S. F. Ry. Co. Pfd.	.....
500	Baldwin Locomotive Works, Com.	55,000.00
141	Batopilas Mining Co.	141.00
100	Beacon Trust Co.	.....
	Booth Fisheries Co., 1st Pfd.	315.00
21	Borden City Mfg. Co.	.....
340	Boston & Albany R.R. Co.	60,911.50
192	Boston & Maine R.R. Co. 1st Pfd.	11,699.00
198	Boston Elevated Ry. Co. Com.	640.00
25	Boston Elevated Ry. Co., Pfd.	425.00
68	Boston Real Estate Trust	71,661.64
41	Boston Woven Hose & Rubber Co. Com.	6,781.52
	Boston Woven Hose & Rubber Co. Pfd.	2,340.00
32	Buffalo, Roch. & Pitts. Ry. Co. Com.	.....
155	Cambridge Gas Light Co.	.....
	Central Wharf & Wet Dock Corp.	18,900.00
93	Chi., Milawukee & St. Paul Ry. Co. Pfd.	7,367.00
	Chi., Milwaukee & St. Paul Ry. Co. Com.	3,168.00
32	Chicago, R. I. & Pac. Ry. Pfd.	.....
	Chicago & Northwestern Ry. Co. Com.	3,733.75
	Congress St. Associates	3,880.00
2	Co-operative Publishing Co.	2.00
100	Copper Range Co.	.....
600	Corning Glass Works Pfd.	.....
	Dallas Elec. Co. 1st Pfd.	114.00
32	Delaware & Hudson Co.	.....
	E. I. du Pont de Nemours Co. Com.	736.14
500	Eastern Mfg. Co. Pfd. 7%	49,000.00
	Essex Co.	3,780.00
25	Federal Trust Co.	.....
37	Fulton Iron Works, Com.	3,034.00
300	General Electric Co.	.....
100	Goodyear Tire & Rubber Co. Pfd.	10,000.00
31	Great Falls Mfg. Co.	3,092.53
84	Hamilton Woolen Co.	5,390.00
	Hood Rubber Co.	4,720.00
	Illinois Central R.R. Co.	1,890.00
37	King Philip Mills	.....
115	Lake Copper Co.	.....
83	Lancaster Mills	9,642.64
48	Lehigh Valley R.R. Co.	.....
7	Libby, McNeill & Libby	.....
78	Lincoln Mfg. Co.	.....
101	Maine Central R.R. Co.	9,740.00
50	Mass. Gas. Cos. Pfd.	.....
600	Mexican Cons. Mining Co.	.....
176	Minn., St. Paul & S. S. M. Ry. Co.	.....

Schedule H. (*Continued*)

Purchases and charges during year	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
$1,425.00	$9,225.00	$1,425.00	.....	$2,081.25
4,000.00	.....	4,000.00	.....	825.00
112.50	.....	112.50	.....	.....
5,900.00	.....	5,900.00	.....	350.00
3,104.00	1.07	9,216.05	.....	592.00
19,581.50	.....	27,471.50	.....	360.00
22,019.50	.....	25,285,50	.....	552.00
51,680.00	.....	51,680.00	.....	2,736.00
25,200.00	.....	25,200.00	.....	840.00
.....	.....	55,000.00	.....	3,500.00
.....	.....	141.00	.....	.....
25,000.00	.....	25,000.00	.....	2,000.00
.....	315.00	.....	.....	8.75
2,312.77	.....	2,312.77	.....	483.00
8,010.00	.....	68,921.50	.....	2,975.00
3,000.00	.....	14,699.00	.....	384.00
16,636.00	640.00	16,636.00	.....	1,091.75
2,100.00	425.00	2,100.00	.....	192.50
.....	.....	71,661.64	.....	2,720.00
.....	.....	6,781.52	.....	430.50
.....	2,340.00	.....	.....	60.00
2,240.00	.....	2,240.00	.....	96.00
34,875.00	.....	34,875.00	.....	1,550.00
.....	18,900.00	.....	.....	546.00
.....	.....	7,367.00	.....	.....
.....	3,168.00	.....	.....	.....
2,464.00	.....	2,464.00	.....	112.00
.....	3,733.75	.....	.....	145.00
.....	3,880.00	.....	.....	140.00
.....	.....	2.00	.....	.....
6,700.00	.....	6,700.00	.....	50.00
59,124.58	.....	59,124.58	.....	1,200.00
.....	114.00	.....	.....	5.70
3,104.00	.....	3,104.00	.....	.....
.....	736.14	.....	.....	12.00
.....	.....	49,000.00	.....	3,500.00
937.17	4,717.17	.....	.....	81.00
3,450.00	.....	3,450.00	.....	225.00
.....	.....	3,034.00	.....	148.00
41,385.00	.....	41,385.00	.....	.....
.....	.....	10,000.00	.....	350.00
.....	.....	3,092.53	.....	372.00
2,800.00	52.08	8,137.92	.....	3,220.00
.....	4,720.00	.....	.....	210.00
.....	1,890.00	.....	.....	94.50
3,500.00	73.46	3,426.54	.....	454.50
1,610.00	.....	1,610.00	.....	.....
.....	.....	9,642.64	.....	830.00
2,256.00	.....	2,256.00	.....	126.00
57.06	.....	57.06	.....	26.00
7,800.00	.....	7,800.00	.....	1,287.00
.....	.....	9,740.00	.....	303.00
4,100.00	.....	4,100.00	.....	200.00
600.00	.....	600.00	.....	.....
9,680.00	.....	9,680.00	$124.36	352.00

Schedule H. (*Continued*)

Shares	*Description of Securities*	*Balance at beginning of year*
44	Nashua Mfg. Co. Pfd.	$4,400.00
500	Nashua Mfg. Co. Com.	27,911.51
3	National Grand Bank of Marblehead	324.00
36	New Eng. Tel. & Tel. Co.	4,682.97
65	N. Y. C. and H. R. R.R. Co.	5,760.63
3	N. Y., N. H. & H. R.R. Co.	3,870.00
	Northern Texas Elec. Co.	66.00
500	Norton Co. Pfd. 7%	50,000.00
	Ohio Cities Gas Co. Com.	2,375.00
88	Old Colony R.R.	7,290.00
77	Pepperell Mfg. Co.	6,845.50
144	Pere Marquette Ry. Co.	.....
63	Plymouth Cordage Co.	11,970.00
	Pray Building Trust	2,500.00
197	Pullman Co.	31,520.00
	Public Service Co. No. Ills., Com.	830.00
	Read Coddington Co.	915.00
11	Rivett Lathe and Grinder Co. Pfd.	935.00
3	Rivett Lathe and Grinder Co. Com.	105.00
86	Salem Gas Light Co.	.....
75	Samson Cordage Co.	5,000.00
500	Sanford Mills Pfd. 7%	50,000.00
1000	Scottish American Oil & Transport Co.	.....
	Somerset Hotel Trust	1,500.00
	South Terminal Trust	2,000.00
	Swift Compania Internacional	2,650.00
	Tampa Elec. Co.	220.00
26	Tecumseh Mills	.....
	Union Carbide & Carbon Corp.	5,040.00
	Union Mills, Inc.	2,500.00
100	Union Pacific R.R. Co. Com.	2,635.00
1600	United Fruit Co.	127,362.50
500	U. S. Steel Corp. Pfd.	55,162.50
250	U. S. Worsted Co. 1st Pfd. 7%	.....
200	Utah Cons. Mining Co.	.....
70	Vermont & Massachusetts R.R. Co.	8,680.00
25	Wamponoag Mills	.....
	Western Real Est. Trust	750.00
15	West End St. Ry. Co. Pfd.	.....
188	Westinghouse Elec. & Mfg. Co. Com.	9,106.54
100	Westinghouse Elec. & Mfg. Co. Pfd.	6,393.90
500	Winnsboro Mills, Pfd. 7%	51,000.00
100	Winona Copper Co.	.....
224	Wisconsin Cent. Ry. Co. Com.	.....
	Wisconsin Cent. Ry. Co. Pfd.	.....
	Deposits in Savings Banks	.....
	MORTGAGE NOTES:	
	E. V. & C. T. Bigelow 5%	$4,500.00
	Cambridge Tobacco Co. 6%	.....
	Samuel Carr et al. Trustees 6%	75,000.00
	Edward W. Fuller 6%	.....
	William Hennessey 6%	.....
	Manhattan Grocery & Provision Co. 6½%	.....

Schedule H. (*Continued*)

Purchases and charges during year	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
.....	.....	$4,400.00	.....	$308.00
.....	.....	27,911.51	.....	3,125.00
.....	.....	324.00	.....	24.00
.....	.....	4,682.97	.....	288.00
.....	.....	5,760.63	.....	325.00
$96.00	$3,870.00	96.00	.....	.....
2.96	68.96	.....	.....	3.00
.....	.....	50,000.00	.....	3,500.00
75.00	2,450.00	.....	.....	153.00
4,760.00	.....	12,050.00	.....	616.00
.....	.....	6,845.50	.....	1,078.00
8,640.00	.....	8,640.00	.....	540.00
.....	.....	11,970.00	.....	1,008.00
.....	2,500.00	.....	.....	.....
.....	.....	31,520.00	.....	1,576.00
.....	830.00	.....	.....	52.50
.....	915.00	.....	.....	.....
.....	.....	935.00	.....	33.00
.....	.....	105.00	.....	5.25
17,200.00	.....	17,200.00	.....	688.00
.....	.....	5,000.00	.....	600.00
.....	.....	50,000.00	.....	3,500.00
3,800.00	.....	3,800.00	.....	.....
141.31	1,641.31	.....	.....	45.00
.....	2,000.00	.....	.....	56.25
75.00	2,725.00	.....	.....	132.00
.....	220.00	.....	.....	10.00
3,562.00	.....	3,562.00	.....	468.00
.....	5,040.00	.....	.....	420.00
.....	2,500.00	.....	.....	150.00
9,600.00	.....	12,235.00	.....	800.00
.....	.....	127,362.50	.....	11,200.00
.....	.....	55,162.50	.....	3,500.00
25,000.00	.....	25,000.00	.....	.....
2,800.00	.....	2,800.00	.....	.....
.....	.....	8,680.00	.....	420.00
2,000.00	.....	2,000.00	.....	725.00
.....	750.00	.....	.....	21.00
1,125.00	.....	1,125.00	.....	60.00
.....	.....	9,106.54	.....	752.00
.....	.....	6,393.90	.....	400.00
.....	.....	51,000.00	.....	3,500.00
611.99	.....	611.99	.....	.....
7,168.00	.....	7,168.00	.....	.....
9,680.00	9,680.00	.....	.....	352.00
2,172.11	.....	2,172.11	.....	101.14
.....	.....	4,500.00	.....	225.00
30,000.00	.....	30,000.00	.....	1,800.00
.....	.....	75,000.00	.....	4,500.00
43,000.00	25,000.00	18,000.00	.....	2,630.00
147,500.00	.....	147,500.00	.....	4,425.00
75,000.00	.....	75,000.00	.....	.....

Schedule H. (*Continued*)

Description of Securities	*Due*	*Balance at beginning of year*
Chester J. O'Brien 6%		.....
Park Square Real Estate Trust Co. 4%		$250,000.00
W. H. Partridge 5%		7,000.00
REAL ESTATE:		
Avon Street Land and Building, Equity		$75,732.55
Huntington Avenue Land and Buildings		.....
Huntington Avenue Land and Buildings		.....
Huntington Avenue, Land and Buildings		.....
Newbury Street, Land and Buildings, Equity		61,763.29
Franklin Street, Land and Buildings, Equity		53,364.53
Dorchester, Land and Buildings, Equity		200.00
Income on Cambridge properties, sold		.....
		$8,312,700.47
INVESTMENTS, W. B. ROGERS MEMORIAL FUND:		
$25,000.00 Atchison, Top. & St. Fe Ry. Co. 4%	1995	$24,470.00
6,000.00 Baltimore & Ohio R.R. Co. 3½%	1925	5,310.00
40,000.00 Cedar Rapids Light & Power Co. 5%	1953	.....
7,000.00 Chesapeake & Ohio Ry. Co. 5%	1939	7,575.00
1,000.00 Chi., Burl. & Quincy R.R. 4%	1958	1,000.00
40,000.00 Chi., Junc. Rys. & U. Stock Yds. Co. 5%	1940	39,400.00
35,000.00 Fort St. Union Depot Co. 4½%	1941	34,825.00
31,000.00 N. Y. C. & H. R. R.R. 4%	1934	30,225.00
37,500.00 Pere Marquette Ry. Co. 4%	1956	37,500.00
24,000.00 Rome, Watertown & Ogdensburg R.R. 5%	1922	24,132.00
4,000.00 United Electric Securities Co. 5%	1940	4,026.00
		$208,463.00
INVESTMENTS, EBEN S. DRAPER FUND:		
$20,000.00 Chi., Mil. & St. Paul Ry. Co. 5%	2014	$20,376.00
16,000.00 Georgia Ry. & Elec. Co. 5%	1932	16,200.00
24,000.00 Indianapolis Union Ry. Co. 5%	1965	23,880.00
20,000.00 New York Tel. Co. 4½%	1939	19,395.00
20,000.00 Wilmington City Elec. Co. 5%	1951	19,600.00
		$99,451.00
INVESTMENTS, THOMAS WENDELL BAILEY FUND:		
Swift International Compania		$75.00
Libby, McNeil & Libby		37.06
Miscellaneous Oklahoma Properties		352.00
		$464.06
INVESTMENTS, TECHNOLOGY EDUCATIONAL ENDOWMENT FUND:		
5000 shares Eastman Kodak Co. Com.		$4,000,000.00
INVESTMENTS, JOY SCHOLARSHIP FUND:		
Massachusetts Hospital Life Insurance Co.		5,000.00
$5,000.00 Cedar Rapids Mfg. & Power Co. 5%	1955	.....

Schedule H. (*Continued*)

Purchases and charges during year	Sales and credits during year	Balance at end of year	Accrued interest, etc.	Income received
$50,000.00	.....	$50,000.00	.....	$3,000.00
.....	.....	250,000.00	.....	10,000.00
.....	.....	7,000.00	.....	350.00
.....	.....	$75,732.55	$7,415.14	9,452.36
34,100.00	.....	34,100.00	.....	2,251.12
27,000.00	.....	27,000.00	.....	2,118.74
26,900.00	.....	26,900.00	.....	2,011.37
32,340.06	$26,000.00	68,103.35	11,928.66	10,430.56
82,000.00	.....	135,364.53	9,655.42	7,783.59
.....	.....	200.00	159.02	79.51
.....	.....	.....	.....	22,302.77
$1,781,635.89	$370,920.94	$9,723.415.42	$33,967.19	$495,221.49
.....	.....	$24,470.00	.....	$1,000.00
.....	.....	5,310.00	.....	210.00
$32,600.00	.....	32,600.00	$655.56	.....
.....	$32.00	7,543.00	.....	350.00
.....	.....	1,000.00	.....	40.00
.....	.....	39,400.00	.....	2,000.00
.....	.....	34,825.00	.....	1,575.00
.....	.....	30,225.00	.....	1,240.00
.....	.....	37,500.00	.....	1,500.00
.....	132.00	24,000.00	.....	1,200.00
.....	2.00	4,024.00	.....	200.00
$32,600.00	$166.00	$240,897.00	$655.56	$9,315.00
.....	$4.00	$20,372.00	.....	$1,000.00
.....	20.00	16,180.00	.....	800.00
.....	.....	23,880.00	.....	1,200.00
.....	.....	19,395.00	.....	900.00
.....	.....	19,600.00	.....	1,000.00
.....	$24.00	$99,427.00	.....	$4,900.00
.....	$75.00	.....	.....	.....
.....	37.06	.....	.....	.....
.....	352.00	.....	.....	.....
.....	$464.06	.....	.....	.....
.....	.....	$4,000,000.00	.....	$187,500.00
.....	.....	5,000.00	.....	237.50
$4,075.00	.....	4,075.00	$81.94	.....

Schedule H. (*Continued*)

Description of Securities	*Due*	*Balance at beginning of year*
INVESTMENTS, SUSAN H. SWETT SCHOLARSHIP FUND:		
Massachusetts Hospital Life Insurance Co.		$10,000.00
INVESTMENTS, RICHARD LEE RUSSEL FELLOWSHIP FUND:		
Fisk Wharf and Warehouse Trust		1,980.00
$2,000.00 Trinity Bldg. Corp. 5½%	1939	.....
INVESTMENTS, JONATHAN WHITNEY FUND:		
$25,000.00 American Thread Co. 6%	1928	$27,187.00
25,000.00 Atchison, Topeka & St. Fe Ry. Co. 4½%	1962	24,381.25
35,000.00 Chicago Union Station 4½%	1963	35,241.00
25,000.00 Detroit Edison Co. 5%	1933	25,358.00
25,000.00 Georgia Ry. & Electric Co. 5%	1932	25,460.00
25,000.00 General Elec. Co. 6%	1940	23,625.00
25,000.00 Ill. Central R.R. Co. 4%	1952	22,625.00
25,000.00 Maine Central Ry. Co. 4½%	1935	25,023.00
25,000.00 Montreal, City of, 5%	1936	25,000.00
25,000.00 New York City 4¼%	1964	26,114.00
25,000.00 New York Telephone Co. 4½%	1939	24,150.39
25,000.00 Swift & Co. 5%	1944	22,625.00
25,000.00 U. S. A. Liberty Loan 4¼%	1928	25,000.00
21,000.00 United Electric Securities Co. 5%	1940	21,078.00
25,000.00 Western Tel. & Tel. Co. 5%	1932	25,516.00
150,000.00 Mortgage Note, M. I. T. Dormitory		150,000.00
		$528,383.64
INVESTMENTS, MALCOLM COTTON BROWN FUND:		
$10,000.00 Met. West Side Elev. Ry. Co. 4%	1938	$4,100.00
15,000.00 Met. West Side Elev. Ry. Co. 4%	1938	6,750.00
		$10,850.00
INVESTMENTS, FRANK HARVEY CILLEY FUND:		
$5,000.00 Cedar Rapids Mfg. & Power Co. 5%	1953	.....
8,000.00 Electrical Securities Corp. 5%	1940	$7,960.00
10,000.00 New York City 4¼%	1964	10,420.00
5,000.00 St. Louis, Iron Mt. & So. R.R. 4%	1933	4,812.50
40 shares Boston & Albany R.R. Co.		8,000.00
10 " Boston & Providence R.R. Corp.		2,500.00
30 " Edison Elec. Illum. Co.		7,959.00
50 " Boston & Maine R.R. 1st Pfd.		5,000.00
75 " Massachusetts Gas Cos. Pfd.		6,825.00
50 " N. Y., N. H. & H. R.R.		4,700.00
25 " Springfield Ry. Cos. Pfd		2,125.00
50 " West End Street Ry. Co. Com.		3,600.00
South American Properties		1.00
Isabelle Aznive, Mortgage Note 6%		1,600.00
Jacob Levenson, Mortgage Note 5%		2,400.00
Total		$67,902.50

Schedule H. (*Continued*)

be- ear	*Purchases and charges during year*	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
.00	.....	.....	$10,000.00	.....	$475.00
.00	$20.00	$2,000.00	.....	.....	80.00
...	2,000.00	.....	2,000.00	.....	.....
.00	.....	313.00	26,874.00	.....	1,500.00
.25	.....	.....	24,381.25	.....	1,125.00
.00	.....	5.00	35,236.00	.....	1,575.00
.00	.....	29.00	25,329.00	.....	1,250.00
.00	.....	41.00	25,419.00	.....	1,250.00
.00	.....	.....	23,625.00	.....	1,500.00
.00	.....	.....	22,625.00	.....	1,000.00
.00	.....	2.00	25,021.00	.....	1,125.00
.00	.....	.....	25,000.00	.....	1,250.00
.00	.....	26.00	26,088.00	.....	1,062.50
.39	.....	.....	24,150.39	.....	1,125.00
.00	.....	.....	22,625.00	.....	1,250.00
.00	.....	.....	25,000.00	.....	1,062.50
.00	.....	4.00	21,074.00	.....	1,050.00
.00	.....	46.00	25,470.00	.....	1,250.00
.00	.....	.....	150,000.00	.....	6,750.00
3.64	.....	$466.00	$527,917.64	.....	$25,125.00
.00	.....	.....	$4,100.00	.....	$400.00
.00	.....	.....	6,750.00	.....	600.00
.00	.....	.....	$10,850.00	.....	$1,000.00
....	$4,075.00	.....	$4,075.00	$81.95	.....
.00	.....	.....	7,960.00	.....	$400.00
.50	.....	$10.00	10,410.00	.....	425.00
.00	.....	.....	4,812.50	.....	200.00
.00	.....	.....	8,000.00	.....	350.00
.00	.....	.....	2,500.00	.....	100.00
.00	.....	.....	7,959.00	.....	360.00
.00	.....	.....	5,000.00	.....	100.00
.00	.....	.....	6,825.00	.....	300.00
.00	.....	.....	4,700.00	.....	.....
.00	.....	.....	2,125.00	.....	100.00
.00	.....	.....	3,600.00	.....	175.00
.00	.....	.....	1.00	.....	.....
.00	.....	.....	1,600.00	.....	96.00
.00	.....	.....	2,400.00	.....	120.00
.50	$4,075.00	$10.00	$71,967.50	$81.95	$2,726.00

Schedule H. (*Continued*)

Description of Securities	*Balance at beginning of year*
*INVESTMENTS, PRATT FUND:	
American Linen Co.	$4,000.00
American Sugar Refining Co. Pfd.	5,900.00
Beacon Trust Co.	25,000.00
Border City Mfg. Co.	2,312.77
Boston Elevated Ry. Co.	18,736.00
Boston & Maine R.R. 1st Pfd.	3,000.00
Boston & Albany R.R.	8,010.00
Cambridge Gas Light Co.	34,875.00
Copper Range Co.	6,700.00
Federal Trust Co.	3,450.00
King Phillip Mills	3,500.00
Lake Copper Co.	1,610.00
Lincoln Mfg. Co.	7,800.00
Massachusetts Gas Companies	4,100.00
Mexican Cons. Mining Co.	600.00
Old Colony R.R. Co.	4,760.00
Salem Gas Light Co.	17,200.00
Tecumseh Mills	3,562.00
Utah Cons. Mining Co.	2,800.00
Wamponoag Mills	2,000.00
West End St. Ry. Co.	1,125.00
Winona Copper Co.	611.99
Boston, City of, 4%	15,000.00
Boston, City of, 4%	20,000.00
Everett, City of, 4%	5,000.00
New York City 4¼%	20,840.00
Salem, City of, 4%	10,000.00
Salem, City of, 4%	11,000.00
U. S. A. 4¼%	2,550.00
Winchester, Town of, 4%	2,000.00
Winchester, Town of, 4%	2,000.00
Deposits in Savings Banks	2,172.11
Edward W. Fuller, Mortgage Note 6%	43,000.00
Chester J. O'Brien, Mortgage Note 6%	50,000.00
Cambridge Tobacco Co. Mortgage Note 6%	30,000.00
Real Estate, Huntington Ave., Boston	34,100.00
Real Estate, Huntington Ave., Boston	27,000.00
Real Estate, Huntington Ave., Boston	26,900.00
Real Estate, Mass. Ave. and Prospect St., Cambridge	176,000.00
Real Estate, Prospect St. and Austin St., Cambridge	74,100.00
Real Estate, Massachusetts Ave., Cambridge	90,900.00
Real Estate, Franklin St., Boston	82,000.00
	$886,214.87

*All Pratt Fund Investments sold or transferred to General Investments.

Grand Total, Schedule D	$14,131,409.54

Schedule H. (*Continued*)

Purchases and charges during year	*Sales and credits during year*	*Balance at end of year*	*Accrued interest, etc.*	*Income received*
.....	$4,000.00	.....	.....	.....
.....	5,900.00	.....	.....	.....
.....	25,000.00	.....	.....	.....
.....	2,312.77	.....	.....	.....
.....	18,736.00	.....	.....	.....
.....	3,000.00	.....	.....	.....
.....	8,010.00	.....	.....	.....
.....	34,875.00	.....	.....	.....
.....	6,700.00	.....	.....	.....
.....	3,450.00	.....	.....	.....
.....	3,500.00	.....	.....	.....
.....	1,610.00	.....	.....	.....
.....	7,800.00	.....	.....	.....
.....	4,100.00	.....	.....	.....
.....	600.00	.....	.....	.....
.....	4,760.00	.....	.....	.....
.....	17,200.00	.....	.....	.....
.....	3,562.00	.....	.....	.....
.....	2,800.00	.....	.....	.....
.....	2,000.00	.....	.....	.....
.....	1,125.00	.....	.....	.....
.....	611.99	.....	.....	.....
.....	15,000.00	.....	.....	.....
.....	20,000.00	.....	.....	.....
.....	5,000.00	.....	.....	.....
.....	20,840.00	.....	.....	.....
.....	10,000.00	.....	.....	.....
.....	11,000.00	.....	.....	.....
.....	2,550.00	.....	.....	.....
.....	2,000.00	.....	.....	.....
.....	2,000.00	.....	.....	.....
.....	2,172.11	.....	.....	.....
.....	43,000.00	.....	.....	.....
.....	50,000.00	.....	.....	.....
.....	30,000.00	.....	.....	.....
.....	34,100.00	.....	.....	.....
.....	27,000.00	.....	.....	.....
.....	26,900.00	.....	.....	.....
.....	176,000.00	.....	.....	.....
.....	74,100.00	.....	.....	.....
.....	90,900.00	.....	.....	.....
.....	82,000.00	.....	.....	.....
.....	$886,214.87	.....	.....	.....
$1,824,405.89	$1,260,265.87	$14,695,549.56	$34,786.64	$726,579.99

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	530,009.16
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	146,975.52
Dormitories, Cambridge	331,357.67
Dormitories, Equipment	20,707.57
New Service Building	37,837.42
Miscellaneous and Undistributed	272,937.62
Total, June 30, 1921 (Schedule D)	$11,422,434.48

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	615,150.00
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 Roger's 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, 1921 (Schedule D)	$11,363,691.97

SCHEDULE P

ENDOWMENT FUNDS FOR GENERAL PURPOSES

Increases and Decreases of Funds for General Purposes

Invested Funds restricted	*Funds June 30, 1920*	*Investment income*	*Other increases or decreases of funds*	*Expenditures*	*Funds June 30, 1921*
George Eastman Building Fund	$2,500,000.00	$118,334.00	.....	$118,334.00	$2,500,000.00
Educational Endowment Fund	5,540,459.50	273,505.88	$457,793.79	273,505.88	5,998,253.29
General Endowment Fund	1,527,549.00	72,278.82	.....	72,278.82	1,527,549.00
George Robert Armstrong	5,000.00	236.67	.....	236.67	5,000.00
Charles Choate	33,932.63	1,609.36	.....	1,609.36	33,932.63
Eben S. Draper	100,000.00	4,900.00	.....	4,900.00	100,000.00
Martha Ann Edwards	30,000.00	1,420.20	.....	1,420.20	30,000.00
William Endicott	25,000.00	1,183.35	.....	1,183.35	25,000.00
Jonathan French	25,212.48	1,183.35	.....	1,183.35	25,212.48
James Fund	163,654.21	7,763.78	.....	7,763.78	163,654.21
Katharine B. Lowell	5,000.00	236.67	.....	236.67	5,000.00
M. I. T. Alumni Fund	6,409.86	331.34	2,469.25	.....	9,210.45
Richard Perkins	50,000.00	2,366.70	.....	2,366.70	50,000.00
John W. and Belinda L. Randall	83,452.36	3,928.72	.....	3,928.72	83,452.36
William B. Rogers	250,225.00	8,659.44	.....	8,659.44	250,225.00
Saltonstall Fund	49,408.23	2,319.37	.....	1,739.53	49,988.07
Samuel E. Sawyer	4,764.40	222.47	.....	222.47	4,764.40
William J. Walker	23,663.59	1,136.02	.....	1,136.02	23,663.59
Albion K. P. Welch	5,000.00	236.67	.....	236.67	5,000.00
Unrestricted					
Sidney Bartlett	$10,000.00	$473.34	.....	$473.34	$10,000.00
A. F. Bemis	10,000.00	473.34	.....	473.34	10,000.00
Stanton Blake	5,000.00	236.67	.....	236.67	5,000.00
Helen Collamore	12,483.97	568.01	.....	568.01	12,483.97
Charles C. Drew	64,000.00	2,130.03	241,171.52	232,130.03	75,171.52
Maria A. Evans	.....	.....	35,300.00	35,300.00	.....
Arthur T. Lyman	5,000.00	236.67	.....	236.67	5,000.00
James McGregor	2,500.00	118.34	.....	118.34	2,500.00
Albert K. Munsell	.....	331.34	7,378.24	331.34	7,378.24
Margaret A. Munsell	.....	9.47	1,105.32	9.47	1,105.32
Nathaniel C. Nash	10,000.00	473.34	.....	473.34	10,000.00
Moses W. Oliver	.....	47.33	8,220.49	47.33	8,220.49
Frank E. Peabody	522.22	1,467.35	51,716.67	51,467.35	2,238.89
Frances M. Perkins	16,525.00	781.01	.....	781.01	16,525.00
Robert E. Rogers	7,680.77	359.74	.....	359.74	7,680.77
Richard B. Sewall	30,000.00	1,420.02	.....	1,420.02	30,000.00
Seth K. Sweetser	25,061.62	1,183.35	.....	1,183.35	25,061.62
Horace W. Wadleigh	.....	47.33	2,143.14	47.33	2,143.14
Charles G. Weld	15,000.00	710.01	.....	710.01	15,000.00
Alexander S. Wheeler	30,000.00	1,420.02	.....	1,420.02	30,000.00
	$10,672,504.84	$514,339.52	$807,298.42	$828,728.34	$11,165,414.44

One-fourth net income added to fund.

SCHEDULE Q

ENDOWMENT FUNDS FOR DESIGNATED PURPOSES

Increases and Decreases of Funds for Designated Purposes

Invested Funds	*Funds June 30, 1920*	*Investment income*	*Other increases or decreases of funds*	*Expenditures*	*Fu Jun 19*
FUNDS FOR SALARIES:					
Samuel C. Cobb For General Salaries . .	$36,000.00	$1,704.02	.....	$1,704.02	$36,0(
Sarah H. Forbes For General Salaries . .	500.00	23.67	.....	23.67	5(
George A. Gardner For General Salaries . .	20,000.00	946.68	.....	946.68	20,0(
James Hayward Professorship of Engineering	18,800.00	889.88	.....	889.88	18,8(
William P. Mason Professorship of Geology	18,800.00	889.88	.....	889.88	18,8(
Henry B. Rogers For General Salaries . .	25,000.00	1,183.35	.....	1,183.35	25,0(
Nathaniel Thayer Professorship of Physics .	25,000.00	1,183.35	.....	1,183.35	25,0(
Totals	$144,100.00	$6,820.83	.....	$6,820.83	$144,1(
FUNDS FOR LIBRARY READING ROOMS AND GYMNASIUM:					
Cilley Fund	$74,470.43	$2,644.05	.....	$184.30	$76,9
Charles Lewis Flint Library	5,000.00	236.67	.....	236.67	5,0(
William Hall Kerr Library .	2,140.90	94.67	.....	80.00	2,1
Arthur Rotch Architectural Library	5,000.00	236.67	.....	236.67	5,0(
John Hume Tod Fund . .	2,788.38	132.54	.....	170.12	2,7
Technology Matrons' Teas Fund	2,089.01	94.67	.....	89.01	2,0
Edna Dow Cheney for Margaret Cheney Reading Room	13,646.08	643.74	$350.00	1,220.00	13,4
Totals	$105,134.80	$4,083.01	$350.00	$2,216.77	$107,3
FUNDS FOR DEPARTMENTS:					
George Eastman for Chemistry and Physics	$400,000.00	$18,933.60	.....	$18,933.60	$400,0
William P. Atkinson . .	13,082.20	615.34	.....	615.34	13,0
Frank W. Boles Memorial .	17,556.92	804.68	.....	1,253.65	17,1
Samuel Cabot (Industrial Chemistry)	66,586.15	3,076.71	.....	3,347.20	66,3
Wm. E. Chamberlain Fund	6,000.00	312.40	$1,309.77	312.40	7,3
Chem. Eng. Practice Fund .	308,300.01	13,537.52	3,446.65	42,511.21	282,7
Susan E. Dorr Fund . . .	95,955.67	4,544.06	.....	4,544.06	95,9
George H. May Chem. Dept.	5,000.00	236.67	.....	236.67	5,0
Pratt Naval Arch. Fund . .	978,034.72	24,423.35	69,000.00	615,292.00	456,1
Arthur Rotch Architectural Fund	25,000.00	1,183.35	.....	1,183.35	25,0
*Edmund K. Turner Fund .	210,698.00	9,940.14	.....	7,965.11	212,6
Totals	$2,126,213.67	$77,607.82	$73,756.42	$696,194.59	$1,581,3

* One-fourth net income added to fund.

Schedule Q. (*Continued*)

Invested Funds	*Funds June 30, 1920*	*Investment income*	*Other increases or decreases of funds*	*Expenditures*	*Funds June 30, 1921*
FUNDS FOR RESEARCH:					
Ellen H. Richards Research Fund	$15,873.21	$752.61	.....	.....	$16,625.82
Charlotte B. Richardson (Industrial Chemistry)	37,825.49	1,751.36	.....	$2,198.07	37,378.78
Technology Plan Research	8,100.00	378.67	$4,687.19	4,043.88	9,121.98
Whitney Fund	43,497.36	2,035.36	.....	.....	45,532.72
Totals	$105,296.06	$4,918.00	$4,687.19	$6,241.95	$108,659.30
FUNDS FOR FELLOWSHIPS:					
Malcolm Cotton Brown	$11,350.00	$1,000.00	.....	$500.00	$11,850.00
Collamore Fund	11,953.07	568.01	.....	130.00	12,391.08
Dalton Graduate Chemical	5,765.02	269.80	.....	250.00	5,784.82
du Pont Fellowship	.....	.....	$750.00	750.00	.....
Graselli Fellowship	.....	.....	750.00	750.00	.....
Moore Fund	6,205.20	293.47	.....	.....	6,498.67
Willard B. Perkins	9,076.19	426.01	.....	.....	9,502.20
*Monsanto	.....	.....	.....	232.00	232.00
Richard L. Russell	2,416.57	80.00	.....	30.00	2,466.57
Henry B. Rogers	.....	804.68	10,000.00	.....	10,804.68
Henry Saltonstall	10,779.60	511.20	.....	470.00	10,820.80
James Savage	14,029.62	648.48	.....	917.00	13,761.10
Susan H. Swett	10,945.45	475.00	.....	400.00	11,020.45
Totals	$82,520.72	$5,076.65	$11,500.00	$4,429.00	$94,668.37
FUNDS FOR SCHOLARSHIPS:					
Elisha Atkins	$5,377.85	$255.60	.....	$250.00	$5,383.45
Billings Student Fund	52,764.51	2,508.71	.....	2,400.00	52,873.22
Jonathan Bourne	10,542.72	520.67	.....	450.00	10,613.39
Lucius Clapp	5,285.23	250.87	.....	250.00	5,286.10
Lucretia Crocker	58,785.79	2,792.71	.....	.....	61,578.50
Isaac W. Danforth	5,448.56	255.60	.....	250.00	5,454.16
Ann White Dickinson	42,900.83	2,035.36	.....	1,800.00	43,136.19
Farnsworth Fund	5,432.30	255.60	.....	250.00	5,437.90
Graselli Scholarship	.....	.....	$500.00	500.00	.....
Charles Lewis Flint	5,499.81	260.34	.....	250.00	5,510.15
Sarah S. Forbes	3,598.25	170.40	.....	135.00	3,633.65
George Hollingsworth	5,320.13	250.87	.....	250.00	5,321.00
T. Sterry Hunt	3,263.59	156.20	.....	135.00	3,284.79
William F. Huntington	5,457.40	255.60	.....	250.00	5,463.00
Joy Scholarships	10,000.00	392.23	.....	392.23	10,000.00
Income Joy Scholarships	4,792.37	.....	392.23	.....	5,184.60
Letter Box Fund	137.96	.....	5.50	.....	143.46
William Litchfield	5,473.30	260.34	.....	250.00	5,483.64
Elisha T. Loring	5,483.09	260.34	.....	250.00	5,493.43
George H. May	4,868.70	236.67	131.30	225.00	5,011.67
James H. Mirrlees	3,056.07	142.00	.....	125.00	3,073.07
Nichols Fund	5,432.30	255.60	.....	250.00	5,437.90
Charles C. Nichols	5,473.59	260.34	.....	250.00	5,483.93
John Felt Osgood	5,423.30	255.60	.....	250.00	5,428.90
Richard Perkins	56,631.66	2,698.04	.....	2,500.00	56,829.70
Thomas Sherwin	5,482.30	260.34	.....	250.00	5,492.64
Susan Upham	1,073.57	47.33	.....	45.00	1,075.90

* Overdraft

Schedule Q. (*Continued*)

Invested Funds	*Funds June 30, 1920*	*Investment income*	*Other increases or decreases of funds*	*Expenditures*	*Funds June 30, 1921*
Ann White Vose	$66,069.97	$3,124.05	.....	$3,500.00	$65,694.02
Louis Weissbein	4,197.08	208.27	.....	180.00	4,225.35
Frances Erving Weston	1,510.00	.....	$200.00	300.00	1,410.00
Samuel Martin Weston	210.00	.....	200.00	200.00	200.00
Totals	$394,982.23	$18,369.68	$1,429.03	$16,137.23	$398,643.71
Funds for Prizes:					
Roberta Boit	.....	$56.80	$5,000.00	.....	$5,056.80
Arthur Rotch Prize Fund in Architecture	$5,272.30	250.87	.....	$200.00	5,323.17
Arthur Rotch "Special" Prize Fund in Architecture	6,307.91	298.20	.....	200.00	6,406.11
Totals	$11,580.21	$605.87	$5,000.00	$400.00	$16,786.08
Funds for Relief:					
Architectural Society	$1,430.98	$66.27	.....	$50.00	$1,447.25
Edward Austin	415,553.81	19,690.62	.....	18,372.84	416,871.59
Thomas Wendall Bailey	2,690.03	108.87	.....	452.00	2,346.90
Levi Boles	11,694.97	568.01	.....	500.00	11,762.98
Bursar's Fund	7,003.68	307.67	$353.43	1,656.00	6,008.78
Mabel Blake Case	25,089.01	1,183.35	.....	.....	26,272.36
Dormitory Fund	2,981.72	142.00	.....	.....	3,123.72
Norman H. George	72,674.86	3,455.38	.....	1,000.00	75,130.24
Teachers' Fund	119,528.28	5,680.08	.....	3,573.39	121,634.97
Jonathan Whitney	535,791.89	25,125.00	.....	18,227.19	542,689.70
Morrill Wyman	77,336.85	3,644.72	.....	3,000.00	77,981.57
Totals	$1,271,776.08	$59,971.97	$353.43	$46,831.42	$1,285,270.06
Recapitulation:					
Funds for General Purposes	$10,672,504.84	$514,339.52	$807,298.42	$828,728.34	$11,165,414.44
Funds for Salaries	144,100.00	6,820.83	.....	6,820.83	144,100.00
Funds for Libraries, Reading Rooms and Gymnasiums	105,134.80	4,083.01	350.00	2,216.77	107,350.04
Funds for Departments	2,126,213.67	77,607.82	73,756.42	696,194.59	1,581,383.32
Funds for Research	105,296.06	4,918.00	4,687.19	6,241.95	108,659.30
Funds for Fellowships	82,520.72	5,076.65	11,500.00	4,429.00	94,668.37
Funds for Scholarships	394,982.23	18,369.68	1,429.03	16,137.23	398,643.71
Funds for Prizes	11,580.21	605.87	5,000.00	400.00	16,786.08
Funds for Relief	1,271,776.08	59,971.97	353.43	46,831.42	1,285,270.06
Grand Total	$14,914,108.61	$691,793.35	$904,374.49	$1,608,000.13	$14,902,275.92

SCHEDULE R

INCREASES AND DECREASES OF MINOR FUNDS

Invested Funds	*Funds June 30, 1920*	*Income*	*Other increases or decreases of funds*	*Expenditures 1920* *Salaries*	*Other*	*Funds June 30, 1921*
MINOR FUNDS:						
Aeronautics	.....	$1,445.32	.....	.....	.....	$1,445.32
A. T. & T. Library	$2,263.04	2,000.00	.....	$1,158.92	$531.27	2,572.85
Business Research	.....	1,600.00	.....	.....	.....	1,600.00
Chem. Eng. Special (2)	.....	.....	†$1,800.00	544.61	894.38	361.01
Course XV	148.80	105.00	.....	.....	141.90	111.90
E. E. Research	10,037.20	10,028.57	.....	5,770.63	11,659.93	2,635.21
Elec. Ry. Traffic	1,645.09	32.00	.....	.....	41.43	1,635.66
Jacques	803.53	.....	.....	.....	803.53	.....
Maclaurin Memorial	.....	1,496.00	.....	.....	.....	1,496.00
Medical Dept.	.....	.....	‡5,500.00	.....	106.52	5,393.48
Petroleum	.....	400.00	.....	.....	1.35	398.65
Presidents	710.43	.....	.....	.....	188.05	522.38
Applied Chemistry	* 1,781.59	85,960.49	§4,993.00	57,284.55	15,710.42	16,176.93
Organic Chemistry	1,745.53	.....	.....	.....	1,745.53	.....
Industrial Physics	.....	.....	‡6,400.00	2,332.78	726.69	3,340.53
Roentgen Ray	648.14	1,250.72	.....	4.31	144.24	1,750.31
Special Research No. 6003	.....	8,400.96	.....	322.88	8,094.08	* 16.00
Special Research No. 13101	.....	18,000.00	.....	42.50	6,425.25	11,532.25
Traveling Scholarship	*125.00	.....	¶3,675.00	.....	3,550.00	.....
U. S. Merchant Marine	.....	7,200.00	.....	.....	6,312.63	887.37
Total	$16,095.17	$137,919.06	$22,368.00	$67,461.18	$57,077.20	$51,843.85

* Overdraft.
† Appropriation from Cabot Fund.
‡ Appropriation from Current Funds.
§ Appropriation from { Current Funds $2,000.00. Richardson Fund $1,751.36. Cabot Fund $1,241.64.
¶ Appropriation from Austin Fund.

August 23, 1921.

Report of the Auditing Committee to the Corporation of the Massachusetts Institute of Technology.

This Committee reports that in carrying out its duties it has employed Messrs. Harvey S. Chase & Company, Certified Public Accountants, to examine the books and audit the accounts of the Treasurer and Bursar for the year ended June 30, 1921. The report of this Company is attached.*

The Committee has also made investigations as to the methods and procedure of the Accounting Department at the Institute and has satisfied itself as to its adequacy.

AUDITING COMMITTEE
MERTON L. EMERSON,
E. W. ROLLINS,
WILLIAM L. PUTNAM.

* See page 40.

SCHEDULE S

CURRENT SURPLUS

Balance, July 1, 1920	$94,439.23
Net decrease (Schedule A)	35,163.13
Balance, June 30, 1921 (Schedule D)	$59,276.10

Details of Losses and Gains, etc.

LOSSES AND CHARGES:	
Accounts Receivable — charged off	$2,082.29
Students' Fees and Deposits Receivable — charged off	1,511.45
Loss on sale of Stocks and Bonds	31,429.19
Inventory adjustment (Stock)	499.94
Lecture Notes (adjustment account previous year)	1,067.50
Miscellaneous Funds (adjustments account previous year)	1,253.29
Total (Schedule A)	$37,843.66

GAINS AND CREDITS:	
Inventories (not previously included)	$21,751.78
Gains on sales of Bonds and Stocks	4,712.91
Collections (previously charged off)	151.70
Students' Fees and Deposits (account of previous years)	565.17
Total (Schedule A)	$27,181.56

September 2, 1921.

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, 1921.

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, 1921 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 & COMPANY,
Certified Public Accountants.

1-22-1500-T.P.

Publications of the Massachusetts Institute of Technology

BULLETINS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Title	*Vol.*	*No.*	*Date of Publication*
General Information, Requirements for Admission	57	1	October, 1921
Scholarships, Fellowships and Prizes	57	1 Extra	October, 1921
Directory of Officers and Students, 1921-1922	57	2	December, 1921
President's Report for 1920-1921	57	3	January, 1922
Summer Session	56	4	March, 1921
Summer Surveying Courses at Camp Technology	56	5	March, 1921
Courses of Study and Subjects of Instruction	56	6	April, 1921
Graduate Study and Research	56	7	July, 1921
School of Chemical Engineering Practice X-A	56	8	December, 1920
Summer School of Chemical Engineering	56	9	December, 1920
Coöperative Course in Electrical Engineering, VI-A	55	10	April, 1920