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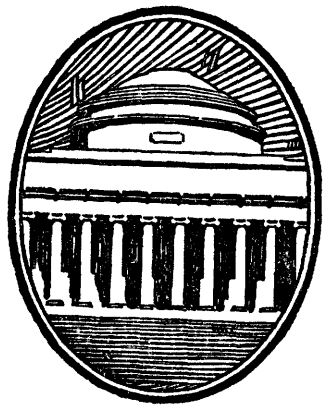

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REPORT OF THE PRESIDENT

TO THE MEMBERS OF THE CORPORATION:

In accordance with the by-laws of the Corporation, I have the honor to submit a report on the Massachusetts Institute of Technology for the past year, covering changes in personnel, development of educational policies, various important projects in the work of the several departments, some of the problems with which we are confronted, together with the reports of other administrative officers of the Institute with reference to the work of their offices.

The Institute has carried on through the present emergency without serious impairment of any of its educational processes. Strict economy has been necessary, various desirable projects have had to remain in abeyance, and the enrollment has decreased somewhat. The spirit of the Institute is, however, excellent and it is ready to proceed effectively in a careful and economical way in order that it may maintain and advance its position in education.

CHANGES IN PERSONNEL

The Corporation has been strengthened during the past year by the election to Life Membership of Charles Neave and Franklin A. Park. The only other changes have been due to the expiration of the terms of service of Messrs. Lammot du Pont, Frank B. Jewett and William S. Forbes, the benefit of whose counsel we greatly appreciate, and the election of Messrs. Louis S. Cates, Harold B. Richmond and Allan Winter Rowe as new Term Members to serve until June 1938.

There have been serious losses and important retirements in the Faculty. Professor Edward F. Miller, long Head of our Department of Mechanical Engineering, died on June 12. Professor William P. Ryan, one of the strongest younger men on the Faculty, and Head of the Department of Chemical Engineering, died suddenly on May 31. In addition, the Faculty has lost through death Professor Harrison W. Hayward of the Department of Mechanical Engineering, and Captain Louis R.

Knight, Assistant Professor in the Department of Military Science and Tactics.

Professor William A. Johnston of the Department of Mechanical Engineering has been retired on account of physical disability with the title Professor Emeritus. There have been several important retirements for age, each with the title of Professor Emeritus: Professors Robert P. Bigelow, W. Felton Brown, Davis R. Dewey, William Hovgaard, Waldemar Lindgren, John O. Sumner and Ervin Kenison. Mr. C. Howard Walker, Lecturer in Architecture, retired in June; as did Major Albert S. Smith, for many years Superintendent of Buildings and Power. An arrangement has been made, new to the Institute, whereby some of our notable Professors Emeriti have been made Honorary Lecturers, in order to maintain their contact in a desirable way with the activities of the Institute, and Professors Bigelow, Dewey, Hovgaard and Lindgren have been retained under this arrangement.

The Institute has been forced, during the past year, to continue the policy of making promotions and additions to the staff only in cases where this was necessary in order to maintain the organization. Accordingly the additions to the teaching staff of the Institute have again been few. Professor Charles M. Spofford has been granted a leave of absence, and Professor Charles B. Breed has been made Acting Head of the Department of Civil and Sanitary Engineering; Professor Ralph E. Freeman has been appointed Acting Head of the Department of Economics with rank of Professor; Professor Warren K. Lewis has been appointed Acting Head of the Department of Chemical Engineering; Professor Hervey W. Shimer has been appointed Acting Head of the Department of Geology; and Professor Henry E. Rossell has succeeded Professor Hovgaard in charge of the Course in Naval Construction.

Dr. Jerome C. Hunsaker, elected last year to the Corporation as a Term Member, and well known to this body, has been added to the Faculty as Head of the Department of Mechanical Engineering and in charge of the Course in Aeronautical Engineering. Other appointments are as follows: Lawrence B. Anderson, Assistant Professor of Architectural Design; Captain James F. C. Hyde and Captain Bayard Johnson, Assistant Professors of Military Science and Tactics; John L. Reid, Assistant

Professor of Freehand Drawing; Sir Raymond Unwin, Lecturer in City Planning, and Albert V. Smith, Superintendent of Buildings and Power.

Resignations in the Faculty have been as follows: Jacques Carlu, Professor of Architectural Design; Major Peter H. Ottosen, Associate Professor of Military Science and Tactics; Lieutenant Clarence L. Adcock, Assistant Professor of Military Science and Tactics; Daniel C. Sayre, Assistant Professor of Aeronautical Engineering; Theodore A. Mangelsdorf, Assistant Professor of Fuel Engineering, and Lepine H. Rice, Assistant Professor of Mathematics.

FINANCIAL STATUS

The report of the Treasurer will bring before you the operations and present situation in regard to the finances of the Institute. It has thus far proved possible to operate, in spite of a decreased enrollment and a decreased income from endowment, without any general cut in salary and without serious curtailment of the teaching staff or employees. This has been due to strict economy and the foregoing of numerous desirable activities throughout the Institute. Early in the academic year a salary reserve fund was set up, in which was placed ten per cent of all salaries of staff and employees, after an exemption of five hundred dollars, for the purpose of providing against a possible financial emergency and therefore avoiding more than a normal deficit. The Faculty committee on the Professors' Fund recommended that this fund be also made available if needed for the same purpose. At the end of the fiscal year, however, the Professors' Fund was left intact, it proved possible to return all of these deposits to the staff and the employees, and the Institute completed its operations with only a nominal deficit. It is too early to estimate accurately the situation for the present academic year. The budget was balanced at the beginning of the fiscal year but with no provision for contingencies. The salary reserve fund has again been put into operation. It is to be hoped that the improvement now evidenced throughout the world will continue and soon relieve the pressure, not only on ourselves, but on educational institutions generally.

ENROLLMENT

The total enrollment, which last year decreased nearly twelve per cent as compared with the preceding year, has again dropped about seven per cent, and now stands at 2,648. The staff and facilities of the Institute are adapted to care adequately for a somewhat larger number. The Institute has never desired an abnormal growth in numbers, but it is becoming increasingly evident that a stabilization of the total number of students is essential to effective and economical operation. Such stabilization can hardly be effected at the present time, when the numbers of students in institutions of higher learning in the United States are fluctuating widely due to economic conditions, but it should be attained as soon as practicable.

There will never be an excess of applicants of outstanding qualifications for admission. The Institute is striving to make its opportunities more readily available to students of promise, and should continue to do so, not with the object of greatly increasing its numbers, but with the far more important object of raising its standards. In this important activity the interest, enthusiasm and definite aid of the Alumni of the Institute are essential to success.

STUDENT AID

If the Institute is to attract, from the entire country and indeed from the entire world, those students best qualified to profit from its unusual advantages, the way must be made easier for capable students of limited financial means. A great step in this direction was taken with the establishment of the Technology Loan Fund, which has proved to be exceedingly helpful in the present emergency. Loans of $204,014 were made last year to students carefully selected for need, promise and reliability. Payments on previous loans are now coming in, although postponement of repayment has been necessary in the present stringency in many cases. There is every indication that, with a return to normal conditions, the Loan Fund will be completely self-sustaining.

Scholarship and fellowship funds granted to students during the year amounted to $136,474. In addition to these scholarships from special funds given to us for the purpose, the Executive Committee has made available for the year 1933–34 special

half-tuition graduate scholarships to the extent of $20,000, which will result in the addition of approximately eighty men to our Graduate student group, nearly all of whom could not otherwise have been enrolled.

The student employment service estimates that the earnings of students on temporary employment while pursuing their studies during the academic year amounted to $28,617.

It thus appears that a total of $369,105 was received by students during the past year in loans, scholarships and earnings, in addition to summer earnings which are difficult to estimate. This is more than twenty-five per cent of the total amount — $1,437,000 — received by the Institute from students for tuition and fees. There has thus been notable progress in the direction of making it possible for a talented student to obtain the Institute degree even though his financial resources may be severely limited.

EDUCATIONAL POLICIES

The Faculty is keenly alive to its responsibility in continuously improving the pedagogical processes of the Institute. Plans for special treatment adapted to the unique needs of outstanding students have received particular attention. For some years we have gained experience in this regard through the operation of Honors groups in a few departments, notably in Electrical Engineering. The results of this experience have been sufficiently promising to convince the Faculty that a similar procedure may well be extended throughout the Institute, and this has been provided for under the control of a Faculty committee. The amount of freedom which exists in the educational career of a student of ability is not always appreciated by those who know the Institute only slightly. There is a choice among about forty formal courses of study, and the present arrangements allow this choice to be made deliberately by a student as he proceeds through the Institute. Moreover, there is a provision whereby a student who wishes to study along special lines may arrange his own plans with the approval of a Faculty committee. In addition, in any department where the Honors Group system is in operation, an outstanding student is given advantageous freedom in his manner of handling subjects of

instruction, together with special conferences and the advice of counselors.

Another aspect of our work which is not apparent on casual inspection is the emphasis which the Faculty places upon subjects of a broadening nature. These so-called cultural subjects, together with those required studies of language and fundamental science which are usually considered as among the strongest broadening subjects of liberal arts education, comprise a very significant portion of the typical student's program.

There is a growing conviction on the part of the Faculty that we still err in allowing a student to carry on simultaneously too many courses of diverse nature, and that our more mature students are often burdened with more classroom work than is pedagogically sound. A Faculty committee has seriously studied this aspect of our work and plans to bring before the Faculty a proposal for simplification of the curriculum with these points especially in mind.

In the last analysis the excellence of teaching in an educational institution depends upon the skill and devotion of the individual members of its faculty, and no amount of formal mechanism will make up for a deficiency in this regard. This fundamental point of view is thoroughly appreciated throughout the Institute.

The Faculty committee on Patents and Patent Policy has further developed and clarified during the year the policy in this important respect. There are several matters now before the committee, involving patents concerned with research being carried on by the Institute, and which the committee is handling in accordance with the policy already approved by the Executive Committee.

INTERNAL ORGANIZATION

In the interests of simplification of organization, there have been several changes during the year. The course in Building Engineering and Construction has been placed under the direction of the Department of Civil and Sanitary Engineering, while maintaining its character of a distinct course of study. In a similar way the course in Aeronautical Engineering has been placed under the Head of the Department of Mechanical Engineering, although it will not lose its individuality nor its exist-

ence as a distinct aspect of our work. A project in the Division of Industrial Coöperation has developed into a treatment of Ceramics which is increasing in importance, and this has now been transferred to the Department of Mining and Metallurgy where it appears logically to belong. The recently established course in City Planning has been made a recognized activity of the School of Architecture.

During the year the Administrative and Faculty Councils developed three documents intended to clarify the policy of the Institute, improve the understanding of its organization, and provide for joint action of departments in matters of mutual interest. These have been reviewed by the Executive Committee and have become a part of the Institute's official policy.

The first of these concerns the selection of younger staff, their training and promotion. The second clarifies the duties and authority of heads of departments. The third provides for the creation of joint project committees to establish Institute programs in regard to activities which are in the field of more than one department. Under this last provision there are now at work Faculty committees to prepare Institute programs of teaching and research in the fields of Acoustics, Heat Transmission and the Corrosion of Metals.

PUBLIC SERVICE

The Institute's position as the outstanding institution of its kind in the country offers an opportunity and imposes an obligation to be of service in public matters, especially in connection with the State of Massachusetts and the cities of Boston and Cambridge. Aid is continually extended to these two cities in their problems by the various departments of the Institute, and appears to be much appreciated. There have been during the year a number of important projects which come under the heading of general serviceability to the public and which warrant special mention.

Early in the year the Mayor of Boston and Trustees of the Boston Public Library requested the Institute to advise them in connection with the problem of the Library foundations, in connection with the general problem of foundations and the ground water level situation in the Back Bay district. A committee under the chairmanship of Professor Norton coöperated

with various agencies, particularly with departments of the City Government, in a study of the situation. Apparently the source of trouble has been discovered and remedied and the danger to the foundations of the Library is no longer serious, and the expense to the City or the Library was minor. This committee however stands ready to assist further if there is future need.

A request from the Police Department of the City of Boston resulted in a comprehensive study of police signal systems, and a definite recommendation to the City of Boston of ways of modernizing and extending its system. This investigation was carried on by Professor Carlton E. Tucker under the direction of Professor Dugald C. Jackson, and has now been completed.

Professor Charles B. Breed conducted during the year, for the Highway Research Board of the National Research Council, an investigation of highway road costs in Massachusetts, the results of which were presented by him before the Board at its meeting in Washington in December, and have been published.

At the request of the Government, Professor Davis R. Dewey acted as arbiter in an important labor dispute. Numerous additional examples of such public service might be cited.

Under Executive Order by President Roosevelt there has been formed a Science Advisory Board for study and report upon the science services of the Federal Government. The President of the Institute is the Chairman of this Board, which is actively coöperating with government officials in planning for improved service and organization of the leading scientific bureaus, and is preparing recommendations of a more effective general policy of the Government with respect to scientific work.

PUBLIC RELATIONS

We believe that the maxim "The best defensive is a strong offensive," has application in educational as well as in military affairs. Consequently when faced with the prospect of a declining enrollment and a somewhat widespread feeling of uncertainty about the value of further emphasis on science and technology, we decided upon more vigorous methods of bringing home to the public three salient propositions in which we

strongly believe: first, further development of science and its applications to meet human needs is inevitable; second, an education based on science but with proper emphasis also on social science and human values, is an excellent preparation for the future whether this future lead to a professional career in the application of science or to a useful life in any other capacity; third, the Massachusetts Institute of Technology has to offer a superior training along these lines whose value should be considered by every ambitious boy and anxious parent.

With this background increasing attention has been given to publicity. In this, however, great care has been exercised to ensure that the publicity is dignified and of high calibre. The proper type of publicity for an educational institution is undoubtedly one which can be justified as of distinctly educational value. The following examples will illustrate the type of publicity which has been emphasized.

The New George Eastman Research Laboratories were dedicated from April 30 to May 2 with a scientific conference attended by distinguished scientists from the entire country. The principal addresses were by appropriate representatives of the Institute and by Professors Gilbert N. Lewis of the University of California, Arthur H. Compton of the University of Chicago, and Charles A. Kraus of Brown University. A special feature of the occasion was a reunion dinner attended by that remarkable group of physical chemists first gathered together by Professor Arthur A. Noyes in the early years of the Research Laboratory of Physical Chemistry, and who have become the leaders in the development of physical chemistry throughout the United States.

After an interval of two years Open House was again held on May 6, when more than twenty-five thousand people, principally school boys and parents, visited the Institute between two and ten o'clock. This was probably the largest and most successful occasion of its kind ever held and was run entirely by the students' Combined Professional Societies. On this occasion the most interesting apparatus and equipment of the Institute were on exhibition and the day was undoubtedly the most effective, from an educational point of view, on the entire year's calendar.

The lectures of the Society of Arts continue to be so popu-

lar that only about half of those who wish to attend can be accommodated, even though each lecture is given three times. The Sunday lectures have in addition proved to be of great interest to Alumni and friends of the Institute living in this vicinity.

Saturday visits to the Institute by groups of students and instructors from neighboring high and preparatory schools were made on every Saturday from February 11 to April 29, under the management of the Director of the News Service. Invitations were sent to the principals of 157 schools and were accepted by 684 students and instructors from forty of the leading schools of the neighborhood. Later comments from school principals stated that a gratifying result of these visits had been a decided improvement in the work and interest shown by the students in their science courses. On each Saturday a certain small group of exhibits was arranged.

A Technology cinema in three reels has been developed during the past year and is almost ready for release. Three committees of the staff have coöperated in what promises to be a most successful venture: a committee on scenario, a committee on production and a committee on distribution. This film portrays the experiences of a young man who comes to the Institute to inquire about the nature of its courses and activities and the types of career which such a course of training may open to him. A number of duplicates of this film are being prepared and will be distributed and shown through Technology Clubs, honorary secretaries and science teachers in schools. Here again the film has a distinct educational value apart from its portrayal of the Institute.

The Massachusetts Institute of Technology's exhibit at the Chicago Century of Progress was arranged at the invitation of the Century of Progress and sponsored by the Technology Club of Chicago. Seven hundred square feet of space in the Hall of Science was attractively decorated in the Technology colors and equipped with such interesting portable apparatus as the Van de Graaff high voltage generator, the high speed stroboscope and motion pictures, a small working model of a wind tunnel for airplane experiments, a new type of mercury lamp, a demonstration of molecular motion, a group of ship models, and numerous enlarged photographs of important

equipment at the Institute. Two recent graduates have been in charge of the demonstrations and the booth has served as a registration point for Institute students and alumni visiting the Exposition. By November 1 more than five hundred thousand people will have actually entered the booth and witnessed the demonstrations, and more than five hundred letters and accompanying literature have been sent from the office of the Director of Admissions to interested parties who have made inquiries regarding admission to the Institute.

A complete revision of the bulletins issued by the Institute has been undertaken. Between thirty and thirty-five thousand pieces of mail have been sent out during the year from the Information Office. Of special interest is the new pictorial bulletin on the Graduate Schools of Science and Engineering, of which about sixty-five hundred copies were sent to all undergraduate members of the honorary societies in engineering, physics, and chemistry throughout the country, and also to leading fraternity houses, members of the Society for the Promotion of Engineering Education, presidents and deans of engineering and scientific schools, and copies for distribution to each honorary secretary. This bulletin has created a great deal of favorable comment and has resulted in about five hundred inquiries regarding admission and several registrations this fall. Its good results will undoubtedly continue to be felt for some time.

Encouraged by the successful reception of this bulletin, Mr. Killian of the Technology Press has also undertaken the preparation of a corresponding undergraduate pictorial bulletin, which is now in the hands of the printer. The basic idea in these pictorial bulletins is to arouse interest through the pictures and to carry the desired message through the explanatory captions which accompany the pictures.

The visits of our Director of Admissions, Professor Tryon, to high and preparatory schools throughout the country have continued. During the past year ninety-seven schools were visited. The records show that about two hundred and fifty men who have studied at the Institute have had their first contact therewith through the visits and advice of Dr. Tryon. The practice of visiting secondary schools in this way, in order to acquaint them directly with our activities, has now been in operation for seven years.

The Technology Press of the Massachusetts Institute of Technology has recently secured registration of the title "The Technology Press." During the past year it has published three books: "A Survey of Progress in Textile Research"; "The Theory of Functions as Applied to Engineering Problems"; and "The Evolving House, Volume I, A History of the Home," by our fellow member Mr. Bemis, and his Associate, Mr. Burchard. There are also in process of publication a book on pumps and turbines, one on waterway engineering and the second volume of "The Evolving House."

A Spectroscopy Conference was held from July 17 to 21 under the direction of Professor Harrison of the Department of Physics, which was attended by about one hundred and fifty of the leading spectroscopists of this country and several from Europe. The program was devoted to four special topics, three in pure science and one in the applications of spectroscopy to industrial problems. The success of this conference greatly exceeded expectations, so that it is planned to make it an annual summer event. Many of the visitors took the opportunity to utilize the unique facilities of the new spectroscopy laboratory for research work during parts of the summer.

A dinner in honor of Professor Elihu Thomson on his eightieth birthday was the occasion of a distinguished gathering of scientists and industrialists, on March 29. A scientific conference was held in the afternoon and a dinner in the evening from which were broadcast the addresses of Governor Ely and Mr. George B. Cortelyou. Other speakers were: Harry P. Charlesworth, Dugald C. Jackson, Harvey Cushing, Vannevar Bush, E. W. Rice, Jr., and Elihu Thomson. An interesting feature of the occasion was an exhibition of some of Professor Thomson's early experimental apparatus and models.

The Institute's News Service, under the able direction of Mr. Rowlands, has issued three hundred thousand words of original copy during the year, not including material sent to special science and news writers. This represents about double the amount for the previous year. There has been a particularly marked increase in the use of Institute news by foreign papers and journals, especially in Germany and England, and there have been many more requests than ever before for material for national publications. Special attention has been devoted

to the sending of more news to Alumni groups, of news items to the home-town papers of individual students who have distinguished themselves through receiving scholarships or otherwise. The response of the local papers to this latter type of news has been particularly gratifying.

This summary will give some idea of the attention which has been devoted to educational public relations which are frankly of a promotional type and yet whose intrinsic value or interest is such as to justify attention to them. The beneficial results of this work are already evident but for the most part will be realized in the future through increased sympathetic interest in the Institute on the part of the general public.

ALUMNI AFFAIRS

A particularly important aspect of the Institute's public relations, which is at the same time a family affair for its own constituents, is the unusual number of contacts which have been made during the past year directly with alumni clubs. These include visits to about thirty clubs by the President of the Alumni Association, to nine by the President of the Institute,to seven by the Vice-President and to five by the Director of Admissions. Besides serving to maintain the desired contacts and friendly relations between the Institute in Cambridge and the Institute as represented by its alumni throughout the country, these visits have been a source of information in regard to ways in which the Institute and its alumni can be mutually more helpful. Statistics show, for example, that new students are coming to the Institute at about the rate which would be represented if each alumnus were responsible for sending to the Institute one student every forty years. This does not indicate a very effective recruiting activity by the alumni body as a whole, although there are numerous individuals and groups who have been very successful in this line. If, however, every alumnus would direct to the Institute one applicant for admission every twenty years the Institute would be in the highly advantageous position of being able to make a more careful selection of students on the grounds of personality and character as well as of scholarship. The opportunity to do this would go a long way toward solving some of the most difficult

problems of education, of placement and of reputation and service of the Institute in the world at large.

Conversely it is evident that the Institute can be of greater service to its alumni than in the past. This service includes such tangible features as an improved placement service which will follow up alumni after graduation and bring them continually in contact with opportunities for advancement and more advantageous location, and also such intangible service as comes from the spiritual forces maintaned by the personal relationships and contacts with the idealism of the Institute through more frequent contact by groups or by correspondence and literature.

An important step in this direction has been the appointment of a Placement Officer, Mr. John M. Nalle, who has given special attention to alumni placement since the early summer. Mr. Nalle has made personal contacts with many of the leading employers in Massachusetts, Washington and elsewhere. He is carrying on his work on the rigid principle of never recommending a man for a position unless he has assured himself that the man is thoroughly competent. His ideal is to build such a reputation that a prospective employer will have complete confidence that the man whom he recommends will be the best man available for the position. To this end Mr. Nalle is also coöperating with placement officers in other educational institutions in cases where special requirements cannot be met by Institute men on his lists. An essential feature of this work is the securing of adequate information in regard to alumni. To this end questionnaires were recently sent to all members of classes from 1920 to 1929 inclusive.

RESEARCH PROJECTS

It is impossible here to mention all of the research work by students and staff of the Institute which is adding prestige, contributing to human welfare, and at the same time providing a most valuable adjunct to the educational program of the Institute. This educational value is directly felt by those who participate in the work and is indirectly felt by the stimulus given to the entire body of staff and students. A bare mention of some of the outstanding investigations will give an idea of the scope and nature of these activities.

At the experimental station at Round Hill, with generous support from Colonel E. H. R. Green, a program of investigation of several years' duration on the physical and chemical properties of fog has reached a point at which practical applications of great value can reasonably be anticipated. Both theory and laboratory tests point to the possibility of opening holes in fogs through which beacon lights may be seen at landing fields.

Also at Round Hill the ten million volt electrostatic generator invented by Dr. R. J. Van de Graaff has reached completion except for final tuning up, and considerable progress has been made toward the construction of the necessary equipment for its utilization in experiments on atomic disintegration. One half of the cost of this development has been borne by the Research Corporation of New York. At the same time in the George Eastman Laboratories another modification of Dr. Van de Graaff's invention is being developed which gives promise of important practical applications in the field of x-ray therapy and also in the field of electric power transmission over large distances.

Research in hydraulics has been continued with the generous support of Mr. J. E. Aldred. The latest important work has been an investigation on the physical nature of cavitation and means of reducing its deleterious effects in water turbines. The Safe Harbor Power and Water Company has supported this work under the supervision of Professor Spannhake, for the past two years Visiting Professor of Hydraulic Engineering, and plans are being perfected to continue the work during the coming year. The goal is an increase in efficiency of turbines and a decrease in their cost of maintenance.

With joint support by the Guggenheim Fund and the Rockefeller Foundation the Institute's program of meteorological investigations, by means of special equipment carried daily in an airplane to an altitude of twenty thousand feet, is also bearing fruit, both scientifically and practically. Our meteorological staff mail to the Weather Bureau and others the only published daily analyses of American air masses. The great advantages of this method of weather prediction have come to be recognized in all quarters and there is reason to hope that within the year it may be extended into the govern-

ment's Weather Bureau Service in a general reorganization which will include coöperation of all the interested government departments with the civilian groups, notably those here and at the California Institute of Technology. One aspect of this reorganization will be the necessity of training a large number of men in this newer technique of meteorology in which the Institute has the leading position in this country.

Professor Edgerton's method of high speed photography and of stroboscopic examination of oscillating or rotating objects is finding wide application in the study and development of machinery and also in investigations of the motions of animals and other living organisms. Perhaps no aspect of the Institute's activity has received more attention in the photographic sections of the press.

The mechanical and electrical computing machines, developed by Dean Bush and his associates, are increasingly demonstrating their scientific and practical importance. The differential analyzer, for example, has been in constant use by members of the Departments of Electrical Engineeering, Physics and Mathematics. One of the leading astronomers of Europe, Professor Rosseland, came to the Institute under the auspices of the Rockefeller Foundation to spend two months in work with this machine preparatory to his undertaking the construction of a similar machine as the chief feature of a European Computing Institute. Similarly, Dr. Hartree, a leading British mathematical physicist of the University of Manchester, has spent some time at the Institute for a like purpose. During their stay both of these men have carried on important mathematical investigations with the aid of the machine.

The work of Professor Schwarz in textile microscopy has been of great importance in calling attention to the opportunities for study and improvement of textiles through use of the polarizing microscope.

Also of use in the textile industry has been the automatic quantitative color analyzer of Professor Hardy, with which there is in progress a comprehensive investigation of textile dyes which is leading to an accurate and convenient method of color specification and color matching. A similar investigation is being initiated to deal with printers' inks. The color analyzer has many other useful applications and will undoubtedly open

the way to a large range of scientific and technical studies.

Of great value to the scientific departments of the Institute has been the Rockefeller Fund which has been administered upon recommendation of a committee of two members from each of the Departments of Biology, Chemistry, Geology and Physics. Each of these departments has planned a program of research extending through several years, toward which the Rockefeller funds are applied as they become available. These Rockefeller grants will extend for three more years on a diminishing scale.

I cannot refrain from calling attention, as did our Visiting Committee last spring, to the remarkable achievements in research by our Department of Mathematics, which now takes its place among the three or four outstanding departments in the country. This special comment is made because, in the nature of the case, the Department of Mathematics has no experimental apparatus or important commercial applications to lend publicity to its work.

Finally, the Division of Industrial Coöperation has carried on effectively through the difficult period of the depression. As pointed out in my report last year, industries refrain from submitting their research problems to outside laboratories during periods of depression, bending every effort to do the necessary work with their own staffs. With the more optimistic trend and greater activity in industry, the Director of the Division of Industrial Coöperation reports an increasing number of contacts with industrial organizations, involving special research problems to be conducted at the Institute. The Visiting Committee of the Division has given careful and constructive consideration to the policies and opportunities in such work. It is our desire particularly to emphasize the advantage to industry in submitting to the Institute its research problems which are of an unusual character or which require the coöperation of experts in various fields and which are, therefore, impossible of satisfactory solution in an industrial laboratory without undue expenditure for special equipment or temporary personnel. Consideration should be given to the means of bringing the opportunities for this type of work more impressively home to the industrial organizations which have work to be done of the type which the Institute can advantageously undertake.

THE GRADUATE HOUSE

The most significant development in the operating plant of the Institute has been the setting aside of three dormitory units, Crafts, Nichols and Holman, to serve as a Graduate Students' House. This has been redecorated and newly furnished and includes a well-stocked library, and a lounge and kitchen. Dr. Avery A. Ashdown, of the Department of Chemistry, is resident Master of the House, whose affairs will be administered with the assistance of a House Committee, composed this year of Richard L. Fossett, Jr. '33, David B. Langmuir '31, Yale University, and Henry A. Rahmel '33.

The new House, which is filled to its capacity of seventy-six occupants and which has a long waiting list for admission, is expected to provide for graduate students those social contacts which are important in broad cultural development. Through it men of widely divergent professional interests but of equivalent intellectual outlook will be brought together in one group. The House Committee is making plans for a series of weekly dinner meetings, at which the graduate students will be addressed by men prominent in various fields of interest.

So far as we know, this is the first arrangement of this type in any technological school and one of the first in any educational institution. The graduate housing plan was introduced by Princeton University in 1915 and has proven an outstanding success.

A feature of immediate practical interest is the fact that these dormitory units, which were nearly vacant last year, are now occupied and the entire dormitory system of the Institute is filled to capacity.

SUMMARY

In conclusion it may truthfully be said that the general situation is very satisfactory and the outlook most encouraging. To be sure a number of important projects are being held in abeyance and the majority of the extensions of the Institute's work, which were recommended in the last report of our late colleague, Dr. Stratton, and in my report of two years ago, remain unaccomplished. On the other hand, the Institute is operating with an efficiency and enthusiasm and a spirit of idealism which are far more important than additional labora-

tories or endowments, and real progress has been made even through this depression in the quality of its educational processes and the importance of its fundamental contributions to knowledge and to human welfare. With this background and with the loyal coöperation of the staff there is every reason to look with confidence to the future.

A more complete record of the operations of the Institute will be found in the reports of its other administrative officers, and in the reports of the heads of departments of the three schools transmitted through the respective deans. These comprise the balance of the President's Report.

KARL T. COMPTON, *President.*

REPORTS OF ADMINISTRATIVE OFFICERS

Dean of Students. Conspicuous in the record of the year are: the very creditable academic accomplishments of the initial group of freshmen admitted under the so-called *upper fifth* plan, continued extraordinary demands for financial assistance by members of the student body, an administrative problem occasioned by vacancies in the dormitories, further improvement in the scholastic averages of activity and fraternity groups, and the maintenance of our athletic program in contrast to the drastic curtailments of schedules which many other institutions have been forced to make.

Of a total membership of 562, 88 of the Class of 1936 entered in September, 1932 without examination, on the basis of having ranked in the upper fifth of their secondary school classes during their last years of attendance. Only two of the 88 failed to finish the year and, as a group, these students averaged 3.31 under the Scholarship Rating System at the close of the first term and 3.39 in June. The corresponding averages for the remaining 474 members of the class (74 of whom failed to complete the year with satisfactory standing) were 2.97 and 3.05. Such a contrast quite obviously suggests that our present aim of attracting to the Institute more and more candidates who are qualified to matriculate under the upper fifth plan is well founded.

During the year 744 individuals — over one-quarter of the entire student body — sought assistance from the Technology Loan Fund. Of these requests 527, or 70.8 per cent, were granted against 495, or 73.6 per cent of the 673 applications filed in 1931–32. The total amount loaned from the Fund during 1932–33 was $203,780 or $25,108 more than in the previous year, an increase of almost 14 per cent.

During its first three years of operation, up to June 30, 1933, a total of $436,525 had been loaned to 925 individuals from this Fund. Also, up to that date, 214 individuals had made repayments to the Fund aggregating $17,932.99, a sum equal to 48 per cent of the total amount of matured notes.

When it is considered that all debtors to the Fund have been men three years or less out of the Institute this is indeed a creditable showing in view of the times.

In addition to the Technology Loan Fund the Institute has a number of smaller loan funds such as the Bursar's, Rogers, Dean's and Grimmons, some of which have been in operation for over twenty-five years. During 1932–33 loans totalling $11,617.23 were made from these miscellaneous funds and repayments of $12,129.05 were received.

Undergraduate scholarship awards for 1932–33 numbered 368 and amounted to $75,050. Forty-nine of these, carrying total stipends of $18,100, went to entering freshmen. The percentage of the undergraduate body receiving scholarship aid in 1932–33 was 15.9 as compared with 14.95 in 1931–32, 18.2 in 1930–31, 15.8 in 1929–30, 15.0 in 1928–29, and 13.7 in 1927–28.

Still another of the agencies for aiding students to solve their financial difficulties — the Undergraduate Employment Bureau of the Technology Christian Association — deserves particular mention because of its accomplishment during 1932–33 in the face of quite patent obstacles. It placed 181 students in positions where they earned over $28,600.

Due to a decline in registration, accompanied by an economic situation which obliged many students to live at home and commute to classes, it was not surprising that there were vacancies in the dormitories. To meet the condition certain measures were undertaken to make residence in the dormitories even more attractive than heretofore. Among these may be cited the introduction of more formal and informal social activities into dormitory life, the organization of two dining clubs (one named in honor of former Dean Alfred Edgar Burton), and the development of a broader program of intramural sports.

For the first time in the history of the Institute an attempt was made to effect an organization of the commuting students. This idea may, by bringing to the attention of this large group of our student body the benefits of living in closer association with their fellow-students, operate in time to induce more of the commuters to take up residence in the dormitories when they find themselves financially in a position to do so. It is interesting to observe in passing that this idea of perfecting a

"commuters' association" came about as a movement sponsored by some of the upper classmen living in the dormitories.

By far the most constructive and forward-looking measure designed to overcome the problem of dormitory vacancies, however, was the decision to reserve three of the four units of the older dormitory building as a "Graduate House" beginning with 1933–34. This proposal, praiseworthy on its own merit as a means to bring a sizable group of advanced students into closer contact with each other and with the undergraduate activities and student government system, should be a very considerable factor in overcoming the condition of surplus housing facilities. This "Graduate House" is to be under the supervision of a member of the Instructing Staff as resident master, who will also be a member of the Dormitory Board.

After a lapse of a year Open House was held on May 6, the function, as has been customary, being carried out ably under the direction of the student government through the Combined Professional Societies. Otherwise, except for a tentative revival of the Tech Show, no particular change is to be noted in the student activity system during 1932–33. The scale on which the production was presented three successive evenings in Walker Memorial was analogous to that on which Tech Show operated in the early days of the activity rather than to the somewhat elaborate program maintained during the several years preceding 1931 when the show's discontinuance came about through an accumulated deficit of not inconsiderable size. This year's trial performances were well received and paid expenses with a small margin of profit. Financially, all of the other major activities, with the exception of two publications which suffered small losses, completed the year satisfactorily.

The average scholastic record of 633 men engaged in 26 student activities was 3.42 in June of 1933; the corresponding average for 417 men in 22 activities being 3.36 in June of 1932. Improvement is also to be noted in the grades of fraternity men; 598 averaged 3.14 in June of 1933, while 622 averaged 3.10 in June of 1932.

The maintenance of the Institute's athletic program with but slight change during the past few years reflects credit upon the undergraduate management of the various teams and upon

the Alumni Advisory Council on Athletics. The carefully considered policies which the latter body, as the continuing group having ultimate responsibility for the conduct of the athletic program, laid down in its early days have now been steadfastfully adhered to for upwards of a quarter of a century. The soundness of these principles, not only as applied to the local problem at Technology, but to college athletics in general, have never been more amply demonstrated than during the present period of crisis through which many leading institutions are passing only with drastically curtailed schedules or heavy accumulated deficits.

In contrast, it has been possible for the Institute's students during 1932–33, as was also true of the previous two years, to carry out their schedules of meets as planned, except where modified by the cancellation of other colleges, and to close the year with an operating surplus of approximately $1,000. This sum will be applied toward a maintenance of the current program during 1933–34 when there is every expectation of a further curtailment in income because of a reduction in the Institute's registration.

It should be stated, however, that the satisfactory character of the above-mentioned showing is due primarily to the fact that various indirect grants from the Corporation suffered no abatement during the year. As these constitute something more than half of the total gross expenditure for athletic purposes, a reduction could have altered the picture considerably.

Technology athletics are conducted primarily not for the purpose of developing winning teams but to provide the means for giving wholesome exercise and recreation to as large a proportion of the student body as may be induced to participate. The value of intercollegiate competition, however, as a stimulative agency to build up larger squads for intramural athletics, has always been recognized. Consequently the success in maintaining schedules as planned will, it is hoped, be the condition in the future as it has been in the past.

H. E. LOBDELL.

Dean of the Graduate School. During the past year all matters pertaining to the graduate work of the Institute have been under the administration of the Graduate School. The plan of organization of the school, as outlined a year ago in the Dean's report, has functioned smoothly and efficiently. The coöperation of the Department Committees on Graduate Students through their liaison representatives on the Committee of the Graduate School has kept this Committee fully informed of the wishes and needs of the various departments in the Schools of Science, Engineering, and Architecture. The delegation of certain phases of the work to sub-committees has saved the Committee on the Graduate School much valuable time. This was particularly true in connection with the arduous task of allocating graduate scholarships and fellowships which this year presented unusual difficulties on account of the urgent need of so many applicants. The sub-committees have given unsparingly of their time to the consideration of matters referred to them. In particular, the services rendered by Professor Ryan, chairman of the sub-committee on graduate courses and instruction, should be here acknowledged. His presence and valued counsel will be sadly missed.

No changes of importance in admission, requirements for higher degrees, or in the conduct of graduate work have been made. The more rigorous requirements for admission and for the master's degree, adopted two years ago, have been maintained. It is the quality and not the number of our graduate students upon which the standing of the Graduate School depends.

The auspicious inauguration of the George Eastman Research Laboratories last April was an event which cannot fail to contribute to the future development of our graduate work in physics and chemistry. The unsurpassed facilities provided in these laboratories and the eminent group of men now working there have already made the laboratory a mecca for graduate students and for research fellows. It is very gratifying to note that during the past year eight national research fellows and two international research fellows chose this laboratory in preference to all others as the place for carrying on their work and the number who have signified their desire to come here this next year is still larger.

The most important development affecting the welfare of graduate students is the assignment of dormitories for the exclusive use of students of the Graduate School. These dormitories have been completely renovated and refurnished, with a general lounge and a library very attractively fitted up on the ground floor of Crafts, the end house facing the river. The project has most interesting possibilities.

The crying need of a dormitory with facilities for graduate students to get together socially has been repeatedly emphasized in the Dean's reports since 1928. Although the idea was favored by President Stratton it was not until this year that conditions have been such that the plan could be put into operation. The great success of the Graduate Houses at Princeton University was known to President Compton from personal observation and it is due to his enthusiastic support and efforts that the above plan, providing not only attractive living quarters but also facilities which will enhance the social life of our graduate students, has been made possible.

As was to be expected, the Graduate School suffered some decrease in registration from that of the preceding year. The figures for 1931 and 1932, as of November 1, are as follows:

	1931	*1932*
Doctor of Philosophy	66	84
Doctor of Science	85	65
Doctor of Public Health	2	0
Master of Science	386	332
Master in Architecture	12	9
	551	490

The decrease, it will be seen, is in the group of students registered for the master's rather than for the doctor's degree. Many graduates who were unsuccessful in obtaining employment desired to return for one year's further study but were unable to do so for financial reasons.

The national and international character of the graduate group is shown from data compiled in the Registrar's Report. During the past year there were representatives from 42 states,

the District of Columbia, Puerto Rico, and the 19 following countries:

Australia
Belgium
British West Indies
Canada
China
Cuba
Ecuador
France
Germany
Greece
India
Ireland
Japan
Manchuria
Palestine
Russia
Scotland
Siam
South Africa

The group includes graduates from 161 different universities and technical schools, of which 28 were in foreign countries. Fifty-eight per cent of all students working for the doctorate and 63 per cent of those working towards the master's degree took their first degree at other institutions. This percentage is slightly higher than a year ago.

Of the 149 students working for the doctor's degree 50 were on the Instructing Staff and of the 341 working for the master's degree, 18 held Staff appointments. Half-time positions as teaching fellows, open to men working for the doctor's degree, have proved very attractive and many more applications are received for these appointments than there are positions available.

During the past year the need of scholarship assistance was very great, while funds available for graduate students were reduced approximately 10 per cent, the total budget being $60,584. Four hundred and twenty-seven applications were received as compared with 334 in 1931; 164 awards were made in amounts varying from tuition to $1,500 fellowships. Of the students working for the Doctor's degree, 90, or 60 per cent of the total number, received graduate scholarship aid. Of the students working for the Master's degree, 50, or 17 per cent, received such aid. Thus a far greater proportion of students studying for the doctorate received scholarship assistance than did those working for the Master's degree. This is to be expected because of the much longer period of study required to obtain the former degree. Approximately 60 per cent of all available funds, including the endowed fellowships, were awarded to students pursuing studies leading to the doctorate.

In the assignment of awards every effort was made to assist students of outstanding ability. Recipients of Tau Beta Pi Fellowships, the National Engineering Honor Society, who desired to study at the Institute were all given scholarships covering their tuition. Notwithstanding the reduction in available funds, the exchange tuition scholarships with Germany and Switzerland were continued. We have also welcomed to the Graduate School this past year outstanding students from Belgium through the Commission for Relief in Belgium Educational Foundation and from England through the Commonwealth Fund.

The great need of additional fellowships carrying stipends of approximately $1,000 to finance students working for the doctorate is again emphasized. One or more such fellowships should be available for each department. Friends of certain departments have already made bequests establishing such memorial fellowships, or have provided special fellowships from year to year. It is hoped that this may be done for other departments, for there is no better way of encouraging the graduate work of a department than by making it possible for carefully selected students to carry on research. Acknowledgment should be made for the aid given graduate students through the Technology Loan Fund Board, the value of which cannot be overestimated. Many students would not have been able to carry on the past year without such assistance.

H. M. GOODWIN.

The Registrar. The first serious decrease in enrollment since 1926 occurred last year when the registration dropped from 3,188 to 2,831, a falling off of 357 or 11 per cent. This was due not only to the withdrawal of students who were without financial resources but also to the smaller registration in the recent entering classes. The freshman registration in the last three years has been 734, 628, and 562 respectively. The long uninterrupted rise in the number of graduate students ended, the registration for this group being 55 less than the previous year.

In the Science courses the number of students was 439, the same as in 1931–32; the registration in Architecture was 159, a

decrease of 31; and the Engineering courses suffered a loss of 298, reducing this group to 2,197.

The decrease varied in the several geographical groups. The numerical and percentage losses were as follows:

North Atlantic States	197	8%
South Atlantic States	13	9%
Central States	65	18%
Western States	31	28%
Foreign Countries	47	26%

The same situation prevailed as regards the schools from which the students came. The numerical and percentage decreases were as follows:

From Secondary Schools	34	6%
College Transfers entering Undergraduate work	62	30%
College Transfers entering Graduate work	44	24%
Former M. I. T. students entering after withdrawal	105	45%
M. I. T. Seniors returning for Graduate work	18	17%

The reduced registration last year was anticipated as college enrollment usually lags behind the business cycle. The first year of a business depression normally produces an increase in college registration as young men who are unable to find employment and have financial resources invest in education. As the depression progresses the savings of the unemployed are gradually reduced and the decline in registration ensues.

The present major decline in registration will be the third in the history of the Institute. The first one occurred in the depression of 1873–78, during which period the enrollment dropped from 348 to 188, a decrease of 46 per cent. The depression following the panic of 1893 lasted several years and although the registration did not decline it held within the narrow range of 1,157 to 1,198 during the seven years from 1893 to 1900. The depression in the 70's and the present one are similar but quite different from the one in the 90's. The major feature of the first two mentioned is a post-war price adjustment with extensive bank failures which deplete or actually "wipe out" the life savings of many people. The depression of the 90's, however, occurred at the trough of the long price cycle and the drop in prices was comparatively minor. The second major decline was the resultant deflation of the abnormal post-war rise in registration. This decline was from 3,505 in

the year 1921 to 2,671 in 1926, a drop of 834 or 24 per cent.

The estimated registration for the year 1933–34 is 2,400. At the present time it seems probable that the actual registration will be near this figure which will make the decrease about 25 per cent from the last peak registration of 3,209 in 1930. The present depression will probably be recorded in history as the longest since the one in the 70's and it would not be surprising if the decline in total registration were severe. Economic and social conditions are changing so rapidly and so little is really known about their effects on education that any attempt to chart a course should not be dignified by the term "estimate."

The Institute has never had a policy of limited registration. If colleges having limited enrollment have experienced less abrupt changes in registration, it would seem an opportune time for the Institute to adopt a policy of limiting the size of the freshman class.

The usual statistics for the year 1932–33 follows:

All statistics on registration are as of November 1, 1932
All statistics on degrees are through June, 1933

TABLE 1
THE CORPS OF INSTRUCTORS

	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	'31	'32
Faculty Members of the Staff	139	170	174	175	174	179	185	199	215	220	240	253	242
Professors	56	56	56	61	64	63	68	73	82	81	86	98	93
Associate Professors	34	35	40	43	42	49	55	58	61	59	63	68	60
Assistant Professors	49	54	48	46	51	53	51	58	64	71	80	79	81
Ex-Officio	—	—	—	—	—	—	—	—	—	2	4	3	3
Instructors	—	25	30	25	17	14	11	10	8	7	7	5	5
Other Members of the Staff	236	224	217	200	220	236	264	268	272	295	323	335	283
Instructors	109	84	80	92	98	112	116	115	119	116	123	133	105
Teaching Fellows	—	—	—	—	—	—	—	—	—	—	—	—	21
Assistants	79	93	87	60	59	53	63	55	53	68	70	96	45
Technical Assistants	—	—	—	—	—	—	—	—	—	—	—	—	28
Lecturers	14	15	15	6	16	21	23	30	29	32	32	34	28
Research Associates	19	19	19	25	26	21	24	29	22	21	31	31	32
Research Assistants	15	13	16	17	21	29	38	39	49	58	65	36	20
Research Fellows (D.I.C.R.)	—	—	—	—	—	—	—	—	—	—	2	5	3
Special Investigator	—	—	—	—	—	—	—	—	—	—	—	—	1
Total	375	394	391	375	394	415	449	467	487	515	563	588	525
Other Members of the Faculty	14	14	16	16	15	17	14	13	11	14	15	15	17
Professors: Emeriti	6	5	8	8	7	7	6	6	4	4	6	7	13
Retired	6	7	6	5	5	7	5	4	3	4	3	3	—
Non-Resident	2	2	2	3	3	3	3	3	4	6	6	5	4

TABLE 2
REGISTRATION SINCE THE FOUNDATION OF THE INSTITUTE

Year	Number of Students	Year	Number of Students	Year	Number of Students
1865–66	72	1888–89	827	1911–12	1,559
1866–67	137	1889–90	909	1912–13	1,611
1867–68	167	1890–91	937	1913–14	1,685
1868–69	172	1891–92	1,011	1914–15	1,816
1869–70	206	1892–93	1,060	1915–16	1,900
1870–71	224	1893–94	1,157	1916–17	1,957
1871–72	261	1894–95	1,183	1917–18	1,698
1872–73	348	1895–96	1,187	1918–19	1,819
1873–74	276	1896–97	1,198	1919–20	3,078
1874–75	248	1897–98	1,198	1920–21	3,436
1875–76	255	1898–99	1,171	1921–22	3,505
1876–77	215	1899–00	1,178	1922–23	3,180
1877–78	194	1900–01	1,277	1923–24	2,949
1878–79	188	1901–02	1,415	1924–25	2,938
1879–80	203	1902–03	1,608	1925–26	2,813
1880–81	253	1903–04	1,528	1926–27	2,671
1881–82	302	1904–05	1,561	1927–28	2,712
1882–83	368	1905–06	1,466	1928–29	2,868
1883–84	443	1906–07	1,397	1929–30	3,066
1884–85	579	1907–08	1,415	1930–31	3,209
1885–86	609	1908–09	1,461	1931–32	3,188
1886–87	637	1909–10	1,479	1932–33	2,831
1887–88	720	1910–11	1,506		

TABLE 3

Classification of Students by Courses and Years

Course Name and Number	1930–31 YEAR						1931–32 YEAR						1932–33 YEAR					
	1	2	3	4	G	Total	1	2	3	4	G	Total	1	2	3	4	G	Total
Aeronautical Engineering XVI	112	27	26	38	30	233	83	26	27	32	25	193	87	22	26	28	30	193
Architectural Engineering IV-A	19	18	17	13	5	72	7	15	12	18	1	53	5	5	13	9	2	34
Architecture IV	47	35	45	56	17	200	29	45	36	42	13	*165	18	25	31	38	13	*125
Army Ordnance	—	—	—	11	—	11	—	—	—	10	—	10	—	—	—	11	—	11
Biology and Public Health VII	13	16	21	28	21	99	11	21	18	23	27	100	11	19	20	21	23	94
Building Engineering and Construction XVII	16	26	22	18	—	82	14	17	15	20	1	67	8	12	15	9	1	45
Business and Engineering Administration XV	94	102	72	70	9	347	102	98	84	71	23	378	88	107	91	62	23	371
Chemical Engineering X	88	70	60	37	80	335	92	85	62	48	61	348	68	61	61	43	40	273
Chemical Engineering Practice X-A, X-B	—	—	—	10	59	69	—	—	—	7	47	54	—	—	—	3	39	42
Chemistry V	30	18	26	11	61	146	24	21	22	16	75	158	23	22	17	19	65	146
Civil Engineering I	47	46	39	52	33	217	37	38	40	42	53	210	35	23	33	44	35	170
Electrical Engineering VI	63	42	53	65	69	292	48	40	69	67	55	279	47	40	61	66	70	284
Electrical Engineering (Coöperative) VI-A	61	64	32	42	32	231	64	61	30	31	37	223	37	41	28	28	25	159
Electrochemical Engineering XIV	13	10	6	6	2	37	13	13	11	4	4	45	10	14	8	7	3	42
Fuel and Gas Engineering	—	—	—	—	11	11	—	—	—	—	9	9	—	—	—	—	—	—
General Engineering IX-B	4	5	14	23	—	46	1	3	11	28	—	43	4	5	7	16	—	32
General Science IX-A	3	1	1	4	—	9	—	2	—	2	—	4	1	—	4	5	—	10
Geology XII	1	1	3	3	9	17	—	2	2	4	12	20	2	—	3	4	11	20
Mathematics XVIII	6	4	6	3	10	29	4	7	3	7	11	32	3	3	7	6	12	31
Mechanical Engineering II	70	117	68	73	41	369	57	72	99	68	48	344	62	57	57	91	48	315
Metallurgy III$_{3,4}$	7	21	13	3	15	59	6	20	15	13	16	70	2	8	20	11	17	58
Mining Engineering III$_{1,2}$	10	11	10	12	3	46	9	10	8	9	8	44	5	9	10	7	5	36
Naval Architecture and Marine Engineering XIII	14	12	16	6	1	49	14	23	13	12	2	64	17	13	19	10	4	63
Naval Construction XIII-A	—	—	—	7	8	15	—	—	—	13	7	20	—	—	10	11	13	34
Physics VIII	7	23	21	9	18	78	10	36	21	23	35	125	23	23	38	15	39	138
Railroad Operation I-A	1	4	4	7	3	19	—	2	2	4	6	14	—	—	—	2	3	5
Sanitary Engineering XI	1	2	6	2	2	13	1	3	3	3	2	12	2	1	3	3	2	11
Ship Operation XIII-C	7	3	6	6	—	22	2	12	5	6	—	25	3	7	13	7	—	30
Unclassified	—	—	—	—	—	56	—	—	—	—	—	54	1	9	11	4	—	25
*Architecture (IV) Fifth Year	—	—	—	—	—	—	—	—	—	—	—	25	—	—	—	—	—	34
Totals	734	678	587	615	539	3,209	628	672	608	623	578	3,188	562	526	606	580	523	2,831

TABLE 4-A

Classification of Students by Courses, Options and Years

COURSE NO.	COURSE NAME	COURSE OPTION	YEAR 1 Opt.	YEAR 1 Tot.	YEAR 2 Opt.	YEAR 2 Tot.	YEAR 3 Opt.	YEAR 3 Tot.	YEAR 4 Opt.	YEAR 4 Tot.	GRAD. Opt.	GRAD. Tot.	TOTAL Opt.	TOTAL Tot.	COURSE NUMBER
I	Civil Engineering.	1. General	—		11		8		18		—				
		2. Transportation Engineering	—		8		10		12		—				
		3. Hydroelectric Engineering	—	35	4	23	14	33	13	44	—	35	—	170	I
		4. Geodesy & Seismology	—		—		1		1		—				
I-A	Railroad Operation		—	—	—	—	—	—	—	2	—	3	—	5	I-A
II	Mechanical Engineering		—	62	—	57	—	57	—	91	—	48	—	315	II
III	Mining Eng. & Metallurgy	1. Mining Engineering	4		6		10		6		5				
		2. Petroleum Production	1		3		—		1		—				
		3. Metallurgy	1	7	7	17	7	30	7	18	17	22	—	94	III
		4. Physical Metallurgy	1		1		13		4		—				
IV	Architecture		—	18	—	25	—	31	—	38	—	13	—	*125	IV
IV-A	Architectural Engineering		—	5	—	5	—	13	—	9	—	2	—	34	IV-A
V	Chemistry		—	23	—	22	—	17	—	19	—	65	—	146	V
VI	Electrical Engineering		—	47	—	40	—	43	—	49	—	70	—	249	VI
VI-C	Electrical Engineering (Communications Option)		—	—	—	—	—	18	—	17	—	—	—	35	VI-C
VI-A	Electrical Engineering (Coöperative)		—	37	—	41	—	28	—	28	—	25	—	159	VI-A
VII	Biology & Public Health	1. Biology & Public Health	11		11		10		13		—				
		2. Industrial Biology	—	11	6	19	9	20	5	21	—	23	—	94	VII
		3. Public Health Engineering	—		2		1		3		—				
VIII	Physics		—	23	—	23	—	38	—	15	—	39	—	138	VIII
IX-A	General Science		—	1	—	—	—	4	—	5	—	—	—	10	IX-A
IX-B	General Engineering		—	4	—	5	—	7	—	16	—	—	—	32	IX-B
X	Chemical Engineering		—	68	—	61	—	61	—	43	—	40	—	273	X
X-A	Chemical Engineering Practice — Graduate		—	—	—	—	—	—	—	—	—	39	—	39	X-A
X-B	Chemical Engineering Practice — Undergraduate		—	—	—	—	—	—	—	3	—	—	—	3	X-B
XI	Sanitary Engineering		—	2	—	1	—	3	—	3	—	2	—	11	XI
XII	Geology		—	2	—	—	—	3	—	4	—	11	—	20	XII
XIII	Naval Architecture & Marine Engineering		—	17	—	13	—	19	—	10	—	4	—	63	XIII
XIII-A	Naval Construction		—	—	—	—	—	10	—	11	—	13	—	34	XIII-A
XIII-C	Ship Operation		—	3	—	7	—	13	—	7	—	—	—	30	XIII-C
XIV	Electrochemical Engineering		—	10	—	14	—	8	—	7	—	3	—	42	XIV
XV	Business and Engineering Administration	1a. Civil Engineering	6		12		7		9		—				
		1b. Mech. & Elec. Engineering	48	88	49	107	56	91	35	62	—	23	—	371	XV
		1c. Industrial Practice	7		11		10		8		—				
		2. Chemical Engineering	27		35		18		10		—				
XVI	Aeronautical Engineering		—	87	—	22	—	26	—	28	—	30	—	193	XVI
XVII	Building Engineering and Construction		—	8	—	12	—	15	—	9	—	1	—	45	XVII
XVIII	Mathematics		—	3	—	3	—	7	—	6	—	12	—	31	XVIII
	Army Ordnance		—	—	—	—	—	—	—	11	—	—	—	11	A. O.
	Unclassified		—	1	—	9	—	11	—	4	—	—	—	25	Unc.
	*Architecture (IV) Fifth Year		—	—	—	—	—	—	—	—	—	—	—	34	IV(5thYr.)
Total				562		526		606		580		523		2831	Total

TABLE 4-B

CLASSIFICATION OF SPECIAL STUDENTS BY COURSES AND YEARS
(Included in Table 4-A)

COURSE	OPT.	YEAR					TOTAL	COURSE
		1	2	3	4	G		
I Civil Engineering		—	—	1	1	2	4	I
II Mechanical Engineering		—	—	—	10	8	18	II
III Mining Engineering and Metallurgy	1	—	—	—	—	1	1	III_1
IV Architecture		3	2	6	7	3	*21	IV
IV-A Architectural Engineering		—	—	1	—	—	1	IV-A
V Chemistry		—	—	—	1	5	6	V
VI Electrical Engineering		—	—	—	3	6	9	VI
VII Biology and Public Health	1	1	—	1	3	3	8	VII_1
	3	—	—	—	1	—	1	VII_3
VIII Physics		—	—	1	3	—	4	VIII
X Chemical Engineering		—	—	—	1	7	8	X
X-A Chemical Engineering Practice		—	—	—	—	3	3	X-A
XII Geology		—	—	—	2	1	3	XII
XIII Naval Architecture and Marine Eng.		—	—	3	—	1	4	XIII
XV Business and Eng. Administration		—	—	—	2	4	6	XV
XVI Aeronautical Engineering		—	—	—	1	4	5	XVI
Army Ordnance		—	—	—	11	—	11	A.O.
Unclassified		—	1	—	2	—	3	Unc.
*Architecture IV (Fifth Year)		—	—	—	—	—	5	IV (5th Yr.)
Total		4	3	13	48	48	121	

TABLE 4-C

CLASSIFICATION OF FORMER STUDENTS WHO RETURNED THIS YEAR
(Included in Table 4-A)

COURSE	OPT.	YEAR					TOTAL	COURSE
		1	2	3	4	G		
I Civil Engineering		—	3	1	3	3	10	I
II Mechanical Engineering		7	3	5	—	4	19	II
III Mining Engineering and Metallurgy	1	—	—	1	—	—	1	III_1
	3	—	—	1	1	1	3	III_3
	4	—	—	1	—	—	1	III_4
IV Architecture		—	—	1	6	1	8	IV
IV-A Architectural Engineering		—	1	2	1	—	4	IV-A
V Chemistry		—	1	—	—	3	4	V
VI Electrical Engineering		3	3	2	—	7	15	VI
VI-A Coöperative		1	—	—	—	—	1	VI-A
VI-C Communications		—	—	3	2	—	5	VI-C
VII Biology and Public Health	1	—	—	—	—	1	1	VII_1
	2	—	—	1	—	—	1	VII_2
VIII Physics		—	—	2	1	2	5	VIII
IX-B General Engineering		1	—	1	—	—	2	IX-B
X Chemical Engineering		—	1	1	1	1	4	X
XII Geology		—	—	—	—	1	1	XII
XIII Naval Architecture & Marine Eng.		—	—	2	—	—	2	XIII
XIII-C Ship Operation		—	—	1	—	—	1	XIII-C
XIV Electrochemical Engineering		—	1	—	—	—	1	XIV
XV Business and Eng. Administration		8	2	3	—	5	18	XV
XVI Aeronautical Engineering		—	—	—	—	2	2	XVI
XVII Building Eng. and Construction		—	1	—	—	—	1	XVII
XVIII Mathematics		—	—	—	—	1	1	XVIII
Unclassified		—	2	1	—	—	3	Unc.
Total		20	18	29	15	32	114	

Excluding 12 Special Students.

TABLE 5

Classification of Students by Courses since 1925

	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31	1931–32	1932–33
Engineering Courses . . . *Total*	2,423	2,253	2,240	2,305	2,405	2,564	2,495	2,197
Aeronautical Engineering XVI	15	72	170	224	278	233	193	193
Architectural Engineering IV-A	92	110	90	84	73	72	53	34
Building Engineering and Construction XVII	—	—	66	90	102	82	67	45
Business and Engineering Administration XV	365	334	307	303	299	347	378	371
Chemical Engineering X, X-A, X-B	294	286	300	318	384	404	402	315
Civil Engineering I, I-A	298	273	233	260	240	236	224	175
Electrical Engineering VI, VI-A, VI-C	711	622	554	513	484	523	502	443
Electrochemical Engineering XIV	58	50	55	50	47	37	45	42
Fuel and Gas Engineering	3	8	14	13	7	11	9	—
General Engineering IX-B	81	44	32	30	37	46	43	32
Mechanical Engineering II	365	329	297	283	303	369	344	315
Military Engineering	—	1	—	—	—	—	—	—
Mining Engineering and Metallurgy III	68	57	51	51	67	105	114	94
Naval Architecture and Marine Eng. XIII, XIII-C	39	35	39	55	56	71	89	93
Naval Construction XIII-A	19	15	15	12	14	15	20	34
Sanitary Engineering XI	15	17	17	19	14	13	12	11
Science Courses . . . *Total*	219	227	248	291	341	378	439	439
Biology and Public Health VII	41	36	51	68	93	99	100	94
Chemistry V	110	122	108	123	118	146	158	146
General Science IX-A	10	6	10	11	13	9	4	10
Geology XII	21	15	14	26	24	17	20	20
Mathematics XVIII	13	17	18	19	24	29	32	31
Physics VIII	24	31	47	44	69	78	125	138
Architecture IV . . . *Total*	133	150	189	218	228	200	190	159
Army Ordnance . . . *Total*	9	8	10	9	11	11	10	11
Unclassified . . . *Total*	29	33	25	45	81	56	54	25
Grand Total	2,813	2,671	2,712	2,868	3,066	3,209	3,188	2,831

TABLE 6
GEOGRAPHICAL CLASSIFICATION OF STUDENTS SINCE 1928

UNITED STATES	1928	1929	1930	1931	1932
North Atlantic . . . . . Total	2,098	2,241	2,361	2,375	2,178
Connecticut	81	89	76	81	72
Maine	47	45	41	54	45
Massachusetts	1,411	1,540	1,612	1,558	1,373
New Hampshire	41	36	32	39	41
New Jersey	96	105	109	113	118
New York	278	285	322	345	347
Pennsylvania	102	100	107	114	111
Rhode Island	26	25	43	54	55
Vermont	16	16	19	17	16
South Atlantic . . . . . Total	138	146	156	143	130
Delaware	10	8	15	12	8
District of Columbia	57	51	46	43	53
Florida	13	10	11	10	6
Georgia	7	6	5	4	2
Maryland	18	22	19	22	19
North Carolina	10	11	13	10	8
South Carolina	5	9	5	4	3
Virginia	12	23	33	27	27
West Virginia	6	6	9	11	4
South Central . . . . . Total	71	85	86	81	52
Alabama	6	8	6	11	7
Arkansas	2	4	6	3	2
Kentucky	14	15	13	12	10
Louisiana	5	12	10	10	8
Mississippi	4	4	5	4	4
Tennessee	8	9	11	11	5
Texas	32	33	35	30	16
North Central . . . . . Total	270	290	302	286	250
Illinois	80	86	83	64	58
Indiana	13	15	17	16	13
Iowa	8	10	8	11	7
Kansas	13	9	15	11	11
Michigan	24	35	43	27	28
Minnesota	14	13	20	20	14
Missouri	43	42	36	37	37
Nebraska	5	8	7	8	7
North Dakota	3	4	3	6	2
Ohio	50	53	58	66	58
South Dakota	—	—	—	—	2
Wisconsin	17	15	12	20	13
Western . . . . . Total	89	98	103	109	78
Arizona	4	5	3	4	1
California	32	27	30	39	31
Colorado	14	15	22	18	11
Idaho	3	2	2	3	2
Montana	7	9	8	6	4
Nevada	—	—	—	1	—
New Mexico	1	3	2	1	—
Oklahoma	3	5	8	7	7
Oregon	9	8	5	9	4
Utah	4	4	3	1	4
Washington	12	18	18	19	13
Wyoming	—	2	2	1	1
Territories and Dependencies . Total	19	19	20	12	8
Alaska	1	1	1	1	1
Canal Zone	—	—	—	1	1
Hawaii	3	4	4	5	4
Philippine Islands	8	7	6	3	—
Porto Rico	6	6	8	2	2
Virgin Islands	1	1	1	—	—
Total for United States	2,685	2,879	3,028	3,006	2,696

TABLE 6 (*Continued*)

Foreign Countries	1928	1929	1930	1931	1932
Total	183	187	181	182	135
Africa	—	1	—	—	—
Argentina	—	—	—	1	1
Australia	1	3	1	2	2
Austria	1	1	1	1	1
Bahamas	—	—	1	—	—
Belgium	1	3	1	2	3
Bermuda	1	1	—	—	—
Brazil	2	—	2	—	—
British West Indies	—	—	1	2	1
Canada	33	29	32	34	26
Chile	—	1	1	1	1
China	24	29	24	17	16
Colombia	10	6	6	6	5
Costa Rica	2	2	2	1	—
Cuba	7	6	10	14	9
Czechoslovakia	—	—	—	1	—
Denmark	1	1	1	1	1
Dominican Republic	—	1	1	—	—
Dutch East Indies	—	—	—	—	1
Ecuador	1	1	1	2	1
Egypt	2	3	2	1	—
England	3	5	7	3	1
Esthonia	1	1	1	—	—
France	3	4	5	4	4
Germany	3	8	7	5	2
Greece	—	1	1	—	—
Guatemala	—	—	1	—	—
Haiti	2	1	—	—	—
Hungary	—	—	—	—	1
Iceland	—	1	—	—	—
India	8	11	12	6	6
Irak	2	1	—	2	3
Ireland	1	—	1	1	1
Italy	1	1	2	—	—
Japan	10	5	6	5	4
Korea	1	1	—	—	—
Lithuania	1	3	1	2	—
Mexico	16	14	13	13	6
Netherlands	2	1	—	—	—
Norway	1	2	2	2	2
Palestine	3	4	3	4	3
Panama	8	8	7	3	3
Peru	2	1	1	3	2
Poland	—	—	—	1	1
Russia	3	2	—	25	20
Salvador	1	1	2	2	1
Scotland	1	1	—	1	—
Siam	3	5	4	3	1
South Africa, Union of	4	4	3	4	4
Spain	3	5	6	2	—
Straits Settlements	1	1	1	—	—
Sweden	1	1	2	2	—
Switzerland	1	1	1	1	—
Syria	3	—	2	—	2
Turkey	2	2	1	—	—
Venezuela	6	3	2	2	—
Grand Total, United States and Foreign	2,868	3,066	3,209	3,188	2,831

TABLE 7
Women Students Classified by Courses and Years

COURSE	YEAR					Total
	1	2	3	4	G	
Aeronautical Engineering XVI	1	—	—	1	1	3
Architectural Engineering IV-A	1	—	—	—	—	1
Architecture IV	3	1	2	10	—	16
Biology and Public Health VII	1	—	2	4	8	15
Chemistry V	2	—	1	—	4	7
General Science IX-A	—	—	1	—	—	1
Geology XII	—	—	—	—	1	1
Mathematics XVIII	—	1	—	—	1	2
Naval Architecture and Marine Engineering XIII	—	—	1	—	—	1
Physics VIII	—	1	—	—	1	2
Total	8	3	7	15	16	49

TABLE 8
Old and New Students

Year	1927–28	1928–29	1929–30	1930–31	1931–32	1932–33
Students registered at end of last academic year (including specials)	1,654	1,749	1,861	1,938	1,949	1,866
Students who have previously attended the Institute, but were not registered at end of last academic year	147	132	152	165	231	126
New students who entered by examination	465	483	549	609	526	403
New students who entered without examination	——	——	——	——	——	89
New students who entered from other colleges as candidates for degrees	381	417	434	421	395	289
New students (specials, not candidates for degrees)	65	87	70	76	87	58
Total	2,712	2,868	3,066	3,209	3,188	2,831

TABLE 8-A
New Students Admitted by Examination

Status of Admission	Year of Entrance				
	1928	1929	1930	1931	1932
Clear	298	319	419	373	288
1 Condition	105	134	110	81	72
2 Conditions	46	60	57	48	31
3 Conditions	27	25	21	16	7
More than 3 Conditions	7	11	2	8	5
Total	483	549	609	526	403

TABLE 9

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

College		College		College	
Alabama Polytechnic Inst.	3	Mount Holyoke	2	University of Cincinnati	3
Amherst	4	Municipal Univ. of Akron	1	University of Florida	1
Baker	1	Municipal Univ. of Wichita	1	University of Illinois	4
Bates	3	Muskingum	2	University of Iowa	1
Boston College	2	New Mexico Col. of A.&M.A.	1	University of Kansas	1
Boston University	1	New York	4	University of Maine	3
Bowdoin	3	Niagara	1	University of Michigan	6
Brigham Young	1	North Dakota Agricultural	2	University of Missouri	1
Brown	2	Northeastern	10	University of Montana	3
Bryn-Mawr	2	Northwestern	1	University of Nebraska	2
Bucknell	1	Oberlin	1	Univ. of New Hampshire	3
California Inst. of Tech.	4	Ohio Northern	1	Univ. of North Carolina	1
Carleton	2	Ohio State	1	University of Notre Dame	3
Carnegie Inst. of Tech	4	Ohio Wesleyan	1	University of Oklahoma	3
Case School of App. Sci.	2	Oklahoma Agr. and Mech.	1	Univ. of Pennsylvania	6
Catholic Univ. of America	1	Oregon State Agricultural	1	University of Pittsburgh	1
Centre	1	Pennsylvania State	9	University of Redlands	1
Clarkson Mem. Sch. of Tech.	1	Poly. Inst. of Brooklyn	1	University of Richmond	2
Colby	1	Pomona	3	University of Rochester	4
College of Puget Sound	1	Princeton	8	University of S. Carolina	1
Coll. of the City of N. Y.	1	Purdue	5	University of Texas	2
College of Wooster	1	Randolph-Macon	1	University of Utah	1
Colorado	1	Regis (Mass.)	2	University of Vermont	2
Columbia	3	Rensselaer Poly. Inst.	4	University of Virginia	2
Cornell	10	Rhode Island State	1	University of Washington	3
Dartmouth	13	Rice Institute	2	University of Wisconsin	3
Davidson	1	Rose Polytechnic Inst.	1	Vanderbilt	1
Drexel Institute	2	Rutgers	1	Vassar	3
Duke	1	St. Lawrence	2	Villanova	2
Emmanuel	1	St. Louis	1	Virginia Military Inst.	2
Franklin and Marshall	1	St. Mary's (Oakland, Cal.)	1	Virginia Polytechnic Inst.	2
Furman	1	St. Olaf	2	Washington and Lee	1
Georgia School of Tech.	3	Simmons	2	Wellesley	3
Hamilton (N. Y.)	1	Smith	1	Wesleyan	1
Hampden-Sidney	1	Southern Methodist	1	Western Reserve	1
Harvard	18	Stanford	9	Westminster College (Mo.)	1
Haverford	2	State Coll. of Washington	2	West Virginia	1
Holy Cross	3	Susquehanna	1	Williams	6
Hunter	1	Swarthmore	1	Woodstock	1
Iowa State Col. of A.&M.A.	2	The Citadel	1	Worcester Polytechnic Inst.	6
Kalamazoo	2	Trinity College (Hartford)	2	Yale	6
Kansas State Agricultural	2	Tri-State	1		
Kenyon	1	Tufts	7	Total	596
Lafayette	1	Tulane	2		
Lehigh	2	Union	1	Number of American Colleges Represented	143
Louisiana State	2	U. S. Military Academy	18	Number of Foreign Colleges Represented (Not listed)	42
Lowell Textile	1	U. S. Naval Academy	44		
Massachusetts State	3	University of Akron	1	Total	185
Mass. Inst. of Tech.	199	University of Alabama	1		
Miami	1	University of California	3		
Middlebury	1	University of Chicago	1		

TABLE 10

NEW STUDENTS ENTERING FROM OTHER COLLEGES AS CANDIDATES FOR DEGREES

Class Joined at the Institute	Years Spent at College				Total
	One	Two	Three	Four or more	
First year	34	8	1	3	46
Second year	15	17	3	5	40
Third year	—	4	5	33	42
Fourth year	—	—	—	18	18
Graduate year	—	—	6	137	143
Total	49	29	15	196	289

TABLE 11

Regular Students from Colleges Classified by Courses

COURSE	No Previous Degree			Graduates of Other Colleges					Graduates of M. I. T. Taking Graduate Work		
	Entered		Total	Entered				Total	S. B. Degree June 1932	Other Graduates	Total
				Sept. 1932		Previous Years					
	Sept. 1932	Previous Years		Undergrad.	Grad.	Undergrad.	Grad.				
Aeronautical Engineering XVI	7	11	18	1	17	3	3	24	4	2	6
Architectural Engineering IV-A	—	6	6	—	—	—	—	—	2	—	2
Architecture IV	6	20	26	4	6	14	1	25	2	1	3
Biology and Public Health VII	—	10	10	1	7	1	3	12	1	9	10
Building Engineering and Construction XVII	1	6	7	3	—	1	—	4	—	1	1
Business and Eng. Administration XV	14	40	54	3	5	7	2	17	5	7	12
Chemical Engineering X	13	32	45	—	11	1	13	25	5	4	9
Chemical Engineering Practice X-A	—	—	—	—	15	—	13	28	8	—	8
Chemical Engineering Practice X-B	—	2	2	—	—	—	—	—	—	—	—
Chemistry V	2	1	3	—	13	—	24	37	4	19	23
Civil Engineering I, I-A	7	23	30	1	13	6	10	30	8	5	13
Electrical Engineering VI, VI-A, VI-C	18	41	59	8	24	15	16	63	31	18	49
Electrochemical Engineering XIV	—	—	—	—	1	—	—	1	2	—	2
General Science IX-A	—	1	1	—	—	—	—	—	—	—	—
General Engineering IX-B	—	9	9	—	—	3	—	3	—	—	—
Geology XII	1	1	2	—	1	—	5	6	1	3	4
Mathematics XVIII	—	2	2	1	1	—	6	8	1	4	5
Mechanical Engineering II	9	29	38	4	13	9	9	35	6	12	18
Mining Engineering and Metallurgy III	—	13	13	1	2	1	11	15	2	6	8
Naval Architecture XIII, XIII-C	3	8	11	2	—	1	1	4	1	1	2
Naval Construction XIII-A	—	—	—	21	—	—	13	34	—	—	—
Physics VIII	3	7	10	1	14	—	9	24	5	11	16
Sanitary Engineering XI	—	1	1	—	—	—	1	1	1	—	1
Unclassified	7	6	13	3	—	—	—	3	—	—	—
Total	91	269	360	54	143	62	140	399	89	103	192

TABLE 12

NUMBER OF DEGREES AWARDED IN DECEMBER, 1932 AND JUNE, 1933

Name of Course	S.B.		B.Arch.		S.M.		M.Arch.		Ph.D.		Sc.D.		Totals	
	Dec. '32	June '33	Dec. '32	June '33	Dec. '32	June '33	Dec. '32	June '33	Dec. '32	June '33	Dec. '32	June '33	Dec. '32	June '33
Aeronautical Engineering	2	23	—	—	1	6	—	—	—	—	—	—	3	29
Architectural Engineering	1	9	—	—	—	2	—	—	—	—	—	—	1	11
Architecture	3	—	3	22	—	—	—	7	—	—	—	—	6	29
Biology and Public Health	—	8	—	—	—	—	—	—	—	1	—	—	—	9
Building Engineering and Construction	—	9	—	—	—	—	—	—	—	—	—	—	—	9
Business and Engineering Administration	2	52	—	—	3	2	—	—	—	—	—	—	5	54
Chemical Engineering	7	37	—	—	4	10	—	—	—	—	—	8	11	55
Chemical Engineering Practice	—	3	—	—	3	26	—	—	—	—	—	—	3	29
Chemistry	2	18	—	—	4	4	—	—	1	3	—	—	7	25
Civil Engineering	5	39	—	—	1	12	—	—	—	—	—	2	6	53
Electrical Engineering (Inc. VI-A)	17	70	—	—	12	33	—	—	—	—	—	2	29	105
Electrochemical Engineering	—	6	—	—	—	2	—	—	—	—	—	—	—	8
General Engineering	6	14	—	—	—	—	—	—	—	—	—	—	6	14
General Science	—	3	—	—	—	—	—	—	—	—	—	—	—	3
Geology	1	2	—	—	—	—	—	—	—	3	1	—	2	5
Industrial Biology	—	3	—	—	1	1	—	—	—	—	—	—	1	4
Mathematics	—	6	—	—	—	1	—	—	—	3	—	1	—	11
Mechanical Engineering	14	80	—	—	6	14	—	—	—	—	—	—	20	94
Metallurgy	2	8	—	—	1	1	—	—	—	—	—	3	3	12
Mining Engineering	1	6	—	—	—	—	—	—	—	—	1	1	2	7
Naval Architecture and Marine Engineering	1	6	—	—	—	1	—	—	—	—	—	—	1	7
Naval Construction	—	—	—	—	—	13	—	—	—	—	—	—	—	13
Physics	1	13	—	—	1	3	—	—	—	—	—	—	2	16
Public Health Engineering	1	1	—	—	—	—	—	—	—	—	—	—	1	1
Railroad Operation	—	—	—	—	1	3	—	—	—	—	—	—	1	3
Sanitary Engineering	1	2	—	—	—	1	—	—	—	—	—	—	1	3
Ship Operation	—	6	—	—	—	—	—	—	—	—	—	—	—	6
Without Course Classification	—	—	—	—	9	14	—	—	—	—	—	—	9	14
Totals	67	424	3	22	47	149	—	7	1	10	2	17	120	629

TABLE 13

DEGREES OF BACHELOR OF SCIENCE ACCORDING TO CLASS IN WHICH THEY WERE AWARDED

Class	Aeronautical Eng.	Architectural Eng ‡	Architecture	Biology or Natural History	Building Constr.	Business and Eng. Admin.	Chemical Eng.	Chemical Eng. Practice X-B	Chemistry	Civil Engineering	Electrical Eng. (Inc. VI-A)	Electrochemical Engineering*	General Eng.	General Science or General Course	Geology	Mathematics	Mechanical Eng.	Military Eng.	Mining Eng. and Metallurgy	Naval Arch.	Physics	Sanitary Eng.	Total	Total by Decades
1868	—	—	—	—	—	—	—	—	—	6	—	—	—	1	—	—	1	—	6	—	—	—	14	
1869	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—	—	2	—	—	—	—	—	5	
1870	—	—	—	—	—	—	—	—	1	4	—	—	—	1	—	—	2	—	2	—	—	—	10	29
1871	—	—	—	—	—	—	—	—	2	8	—	—	—	—	—	—	2	—	5	—	—	—	17	
1872	—	—	—	—	—	—	—	—	3	3	—	—	—	—	—	—	1	—	5	—	—	—	12	
1873	—	—	1	—	—	—	—	—	7	12	—	—	—	1	—	—	2	—	3	—	—	—	26	
1874	—	—	1	—	—	—	—	—	—	10	—	—	—	2	—	—	4	—	1	—	—	—	18	
1875	—	—	1	—	—	—	—	—	1	10	—	—	—	2	—	—	7	—	6	—	1	—	28	
1876	—	—	1	2	—	—	—	—	5	12	—	—	—	4	—	—	8	—	8	—	3	—	43	
1877	—	—	4	—	—	—	—	—	2	12	—	—	—	—	—	—	6	—	8	—	—	—	32	
1878	—	—	3	—	—	—	—	—	3	8	—	—	—	1	—	—	2	—	2	—	—	—	19	
1879	—	—	1	1	—	—	—	—	3	6	—	—	—	—	—	—	8	—	3	—	1	—	23	
1880	—	—	—	—	—	—	—	—	1	3	—	—	—	1	—	—	—	—	3	—	—	—	8	226
1881	—	—	3	1	—	—	—	—	8	3	—	—	—	2	—	—	5	—	6	—	—	—	28	
1882	—	—	3	1	—	—	—	—	6	2	—	—	—	1	—	—	5	—	5	—	1	—	24	
1883	—	—	1	—	—	—	—	—	3	3	—	—	—	—	—	—	7	—	5	—	—	—	19	
1884	—	—	—	—	—	—	—	—	12	5	—	—	—	—	—	—	6	—	13	—	—	—	36	
1885	—	—	2	—	—	—	—	—	4	4	2	—	—	1	—	—	7	—	8	—	—	—	28	
1886	—	—	1	1	—	—	—	—	7	9	10	—	—	1	—	—	23	—	7	—	—	—	59	
1887	—	—	1	1	—	—	—	—	9	10	8	—	—	3	—	—	17	—	8	—	1	—	58	
1888	—	—	5	3	—	—	—	—	10	11	17	—	—	1	—	—	25	—	4	—	1	—	77	
1889	—	—	3	1	—	—	—	—	8	14	17	—	—	2	—	—	24	—	5	—	1	—	75	
1890	—	—	5	3	—	—	—	—	13	25	18	—	—	6	—	—	28	—	3	—	2	—	103	507
1891	—	—	6	3	—	—	7	—	11	18	23	—	—	1	1	—	26	—	4	—	3	—	103	
1892	—	—	13	6	—	—	4	—	7	22	36	—	—	7	1	—	26	—	4	—	1	6	133	
1893	—	—	2	2	—	—	8	—	8	25	41	—	—	6	2	—	30	—	5	—	—	—	129	
1894	—	—	14	1	—	—	12	—	11	21	33	—	—	5	—	—	31	—	4	—	3	3	138	
1895	—	—	15	—	—	—	11	—	14	25	33	—	—	4	—	—	30	—	3	5	2	4	146	
1896	—	—	24	3	—	—	7	—	17	26	48	—	—	7	3	—	34	—	10	5	3	4	191	
1897	—	—	16	2	—	—	12	—	20	25	33	—	—	7	1	—	40	—	7	9	3	4	179	
1898	—	—	29	3	—	—	9	—	25	32	33	—	—	6	—	—	41	—	7	7	4	3	199	
1899	—	—	22	2	—	—	10	—	22	30	32	—	—	1	—	—	37	—	9	8	2	1	176	
1900	—	—	21	3	—	—	11	—	19	32	23	—	—	5	—	—	34	—	21	9	3	4	185	1,579
1901	—	—	21	1	—	—	14	—	17	37	25	—	—	6	1	—	39	—	18	16	1	4	200	
1902	—	—	18	5	—	—	9	—	14	24	35	—	—	3	—	—	46	—	14	14	3	7	192	
1903	—	—	15	1	—	—	10	—	13	26	39	1	—	1	1	—	37	—	27	12	3	4	190	
1904	—	—	24	3	—	—	7	—	15	34	34	8	—	5	1	—	45	—	32	17	5	2	232	
1905	—	—	12	3	—	—	13	—	23	46	31	3	—	3	1	—	54	—	26	24	—	5	244	
1906	—	—	22	2	—	—	10	—	21	47	37	3	—	—	—	—	69	—	38	19	4	6	278	
1907	—	—	21	—	—	—	14	—	10	37	32	5	—	—	2	—	52	—	22	10	—	3	208	
1908	—	—	19	4	—	—	15	—	16	48	38	2	—	—	—	—	62	—	19	5	—	2	230	
1909	—	—	18	5	—	—	13	—	12	51	42	3	—	—	—	—	41	—	30	5	3	9	232	
1910	—	—	18	3	—	—	18	—	10	57	36	3	—	2	—	—	57	—	24	11	—	12	251	2,257
1911	—	—	10	1	—	—	19	—	12	46	49	5	—	2	—	—	49	—	17	6	1	15	232	
1912	—	—	21	4	—	—	31	—	7	55	52	3	—	1	—	—	47	—	21	3	2	14	261	
1913	—	—	26	2	—	—	30	—	12	58	43	8	—	—	—	—	50	—	20	4	1	15	269	
1914	—	—	19	6	—	—	37	—	9	60	51	8	—	4	—	—	65	—	17	8	1	19	304	
1915	—	—	30	3	—	—	33	—	23	49	42	10	—	3	—	—	69	—	5	7	3	12	289	
1916	—	—	37	5	—	—	32	—	11	45	56	14	—	2	—	—	84	—	5	9†	3	18	321	
1917	—	—	27	10	—	37	43	—	13	49	45	10	—	5	2	—	63	—	14	9†	1	17	345	
1918	—	—	28	7	—	29	40	—	10	45	50	11	2	4	1	—	75	—	10	4	3	5	324	
1919	—	—	16	9	—	28	44	—	8	45	50	6	3	1	—	—	66	—	7	7	4	6	299	
1920	—	—	19	2	—	48	63	—	6	52	30	9	1	4	—	—	55	—	13	12	2	2	319	2,963
1921	—	—	11	3	—	70	92	—	9	98	75	15	15	—	3	—	128	—	24	18	1	3	565	
1922	—	—	32	8	—	127	98	15	11	65	109	25	25	1	8	—	56	—	27	16	8	7	638	
1923	—	13	18	6	—	115	73	19	16	64	78	16	23	2	8	3	106	—	23	13	9	3	608	
1924	—	6	15	6	—	81	57	8	13	69	125	17	36	4	2	1	82	—	19	11	3	1	556	
1925	—	6	18	2	—	94	53	8	18	57	109	9	37	2	3	2	98	—	23	10	5	—	554	
1926	—	9	24	5	—	95	45	13	19	76	108	14	33	2	4	1	76	—	20	14	1	2	561	
1927	2	15	19	6	—	89	39	6	13	73	121	8	22	2	3	3	72	1	9	4	4	3	514	
1928	8	19	16	5	—	73	38	7	13	59	114	11	12	2	1	3	67	—	12	3	3	5	471	
1929	29	25	26	7	9	69	37	11	18	46	84	10	14	1	2	5	64	—	11	5	4	6	483	
1930	29	15	44	9	23	59	39	12	11	46	76	8	9	1	2	1	48	—	6	6	11	4	459	5,409
1931	39	10	18	16	15	68	32	10	12	49	82	6	22	5	3	4	70	—	12	13	7	2	495	
1932	27	16	5	15	18	70	45	7	15	38	70	4	29	3	2	3	68	4	21	16	21	4	501	
1933	23	9	—	12	9	52	37	3	18	36	51	6	14	3	2	6	80	—	14	12	13	2	*402	
Total	157	143	865	215	74	1,204	1,271	119	711	2,125	2,426	261	297	153	60	32	2,661	5	790	386	165	248	14,368	

*Includes only June degrees.
†Two received the degree in XIII-B in 1916 and three in 1917.
‡Prior to 1923 degrees were awarded in Architecture.

TABLE 14

Degrees of Master of Science Awarded

	Aeronautical Engineering	Architectural Engineering	Architecture	Biology and Pub. Health	Business and Eng. Admin.	Chemical Engineering	Chem. Eng. Practice	Chemistry	Civil Engineering	Electrical Eng. (Inc. VI-A)	Electrochemical Eng.	Fuel and Gas Eng.	General Science	Geology	Mathematics	Mechanical Engineering	Metallurgy	Meteorology	Mining Engineering	Naval Architecture	Naval Con., U. S. N.	Naval Con., Foreign Stud.	Physics	Railroad Operation	Sanitary Engineering	Without Course Classification	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	—	—	2	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	5
1899	—	—	1	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1901	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	4
1902	—	—	3	—	—	—	—	3	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	8
1903	—	—	5	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	7
1904	—	—	4	—	—	—	—	1	—	2	—	—	—	—	—	1	—	—	—	—	3	—	1	—	—	—	12
1905	—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	—	—	—	1	—	18
1906	—	—	3	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2	3	—	—	—	—	—	9
1907	—	—	6	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	—	—	—	—	—	15
1908	—	—	1	—	—	—	—	1	—	3	—	—	—	—	—	—	—	—	—	—	7	—	—	—	—	—	12
1909	—	—	6	—	—	1	—	1	2	1	—	—	—	1	—	1	—	—	2	—	3	—	1	—	—	—	19
1910	—	—	6	1	—	—	—	1	2	1	—	—	—	—	—	1	—	—	—	—	7	—	—	—	—	—	19
1911	—	—	5	2	—	—	—	2	2	4	—	—	—	—	—	2	—	—	—	—	3	—	—	—	—	—	20
1912	—	—	4	2	—	—	—	3	3	2	—	—	—	—	—	—	—	—	2	—	4	—	—	—	2	—	22
1913	—	—	4	1	—	7	—	—	1	1	—	—	—	1	—	2	—	—	1	—	2	—	—	—	—	—	20
1914	—	—	3	2	—	3	—	5	3	2	—	—	—	1	—	1	—	—	—	—	2	—	—	—	3	—	25
1915	1	—	4	—	—	2	—	2	1	10	1	—	—	—	—	4	—	—	1	1	2	—	—	—	—	—	29
1916	5	—	7	1	—	1	—	3	5	6	1	—	—	—	—	4	—	—	—	—	2	5	—	—	1	—	41
1917	4	—	3	—	—	1	—	1	3	5	—	—	—	—	—	1	—	—	1	—	9	—	1	—	2	—	31
1918	5	—	1	1	—	1	—	1	1	2	—	—	—	—	—	2	—	—	1	—	—	—	—	—	—	1	16
1919	2	—	—	—	—	—	—	3	4	4	1	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	16
1920	—	—	—	1	—	3	—	2	4	7	1	—	—	3	1	5	—	—	1	—	19	—	1	—	—	4	52
1921	3	1	—	—	—	29	—	6	2	4	—	—	—	2	—	10	—	—	—	—	20	—	—	—	—	17	94
1922	5	1	—	—	—	6	32	4	5	37	1	—	—	2	2	4	—	—	3	—	10	—	1	—	—	18	131
1923	10	—	—	—	—	3	34	1	5	45	—	—	—	2	—	15	1	—	—	4	21	—	3	—	—	26	170
1924	4	—	—	—	—	6	41	1	5	34	1	—	—	1	—	8	1	—	1	—	12	—	5	—	—	28	148
1925	5	1	—	—	1	3	35	3	5	35	1	—	—	—	—	10	2	—	1	—	—	—	2	—	1	21	126
1926	6	1	—	—	—	5	20	2	2	60	1	—	—	3	—	6	1	—	—	—	12	—	—	—	—	25	144
1927	9	—	—	1	—	2	26	4	6	54	2	2	—	6	1	13	—	—	2	—	6	—	1	—	—	32	167
1928	9	—	—	—	—	5	14	2	8	63	3	7	—	—	2	13	—	—	—	—	9	—	1	—	—	43	179
1929	5	1	—	—	2	3	21	4	6	79	2	6	—	4	2	16	—	—	—	—	6	—	2	—	1	45	205
1930	3	4	—	—	1	7	22	5	9	51	5	2	—	1	2	5	3	—	1	1	5	—	1	—	1	53	182
1931	4	3	—	2	5	15	34	5	12	57	2	4	—	2	5	10	4	4	2	—	8	—	2	3	—	20	203
1932	5	—	—	5	9	25	33	8	17	56	2	5	—	2	3	16	1	4	1	—	7	—	6	6	—	40	251
1933	6	2	—	1	2	10	26	4	12	33	2	—	—	—	1	14	1	—	—	1	13	—	3	3	1	14	*149
Total	91	14	84	21	20	142	338	84	126	658	26	26	1	31	20	171	14	8	20	9	211	5	34	12	14	387	2,567

* Includes only June degrees.

TABLE 15

DEGREES OF BACHELOR IN ARCHITECTURE AND MASTER IN ARCHITECTURE AWARDED

Year	Bachelor in Architecture	Master in Architecture
1921	—	3
1922	—	2
1923	—	7
1924	—	8
1925	—	5
1926	—	9
1927	—	7
1928	—	6
1929	—	9
1930	—	7
1931	—	9
1932	11	5
1933	*22	*7
Total	33	84

TABLE 16

DEGREES OF DOCTOR OF PHILOSOPHY AWARDED

Year	Biology	Chemistry	Geology	Mathematics	Physics	Total
1907. . . .	—	3	—	—	—	3
1908. . . .	—	3	—	—	—	3
1909. . . .	—	—	—	—	—	—
1910. . . .	—	1	1	—	—	2
1911. . . .	1	—	—	—	—	1
1912. . . .	—	3	3	—	—	6
1913. . . .	—	1	—	—	—	1
1914. . . .	—	2	—	—	—	2
1915. . . .	—	2	—	—	—	2
1916. . . .	—	1	1	—	1	3
1917. . . .	—	3	1	—	—	4
1918. . . .	—	3	1	—	—	4
1919. . . .	—	—	—	—	1	1
1920. . . .	—	4	1	—	—	5
1921. . . .	1	3	—	—	3	7
1922. . . .	—	4	1	—	—	5
1923. . . .	—	5	1	—	—	6
1924. . . .	2	10	—	—	2	14
1925. . . .	—	11	—	—	—	11
1926. . . .	—	2	2	—	—	4
1927. . . .	2	6	1	1	1	11
1928. . . .	1	5	1	1	—	8
1929. . . .	4	8	2	1	—	15
1930. . . .	—	5	2	3	—	10
1931. . . .	—	9	—	1	—	10
1932. . . .	1	12	—	1	2	16
1933. . . .	1	3	3	3	—	*10
Total. . . .	13	109	21	11	10	164

*Includes only June degrees.

TABLE 17

Degrees of Doctor of Science Awarded

Year	Aero. Eng.	Chem. Eng.	Chem-istry	Civil Eng.	Elec. Eng.	Electro-chem. Eng.	Geol-ogy	Math-emat-ics	Mech. Eng.	Metal-lurgy	Min. Eng.	Naval Arch.	Phys-ics	Total
1911	—	—	—	—	1	—	—	—	—	—	—	—	—	1
1912	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1915	—	—	—	—	1	—	—	—	—	—	—	—	—	1
1916	1	—	—	—	—	—	—	—	—	—	—	—	—	1
1917	—	—	—	—	1	—	—	—	—	—	—	—	—	1
1918	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1919	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1920	1	—	—	—	—	—	1	—	—	—	1	—	—	3
1921	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1922	1	—	1	—	1	—	—	—	—	—	—	—	—	3
1923	1	—	—	—	—	—	1	—	—	1	—	—	2	5
1924	—	2	—	—	1	—	1	—	—	1	—	—	1	6
1925	1	3	—	—	—	—	—	—	—	3	—	—	—	7
1926	—	1	1	1	1	1	—	—	—	4	—	—	—	9
1927	—	—	—	—	1	—	—	1	1	2	—	—	1	6
1928	1	5	—	1	2	—	—	—	—	1	—	—	—	10
1929	—	3	—	—	—	—	—	—	—	1	—	1	1	6
1930	—	9	—	—	6	—	—	1	3	1	—	—	—	20
1931	—	3	2	—	3	—	—	—	—	1	—	—	—	9
1932	—	5	—	1	2	—	1	—	2	1	—	—	2	14
1933	—	8	—	2	2	—	—	1	—	3	1	—	—	*17
Total	6	39	4	5	22	1	4	3	6	19	2	1	7	119

*Includes only June degrees.

TABLE 18

Degrees of Doctor of Public Health Awarded

Year	Number
1925	1
1927	1
1928	1
1930	1
Total	4

TABLE 19

Degrees of Doctor of Engineering Awarded (*Discontinued after 1918*)

Year	Electrical Engineering	Electrochemical Engineering	Total
1910	1	—	1
1914	1	—	1
1916	1	—	1
1917	—	1	1
Total	3	1	4

TABLE 20

Summary of Degrees Awarded (1868–1933)

Bachelor of Science	14,368
Bachelor in Architecture	33
Master of Science	2,567
Master in Architecture	84
Doctor of Philosophy	164
Doctor of Science	119
Doctor of Public Health	4
Doctor of Engineering (Discontinued after 1918)	4
Grand Total	17,343

J. C. MacKinnon.

Summer Session. The total registration for the Summer Session of 1933 was 1,052 as compared with 1,305 (excluding 46 Reserve Officers) last summer, a decrease of 253 or 19 per cent. This decline was anticipated in view of the smaller number of students in attendance the preceding academic year and the present conditions.

The program offered this year consisted of only the regular subjects, except for three special subjects in Spectroscopy, as it seemed advisable to temporarily suspend the other activities of the Summer Session.

The smaller registration during the coming academic year will probably produce a slight decline in the attendance at the regular subjects in the summer of 1934. The resumption of the other activities of the Summer Session will probably have to await more favorable conditions.

J. C. MACKINNON,
For the Committee on Summer Session.

The Librarian. The extent to which the Institute Library and its branches are used is not easily reduced to figures. No statistics are kept of the number of users of material available on open shelves, nor of the visits of instructors and others who have keys to closed stacks. No record is kept of the multitude of requests for aid in locating reference material which come over the desks of the reference librarians and branch librarians. It is safe to say that such records if kept for one year would be surprising in amount, character and scope. A fair indication of use, however, is given by the statistics of books borrowed, which for the last two years have been as follows:

	1931–32		*1932–33*	
Volumes borrowed from the Central Library:				
Books	34,190		31,426	
Periodicals, current	4,328	38,518	4,820	36,246
Volumes borrowed from the branch libraries:				
Books and periodicals		29,965		39,033
Total		68,483		75,279

The Architectural library circulated 8,419 photographs and prints and 1,550 clippings.

It will be noted that while the circulation of books at the Central Library decreased the circulation of current periodicals increased. Many factors doubtless played a part in causing these changes, among them the development of the Eastman Library whose books are lent for two weeks but periodicals over night only, and the improved service being given in other branch libraries, particularly in Walker Memorial Library, where loans totalling 13,138 very nearly doubled last year's figure of 6,696. The liberal purchase of the newest and most discussed books in general reading has made this branch increasingly popular and increasingly useful.

In interlibrary loan service we borrowed 724 volumes from other libraries and lent to other libraries 736. Photostat orders filled for readers or outside firms or individuals totalled 84.

The growth of the Library very closely approximated that of last year when the net total was 10,228, as the following figures show:

Acquired by purchase	3,606
Acquired by binding	2,124
Acquired by gift or exchange	4,587
Total	10,317
Less volumes discarded	238
Net growth	10,079

Of the above items, 5,173 were added to the Central Library and 4,906 to the branch libraries. These additions brought the total contents of the Institute Library, including its branches, to approximately 287,785 volumes on June 30, 1933.

The year's expenditures for books, periodicals and binding were as follows:

	Books	*Periodicals*	*Binding*	*Total*
From Library budget	$5,258.54	$4,915.57	$3,914.80	$14,088.91
From endowment funds	4,106.30	72.41	266.91	4,445.62
From special appropriation 774 (Physics)	112.33	186.41	.....	298.74
From special appropriations 880, 912 (Eastman Library)	1,532.35	4,919.00	542.43	6,993.78
From income from sale of Vail duplicates*	25.33	.....	210.34	235.67
From departmental appropriations.	631.00	105.99	1.45	738.44
	$11,665.85	$10,199.38	$4,935.93	$26,801.16

*Augmented by special appropriation 931 from the Vail Fund.

The year has been an exceptionally busy one, with first attention given to the continued improvement of the branch library situation. The cataloging of the Eastman Library was virtually completed, after over a year's work. At the beginning of the academic year a set of rules for the conduct of this Library was drawn up by a conference of committees from the Departments of Chemistry, Mathematics and Physics, meeting with the Librarian and members of the Library staff. Under these rules the Eastman Library is open for research work not only to the Instructing Staff and graduate students but to any student who can profit by the use of its collections, and the use of its reading room is granted freely to persons from outside the Institute. The Library has been open evenings until ten o'clock.

This new branch has fully justified its entrance into our library system, if one may judge in part from the statistics of its use. During the year 564 persons registered as users, of whom 155 were members of the Instructing Staff, 178 graduate students, and the rest undergraduates and others. The registration figure represented principally men from Courses V, VI, VIII, X and XVIII, with 119 from other courses. The average daily attendance was 123; the average evening attendance during the second term, 24. The circulation of books for one- or two-week use was 3,462; for overnight use, 3,277.

As in the case of the Central Library, however, these figures do not indicate the amount or quality of reference work done by the branch librarian and her assistant. A report covering the first twelve months of the library, presented by the Eastman Librarian on March 1, records the details of its history and organization and the work then in progress.

The small libraries hitherto maintained by the Departments of Geology and of Mining and Metallurgy were merged into one branch library in Room 8–304, to be under the direct supervision of the Central Library. Plans were drawn which represented a composite of the views of the two departments and of the Librarian. Much of the old shelving was used, pieced out with stack sections found in abandoned reading rooms and storage. Despite the lack of special funds every effort was made to plan the new library for efficient service. Helpful coöperation was received from Professor Harry W. Gardner,

who worked out a color scheme, and from Professor Moon, who studied the lighting problem and made recommendations which resulted in most satisfactory illumination. By the end of June the new library was in operation.

At the same time the miscellaneous collection of books in Room 2–390, which had met no real need, was redistributed to the Central and Eastman libraries and the room discontinued as a library.

The Civil Engineering-Economics branch has become of increasing value to the departments served, through the untiring efforts of the branch librarian. At the beginning of each term, he gave from four to six lectures to students on the use of the library, and throughout the year prepared many bibliographies for members of the Instructing Staff. Student assistance was provided for twenty-four hours per week, and the library was kept open Tuesday and Thursday evenings.

The end of the year, therefore, saw the branch library situation as follows:

Branch Libraries under Central Library Supervision

Civil Engineering — Economics
Eastman
Mining and Metallurgy — Geology
Walker Memorial

Branch Libraries under Department Supervision with Central Library Coöperation

Aeronautics
Architecture
Naval Architecture

Three small reading rooms under department supervision remain: those of Building Construction in 5–230, of Chemistry in 4–258, and of Modern Languages in 2–161.

This is a vast improvement over the situation in 1931, when there were fifteen collections of varying sizes and efficiency known as department libraries.

The activities of the Central Library staff were to a large extent devoted to these branch library changes. Nevertheless time was found to overhaul the Library's extensive duplicate collection and lists were prepared of material to be offered for

sale when the time seems favorable. The selling of Vail collection duplicates, under way for two years, was continued.

It is probably not generally known that the original Vail gift included not only electrical material but a valuable collection of books, pamphlets, prints and broadsides dealing with the early history of aeronautics. A selection of this material was lent to the Newark, New Jersey, Museum as part of an extensive aeronautic exhibit from November to February. A similar selection was lent to the New York Museum of Science and Industry for an exhibit during April and May. Both these exhibits were largely attended. Their success, to which our material contributed an important part, aroused anew our regret that the display facilities of the Institute Library are so meager.

An exhibit of original Heavisidiana lent to the Library by Mrs. Margaret Behrend from the library of her late husband, Dr. B. A. Behrend, was shown in the main reading room during the spring months and attracted wide interest, especially among the graduate students. This exhibit was described by the Vail Librarian in an article in the *Technology Review* of March, 1933, entitled "Oliver Heaviside as Seen in His Books and Letters."

Under the direction of the Reference Librarian the textbook collection has been brought up to date and a card index by courses and subjects prepared and maintained.

At the request of the Librarian the Faculty Committee on the Library took up the long vexatious problem of loans to persons not connected with the Institute and in May adopted a set of rules. Under these rules graduates of the Institute are to have the same privileges as students, without the requirement of a deposit; and responsible outside individuals and firms will be allowed borrowing privileges at fixed annual fees, or, in certain cases, upon other specified terms.

As usual the Library took part with other reference libraries in various coöperative enterprises such as the work of the A. L. A. Coöperative Cataloging Committee. We also began the contribution of a card list of our rare books to the Library of Congress Union Catalogs. In December the Library was honored with charter membership in the Association of Research Libraries, organized "to develop and increase the resources and usefulness of the research collections in American libraries."

The charter membership roll included thirty-seven leading university libraries and five large public reference libraries, namely, the New York Public Library, John Crerar, Newberry, Huntington, and the Library of Congress. The Institute Library was the only technical school library thus honored.

Noteworthy gifts of books were received during the year from the following donors:

Boston Society of Civil Engineers: 306 bound volumes and 583 periodicals and pamphlets, including the following: Annales des ponts et chaussées, 150 volumes; Société des Ingenieurs Civils, Mémoires, 54 volumes; Zeitschrift für Bauwesen, 58 volumes; Institution of Civil Engineers, 116 papers.

Mrs. Frank Vogel and family: 270 volumes on miscellaneous subjects, from the library of the late Professor Vogel.

Baker Library, Harvard School of Business Administration: 237 volumes, principally on engineering subjects.

Mr. Henry D. Jackson, '97: 143 volumes of recreational reading, largely upon yachting and shipping.

Professor H. M. Smith: 70 books and many pamphlets.

From the library of F. D. Carney, '87: 63 volumes on subjects connected with mining.

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

Dr. A. H. Gill: A collection of papers by Ellen H. Richards; a volume of papers by and about Professors W. R. Nichols and L. M. Norton; and 36 miscellaneous volumes.

Among many single volumes of particular interest were the following:

From the Technology Press: Copies of its first two publications: Textile research — a survey of progress, compiled by the U. S. Institute for Textile Research, 1932, *and* The evolving house, by A. F. Bemis, '93, and John Burchard, 2d, '23 — vol. 1, 1933.

Charles Edison, '13: A copy of Paul Sabatier's "Catalysis in organic chemistry," translated into English by E. Emmet Reid, from the library of his father, Thomas A. Edison, whose pencilled underscorings and a marginal annotation give it special association value.

Professor William Emerson: Cram's Cathedral of Palma de Mallorca.

Mrs. Arnold W. Brunner: Arnold W. Brunner, '79, and his work.

Dr. S. Ikehara: Hattori's Chinese-Japanese dictionary.

Mrs. J. J. Storrow: Pearson's James Jackson Storrow.

Among foreign donors were Dr. Ing. D. Thoma, Technische Hochschule, Munich, Dr. F. Cossio del Pomar, the Universidad

de Buenos Aires, Université de Liège, Universitetsbiblioteket, Uppsala, the Chinese Cultural Society, the Academia Sinica, the Huai River Commission, and the Japanese Embassy.

Current numbers of certain periodicals and society publications were presented regularly by Mr. Charles T. Main, President Compton, and Professors Bigelow, Dewey, Doten, Gill, Hayward, Hutchinson, Jackson, Kennelly, C. E. Locke, Prescott, Schell, Schwarz, Tyler, and Waterhouse; also by Mrs. Elihu Thomson and the Blanchard Machine Co.

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

Professor N. H. Frank: Introduction to mechanics. 1932.
Professor Philip Franklin: Differential equations for electrical engineers. 1933.
Professor Arthur C. Hardy and Mr. F. H. Perrin: Principles of optics. 1932.
Professor M. P. Horwood: Sanitation of water supplies. 1932. (Two copies.)
Professor F. A. Magoun: Behemoth. 1932. (In collaboration with Eric Hodgins, '22.)
Professor L. F. Marek: Catalytic oxidation . . . 1932. In collaboration with Dorothy A. Hahn.)
Professor W. Spannhake: Grosskraft-Maschinensätze für Hochdruck — Speicherwerke . . . 1930.
Professor N. Wiener: The Fournier integral and certain of its applications. 1933.
Assistant Dean T. P. Pitré: Chemistry problems. 1930.
Mr. Carl Bridenbaugh: High cost of living in Boston, 1728. 1932.
Mr. F. G. Fassett, Jr.: History of newspapers in the District of Maine, 1785–1820. 1932.
Mr. F. G. Fassett, Jr., and Mr. P. C. Eaton: Practical writing, 1932; Studies in reading. 1932.

Other gifts were received from members of the Instructing Staff, alumni and students, as follows:

President Compton
Professor J. A. Beattie
Professor R. P. Bigelow
Professor E. Burtner
Professor D. R. Dewey
Professor W. Emerson
Professor M. P. Horwood
Professor E. H. Huntress
Professor W. S. Hutchinson
Professor J. R. Jack
Professor D. C. Jackson
Professor F. A. Laws
Professor W. Lindgren
Professor C. E. Locke
Professor E. F. Miller
Professor P. M. Morse
Professor C. L. Norton
Professor H. G. Pearson

Professor C. H. Porter
Professor E. H. Schell
Professor T. K. Sherwood
Professor H. M. Smith
Professor D. J. Struik
Professor B. A. Thresher
Professor J. L. Tryon
Professor G. B. Waterhouse
Professor F. S. Woods
Mr. John R. Freeman, '76
Mr. Charles T. Main '76
Dr. A. A. Ashdown
Dr. H. W. Tyler '84
Dr. A. D. Little '85
Mr. George L. Gilmore '90
Mr. Henry S. Elmwood '96
Mr. Harold B. Smilie '14
Mr. Irving B. Crosby '18
Mr. T. B. Card '21
Mr. Hassan Halet '27
Mr. George G. Morrill '27
Mr. W. Edward Higbee '29
Mr. E. A. Michelman '30
Mr. Bernard Lapidus '33

Finally, the Library is indebted as usual to student professional societies for publications of their national organizations and to the student activities and alumni organizations for current and bound copies of their own publications.

W. N. SEAVER.

Medical Director. During the past year the Medical Director has held to a more rigid medical program and there have been fewer contagious cases and less time lost from studies than usual.

The following is a numerical survey of medical service:

6,999 Surgical cases in clinics		
6,780 Medical cases in clinics		
9 Contagious cases in clinics		
827 Complete physical examinations		
1,792 Re-examinations		
1,819 Medical excuses issued		
18,226		18,226
Number treated in Infirmary after hours	557	
Number admitted	352	909
	Total	19,135

Over two thousand physical examination records were reviewed and decisions concerning pathological conditions recorded.

A special study was made of 49 men, who at their regular physical examination presented signs of heart trouble. These

men were examined by a heart specialist and many of these cases, as was suspected at the first examination, were functional, but 19 were listed for further study (x-ray, cardiograph, etc.). These men have been made familiar with their condition and by private word and lectures have been advised about the proper care of themselves.

An analysis of the 49 cases showed positive cases of organic heart trouble, which were classified as follows:

Mitral regurgitation	6 cases
Aortic regurgitation	5 cases

There was one case of irregular heart action suggesting paroxysmal tachycardia. There were also several cases of irregular heart action not considered as important or indicative of organic heart disease.

Forty-nine x-rays were taken of the chest; twenty-four films were taken because personal history suggested tuberculosis and fourteen cases were taken because of family history of tuberculosis. Eleven of these x-rays were of Asiatic students.

Two cases of active lung tuberculosis were found and the students left school. Five positive cases were found. These were healed or inactive tuberculosis, except as noted in the two cases. Thus 10 per cent of the x-rays showed evidence of tuberculosis.

Among the Asiatic students there was evidence of tuberculosis in three cases, a percentage of 27. Two cases were doubtful and not classed as positive or negative in this study. The fact that evidence of tuberculosis was found in 10 per cent of the cases x-rayed indicates the value of this method of diagnosis. Positive findings in 27 per cent of the Asiatic students emphasized the susceptibility of these races to tuberculosis and the wisdom of making x-rays of the chest a part of the routine examination of all Asiatic students.

One hundred five men showed abnormal blood pressure at the time of examination. These cases were rechecked and special lectures given to the men who showed persistent hypertension.

There were fifty-six men in the Physical Fitness class, the largest number for several years. The class received weekly instruction in food values and subjects relating to health and

physical development. An analysis of the personnel of the class is interesting and instructive.

As a whole the class was 1,388 pounds underweight. This represents an average of 25 pounds underweight per man. The lightest man weighed only 95½ pounds, and the heaviest man weighed only 139½ pounds. Six men weighed 110 pounds or less and thirty-four men weighed 120 pounds or less. One man 73¼ inches tall weighed only 119 pounds.

The average gain per man was 7 pounds. Not a single individual failed to make a gain and the class as a whole regained 28 per cent of its underweight. The highest gain was 19 pounds, another gained 15 pounds, another 13 pounds, two gained 12 pounds, seven gained 12 pounds or more, twelve gained 10 pounds or more, and twenty-one gained 8 pounds or more.

One hundred nineteen men showed albumen in the urine. These men had further tests and advice. Two lectures were also given on kidney conditions.

Thirty-six men were examined by a nose and throat specialist. Nineteen of these, nearly 53 per cent, showed pathological conditions as follows:

Deviated nasal septum	12 cases
Spurs in nose	14 cases
Bad tonsils	10 cases
Cyst in antrum	1 case
Perforated ear drum	1 case
Polypus	1 case

There is no charge for laboratory service. During the year 675 examinations of blood, sputum, stool, urine, etc. were made.

During the month of January the Department was taxed to its utmost capacity. Eight hundred forty-two were treated in the clinic for grippe colds and the number of days lost was 929. The emergency ward was opened and 72 cases were treated with a loss of time of 264½ days. If the men living in dormitories, fraternity houses and rooming houses did not have the privilege of coming to the clinic or the Infirmary for medical attention the loss of time would have been much greater and the consequences far more serious.

A list of all students in the Infirmary was sent daily to the T. C. A. Office, *The Tech* and the office of the Superintendent. This was done in order that the men's mail could be sent without delay and that his colleagues might know where he was.

The Department tried to keep in touch with students ill at home or in other hospitals, and notified the Office of the Dean and their instructors. Twenty-eight of these students were sent to outside hospitals during the year.

Approximately 916 reports on the physical condition of all students applying for loans and scholarships were sent to the Dean of Students.

Two hundred fifteen x-rays were taken during the year. For this service the patient paid only for the interpretation.

When a student was not treated by one of our physicians he was requested to bring a certificate from his own doctor or give evidence of his disability in order to convince the doctor on duty of his legitimate absence.

The following is a list of the substitutions made for Physical Training classes during the year:

	First Term	*Second Term*
Basketball	14	15
Boxing	8	13
Crew	52	54
Fencing	15	6
Gym Team	17	14
Squash	34	35
Swimming	19	19
Track	54	62
Wrestling	15	13
Physical Fitness	58	58
Excused	78	78

Three periods of exercise a week were required of those who substituted sports for physical training classes.

Attendance sheets were turned in by the managers each week. No man was allowed to substitute a sport or enter the gym classes until he had secured certification from the Medical Department as to his physical fitness.

In the corrective class there were seventeen students with poor posture and eight with defects of the feet. Satisfactory

progress was noted in these cases during the year and a check-up was made to determine if there were any relapses.

Two hours of physical training a week were required of freshmen, although participation was not confined to members of the entering class. All students were welcome and many availed themselves of the opportunity.

An innovation the past year was the attendance at gym classes, for a month, of the freshman candidates for crew. Several of the men continued the work beyond this time and the coach has signified a desire to follow the same procedure next year.

Members of the Staff and graduate students were referred to the Department of Physical Training by the Medical Department when the men wished to take part in some activity or build up their health.

Through personal contact and interest many of these young men were shown the benefits of exercise and continued their work while at the Institute. The number is growing each year.

The Department has had a most satisfactory year and it has been singularly free from severe epidemics and serious illnesses.

GEORGE W. MORSE, M.D.

Industrial Coöperation. The principal task of the Division of Industrial Coöperation throughout the year has been the placement, in so far as possible, of the unemployed graduates who have registered with our Personnel Office. In order to take care of this unprecedented situation a considerable reorganization of the office methods and changes in the staff were undertaken. At one time there were about a thousand unemployed alumni registered in the Personnel Office. Mr. John M. Nalle was added to the staff to assist Colonel Locke, and the changes made have enabled us to make more visits to possible employers and to keep more closely in touch with possible openings as they occur. While the pressure upon the office is still very great, it is pleasant to be able to report that the number of placements has shown material improvement, and the number of men placed in the last three months is greater than any period since the establishment of the Personnel Office. The

work of the office is greatly hampered by lack of detailed information concerning the alumni, and efforts are being made to develop a more effective method of securing this information.

The condition of general business has been such that members of the staff have been called upon to do much less research and consultation than in normal years, but a hopeful sign is to be noted in the increased number of inquiries which have developed during the last three months.

In response to a request from the mayor of the city of Boston, through the trustees of the Boston Public Library, a committee of the Faculty was appointed early in the year to study the ground water conditions as affecting the piling upon which the Public Library building in Copley Square rests. The committee, consisting of Professor Charles M. Spofford, Professor Ross F. Tucker, with the Director of the Division as chairman, studied the problem at considerable length. This is a part of the general problem of the cause and prevention of the general subsidence of water in the filled Back Bay district of Boston. Thanks largely to the activity of the Sewer Department of the city of Boston, a plan has been worked out which appears to insure for the present, at least, the permanence of the pile structure of the library by the maintenance of the water level at a sufficient height to keep the piles covered.

The research work on the creep of steel at high temperatures under long-time loads has been continued throughout this, its seventh year. An entirely new set of furnaces and measuring devices have been constructed, and the work is now going on over a greater range of temperatures and with greatly increased precision. Research work in refractories has been continued with special reference to the preparation of refractories for steel furnaces.

The Division has had the usual number of contacts with the Commonwealth, the cities of Boston and Cambridge, and other municipalities, and has carried on a number of tests and investigations for them. The New England Council had technical meetings at the Institute again this year, and from these meetings a number of research contacts have developed which have been continued through the Division.

The administrative policy relating to research work done for outside business interests has now become so firmly agreed

upon and established that practically all work of this type by members of the Staff requiring the use of the laboratories and facilities of the Institute is routed through the Division. This has resulted in a considerable saving of lost motion in carrying out tests and investigations, and has further given an opportunity to direct the Staff toward the more desirable type of problems and research rather than mere routine tests and investigations.

Under the new and definite policy relating to the handling of patents, a number of patents have been developed, some assigned to the Institute, and others in the process of development jointly by the Institute and the staff members.

The Ceramics Laboratory, which was developed as a research laboratory for one of the earliest of the Institute's industrial contractors, has grown to be a real teaching unit, and has been transferred this year to the Department of Mining and Metallurgy.

C. L. NORTON.

Society of Arts. The usual program of Popular Science Lectures, given under the direction of the Society of Arts, was offered during the past year. Keen interest on the part of pupils in the secondary schools as well as of the general public continued unabated — as indicated by capacity audiences at practically every lecture. Indeed, for the lecture on "Cosmic Rays" between three and four hundred applications for tickets had to be refused.

Some schools have complained that insufficient tickets are allotted them, thus disappointing many of their pupils at being unable to attend the lectures. It does not appear, however, that such complaints are justified. Every ticket is numbered and a record is kept of those sent to each school and of those returned at the door and the allotment of tickets to the schools is based largely on these records of attendance.

It has been found necessary to limit the number of tickets to the Sunday afternoon lectures to not more than two to each applicant and, even so, all tickets are usually distributed by Thursday preceding the lectures. Many members of the Instructing Staff and Institute students attend regularly. It may

become necessary, as with the Lowell Institute lectures, to limit the assignment to one ticket to each applicant.

The lectures given during 1932–33 were as follows:

December 9, 10, 11.	COSMIC RAYS — THE MYSTERY OF MODERN PHYSICS. By Ralph D. Bennett, Ph.D., Associate Professor of Electrical Engineering.
January 13, 14, 15.	CHEMISTRY AS ART, AS MAGIC AND AS SCIENCE. By Tenney L. Davis, Ph.D., Associate Professor of Organic Chemistry.
February 10, 11, 12.	THE NAVY OF THE AIR. By Henry E. Rossell, S.M., Commander, U. S. N. Professor of Naval Construction.
March 10, 11, 12.	WAVES AND WAVE MOTION. By Francis W. Sears, S.M., Assistant Professor of Physics.

H. M. GOODWIN.

SCHOOL OF ENGINEERING

Aeronautical Engineering. In the field of instruction the changes in program mentioned in last year's report have been in effect during the present academic year, and have proved very successful. An attempt will be made to increase the freedom of choice of courses, and to liberalize the method of study for superior students.

Several interesting pieces of apparatus for demonstrating aerodynamic principles to students have been acquired or built. Most important among these is a small wind tunnel for use on the instructor's desk. The development of a dynamic speed regulator has been completed and one of these instruments has been in successful operation in the four-foot wind tunnel.

In the field of aerodynamic research a two-year study of the boundary layer on a full-size wing-section has been completed, and the report is now in process of preparation. The second phase of the work on heat transfer from metal surfaces was completed and the report submitted to the National Advisory Committee for Aeronautics. Two sets of experiments were completed on the apparatus for coasting models in still air. One of these covered drag tests on a series of discs and the

other drag tests on a series of rectangles. A paper covering this work is now in preparation.

In the field of structural research, tests have been completed and reports prepared on the column strength of duralumin channels and on the retardation of aging of duralumin under storage conditions. The first phase of a program of research on a large duralumin cylinder in bending has been completed. The results of experimental work on flat and curved sheets in compression, which was carried out last year, have been coördinated and analyzed.

In the field of power plants, the first phase of the fuel injection research on a sleeve valve cylinder has been completed and report submitted to the American Society of Mechanical Engineers. A new type of knock meter has been developed and given preliminary tests. This knock meter appears to be of distinct practical value and may possibly be used by the industry in rating automotive fuels. An improved technique for photographing the motion of the flame within an engine cylinder has been developed and the apparatus is now ready for use in a research program on the effect of different variables on the rate and character of flame propagation. An experimental analysis of the physical aspects of detonation has been made and the results have been found to agree surprisingly well with the theory of wave propagation within the cylinder gases. The results of this most interesting study are now being prepared for publication. The M. I. T. point-by-point indicator has been improved to an extent which makes it of interest to other laboratories, and it is hoped that arrangements can be made for its reproduction and distribution.

Considering business conditions, the amount of industrial work submitted to the aerodynamic laboratories has been surprisingly large. Among the more important pieces of work of this nature were included an extensive series of model tests on the drag of ring cowling for air-cooled engines. Two companies submitted seaplane floats for aerodynamic tests. An investigation of the lag of cup and vane type anemometers was made for the Blue Hill Observatory of Harvard University. One manufacturer submitted an airplane model for rather complete design and stability determinations.

In order that the fourth year courses in Aeronautical Engi-

neering may be more effectively handled, it is recommended that arrangements be made for more effective general courses in fluid dynamics and in vibrating systems, to be offered during the earlier years.

We would like to call attention again to the need for modernized wind tunnel equipment at such time as funds become available.

Considerable difficulty has been experienced in securing publication of papers through ordinary channels, and it is recommended that consideration be given to a centralized medium of publication, issued by the Institute itself.

C. F. TAYLOR.

Building Engineering and Construction. Much effort has been devoted to consolidating and improving the instruction in accordance with the changes made in the course during the previous year. In addition to this, the two principal matters of interest have been the continuation of the study of the "Permeability of Masonry Walls" and "Low Cost Housing and the Improvement of the Frames of Wooden Houses."

Both of these items are of major interest to the building industry, but as these studies are not completed we can only report progress. The work depends upon tests and experiment and we have been handicapped by lack of adequate funds, as interested industries have been able to make only limited appropriations. Nevertheless Professor Voss has developed a well-equipped laboratory and is now engaged in long-time tests to confirm the indications that have been disclosed during the past two years. Leaky brick masonry is almost universal and is giving the industry no end of trouble. Professor Voss' paper, read in June before the A. S. T. M., in which he gives indicated results of his preliminary work, has been received with great interest and we are hoping to make a real contribution to the industry in due time.

Our hope is that we may in the near future interest a number of organizations, which are most concerned with studies of this kind, to set up an endowment fund, the income from which could be used to conduct studies in the use of materials. Professor Voss and Mr. Peskin are taking advanced

courses in order to equip themselves for the specialized work which such investigations involve.

In spite of the many studies and experiments that are being made for the adaptation of various materials to the construction of dwellings, substantially no progress has been made which promises to displace our wooden house construction. At the same time, the manner in which we build our houses constitutes one of the largest of our national wastes. A good deal of thought has been given, not alone to the betterment of our wood construction, but to the devising of a system by which houses of a durable and attractive character may be produced at a much lower cost than heretofore, possibly for a third as much.

Owing to the almost complete prostration of the building industry, we have had difficulty this year in placing our graduates in building although they have all found positions of one kind or another.

ROSS F. TUCKER.

Business and Engineering Administration. The most important constructive activity carried on by the Department during the past year has been the reorganization of its undergraduate curriculum.

The new fourth year schedule includes subjects which coördinate the business functions previously studied. The second and third year programs continue the Department's policy of favoring balanced professional training rather than specific vocational instruction. The detailed recommendations of the departmental curriculum committee have received the approval of the Faculty and will become effective as rapidly as existing schedules will allow.

Choice of graduate electives has been broadened by the addition of two subjects in the increasingly important field of Marketing. The number of subjects offered in the preparatory summer school has also been increased, thereby freeing the subsequent graduate year for greater concentration upon advanced work.

Undergraduate teaching activities were extended by offering a new course in Industrial Research Methods, a special

series of laboratory exercises in work simplification, and a coördinative seminar in Industrial Problems.

A most unusual educational adventure of the year has been the conduct of a summer tour of European industries by a group of junior and senior students. Through the generosity of the Thorne-Loomis Foundation of New York a specially constructed bus offering complete camping facilities was placed at the Department's disposal. During the months of June and July, this equipment enabled the students to make, at very moderate cost, more than forty industrial visitations in the manufacturing centers of nine foreign countries.

Research in the type of student best fitted to profit by work in the Department has been continued. Analysis of the activities of graduates has disclosed the unusual degree to which sons of industrialists have found opportunity to make their training of particular value in the family business. Additional data has also been collected from a selected group of graduates, bearing upon the relationship between inherent aptitudes and subsequent industrial accomplishments.

The year's greatest contribution to educational theory, as it relates to training for business, has been the growing proof of the value of informal contacts between students and active industrial leaders. The graduate training program which has been arranged for the Honorary Fellows and has been so generously sponsored by members of the Institute Corporation, has established the evening conference between small groups of students and industrialists, as an educational device of first importance. Such opportunities for contact are being extended as rapidly as possible to other graduate students and to members of the senior class.

In a desire to reciprocate in some measure for the important services received from other scientific and engineering departments, there has been organized for presentation during the coming year a two-term introductory treatment of Business Management, to be available as an elective for students in other courses. Though of necessity elementary in character, the presentation will aim to develop a familiarity with the round of business activities inherent in manufacturing. The Department also plans the establishment of a Management Laboratory, to be available as a fourth year departmental

elective, formalizing previous experimental activities in industrial film presentation, equipment demonstration and applied motion analysis.

The Department especially wishes to record its very real sense of obligation to the Department of Economics for the manifold assistance given. For the past two years members of this Department have served with great value on the curriculum committee, and have collaborated generously in the joint organization and presentation of the newer coördinating subjects. In addition to their present schedules of specialized teaching in the field of business economics they have willingly undertaken the offering of additional undergraduate and graduate subjects of pertinence to our students. Such progress as has been made by the Department has resulted in no small degree from this fine quality of neighborly support.

ERWIN H. SCHELL.

Chemical Engineering. The outstanding result during the year of the research program of the Department was the publication of Professor McAdams' book on *Heat Transmission*, designed to present to the engineer in usable and well-digested form the research results achieved in this field during the last decade. The extent to which it appealed to the profession is attested by the fact that the first printing was exhausted in three weeks and a third printing necessary in six months. It is gratifying that not only was the work of assembly, correlation and interpretation centered in the Department, but a considerable and important part of the data was obtained in our laboratories. The work on the behavior of hydrocarbon mixtures under pressure was expanded and confirmed by the collection of data on mixtures occurring in important industrial operations. The research work on rubber carried on during the last three years culminated in an interpretation of the mechanism of the vulcanization reaction which should prove a helpful forward step in this important field. Problems involving diffusional interaction of vapors and liquids have in the past been handled by the use of the Stefan equation, despite the fact that the known interrelations of eddy and laminar flow of fluids, as developed in work on fluid dynamics and heat

transmission, have rendered this use of that equation logically untenable. Experimental work in this field under Professor Sherwood has justified the use of the Stefan correction for the presence of non-diffusing gas, but demonstrated the inaccuracy of the corresponding correction for diffusivity. Tentative equations, empirical but dimensionally sound, were developed to aid the engineer in the more rational design of equipment involving this type of interaction of gas and liquid.

The changes in undergraduate instruction authorized two years ago completed their first full year of operation and, while minor modifications are indicated as desirable, have thoroughly justified their adoption. The correlation of the report work of the senior year with that in other departments was inaugurated and gives promise of success.

As a matter of organization, the Research Laboratory of Applied Chemistry was transferred to the Division of Industrial Coöperation. This move has long been advocated by the Department. It is gratifying to find that it has been possible to make this change, which relieves the Department from disturbing, non-educational responsibilities, without the loss of intimate contact with the technical and educational sides of the work.

At the end of the year the Faculty approved the establishment of an Honors Group for men of outstanding ability in the senior class of the course in Chemical Engineering, to be established this fall. The Department is undertaking this program with high hopes that it will lead to the development of better methods of instruction for men of unusual capacity. The plan offers the possibility of a more helpful service to exceptional students, and through this indirectly to the industries into which they go. The Department is also reorganizing its thesis work in the endeavor to make this important branch of instruction more adequately meet the needs of the student.

It is impossible to close this report without expressing the irreparable loss of the Department and the Institute in the death of Professor Ryan, who was so ably directing its activities into larger fields of usefulness.

W. K. Lewis.

Civil and Sanitary Engineering. The registration of undergraduate and graduate students in both the Civil Engineering and Sanitary Engineering courses was considerably lower this year than last year. The reduction was unquestionably due in large measure to the unprecedented decrease in construction activities throughout the world and the consequent lack of demand for recently graduated engineers. With the increase in construction now under way and the consequent developing demand for civil engineers, who are required for all construction projects from their inception throughout the construction period, and often for operation after construction, the opportunities for graduates of this fundamental branch of engineering should increase again soon.

There have been no radical changes in the curriculum during the year, but the undergraduate course in Civil Engineering has been somewhat simplified by modifying the requirements for the various options so that all students taking Civil Engineering will have the same subjects in the first three years regardless of which option they may later elect. Two new graduate courses to be offered for the first time during the coming year are to deal with seismometry and vibration measurements, and are planned to meet the needs, not only of seismologists, but also of civil and mechanical engineers to whom problems of vibration are becoming increasingly important.

Coöperative work with the Bureau of Public Roads of the United States Department of Agriculture was continued during the summer of 1932, but was suspended at the end of September as a result of the resignation from the government service of Mr. Arthur Casagrande, the government representative stationed at our Soil Mechanics Laboratory since 1926. The results of some of the researches conducted under this agreement have appeared from time to time in various publications and some of them have attracted the attention of engineers connected with the road building departments of various foreign governments.

The research work in the Soil Mechanics Laboratory conducted in coöperation with the Committee on Earths and Foundations of the American Society of Civil Engineers was also completed in the late fall of 1932 with the conclusion of

the problems undertaken. The results of these investigations, together with those made in other universities in this country and abroad, are contained in the report of the Committee, of which Dr. Gilboy, of the Department, is a member.

Experimental research has been conducted by the Department staff in Soil Mechanics, River Hydraulics, Sanitary Engineering, and Seismology; theoretical research in Structural Engineering; and statistical research in Highway Engineering.

In the Soil Mechanics Laboratory investigations have been made which it is believed will form important contributions to soil physics. Some of the researches were conducted by graduate students, and engineers otherwise not employed, whose services were made possible by the Institute Emergency Fund and by the Boston Planning Bureau.

Among the more important investigations made in the River Hydraulic Laboratory may be mentioned those on the transportation of sand by running water, wave phenomena in canals and sea wall design. Papers relating to various hydraulic problems have been presented by several members of the Staff before engineering and scientific societies.

In the Sanitary Engineering field, further needed investigations of settling basins and filter underdrains have been made, the results of which it is hoped will make possible improvements in the design of these important portions of sewage disposal plants.

In the Seismological field, the short period accelerometer which has been under development by Mr. Braunlich for some time has been completed. This instrument was described and demonstrated by Mr. Braunlich at a joint meeting of the Geophysical Union and the Eastern Section of the Seismological Society of America held in Washington during the spring, and attracted much attention. The contact accelerometer previously developed by Mr. Braunlich had its first practical demonstration during the earthquake in California in March, two of these instruments which had been installed at Long Beach giving satisfactory results. Further experimental studies of a shaking table have been made, these investigations indicating that for satisfactory results a table should be designed along somewhat different lines from any now in existence.

Professor Breed conducted during the year, for the Highway Research Board of the National Research Council, an investigation of highway road costs in Massachusetts, the results of which were presented by him before the Board at its meeting in Washington in December, and published in the Twelfth Annual Proceedings. This investigation is being carried further during the present year.

Theoretical investigations in the field of structural engineering have been conducted by members of the staff and by graduate students with the object of simplifying the intricate mathematical calculations required in exact investigations of the complicated bridge and building structures which have come into more or less general use in recent years.

As usual, members of the staff, in addition to the presentation of papers and discussions, participated actively during the year in the administrative affairs of scientific and engineering societies, and gave assistance to public authorities.

Professor Barrows served as President of the Northeastern Section of the American Society of Civil Engineers, Advisory Engineer of the Federal Reconstruction Finance Corporation, Chairman of the Committee on Public Affairs of the Engineering Societies of Boston, and Chairman of the Massachusetts Committee of the National Committee on Trade Recovery.

Dr. Gilboy was a member of the Committee on Earths and Foundations of the American Society of Civil Engineers, and an American delegate to the Congress of the International Commission on Large Dams held at the World Power Conference in Stockholm in the early summer, presiding at one of the division meetings as well as presenting a paper on the subject of hydraulic-fill dams.

Professor Spofford served as Chairman of the Waterways Division of the American Society of Civil Engineers, and as Chairman of the Society's Committee on Accredited Schools and of its Alfred Noble Prize Committee. He also acted as Advisory Engineer of the Federal Reconstruction Finance Corporation.

C. M. SPOFFORD.

Electrical Engineering. The official work of the department staff is of four categories — teaching, research, participation in activities of scientific and professional societies, and duties associated with Faculty activities. Various members of the staff also continue with recognized and desirable industrial associations. No depression has fallen on the intellectual activity of the Department, but the emphasis was somewhat shifted during the year. A slightly curtailed staff, associated with unimpaired numbers of graduate and senior students, has demanded closer attention by each individual staff member to our principle of making research a feature of education and has curtailed the time available for summing up and preparing for publication the results of personal researches.

The consequence is that, in addition to articles and papers which were published during the year, a number of delayed publications properly pertaining to the past year will appear in the new academic year. After the registration figures are available for the new year suitable arrangements will be proposed to prevent this situation from becoming permanent and thereby reducing the influence of the department and its staff. The importance of this point is emphasized by the increasing proportion of the graduate students of the department who are becoming candidates for the doctor's degree. This is a new tendency in American engineering education.

In their relations to national scientific and professional societies, members of the staff are sought after and can do much good work as members of important committees. For example, sixteen standing committees of the American Institute of Electrical Engineers include representatives from our staff as stated members.

The well-established activities of the Department continue in good state. We are indebted to electrical industries for continued contribution of leaders for our senior colloquia. We are also again indebted to practicing engineers and to professors in other institutions for coöperation in our comprehensive examinations for Honors Group seniors. The Honors Group plan is established in stronger influence by the recent approval by the Faculty for a general adoption of the principle in the Institute. Our complete review of the undergraduate electrical engineering curriculum, which has been under way and is drawing to a close,

will enable us to improve the arrangement of subject matter and methods of exposition. The results should contribute to the continued leadership of the department in electrical engineering education. Our ability through the depression to continue essential relations with the four companies with which we are in coöperation in our Coöperative Course in Electrical Engineering is a tribute to the wisdom of the geographical principle and the comprehensiveness principle adopted as two of the principles underlying the conditions of that course.

We have found opportunity to improve our coöperation with the Physics Department regarding the subject of acoustics and with the Chemistry Department regarding some measurements relating to infra-red light. The Department has contributed considerable equipment from its own stock for use in connection with the ultra-high-voltage Van de Graaff generator at Round Hill. The Department is studying the possibilities of the Van de Graaff idea as applied to a vacuum system for direct-current high-voltage power transmission; and it now appears to us that the ultra-high-voltage generator may enable us to carry on some investigations of phenomena of lightning not heretofore investigated.

The differential analyzer has been continued in productive service. During the year six staff problems for members of four departments (mathematics, physics, geology and electrical engineering) have been investigated and many thesis problems of electrical engineering graduate students also have been on the machine. Dr. Svein Rosseland of the Universitetets Observatorium, Oslo, Norway, spent several weeks during the latter part of the academic year examining into the desirability of building a similar machine for solving problems in celestial mechanics, in which field he is notable. He was followed by Dr. D. R. Hartree, a leading English investigator of wave functions of atoms from the university at Manchester, England, who carried out on the machine some original investigations on the wave functions of mercury atoms, as well as determined the desirability of building a machine in England for continuing such investigations. The accomplishments of the machine are receiving significant recognition in international scientific literature.

A servo-mechanism for causing a pointer to automatically

follow along a curve plotted on paper is now worked out into an operating device and soon will be applied to our purposes. The stroboscopic high-speed photography is constantly finding new fields of service. Further serviceability of the network analyzer in the solution of electric circuit problems has been disclosed, and the machine has been applied to solving the stability of electric power transmission systems. With the addition of a research associate for the work, we are making further progress in improved amplifiers and oscillographs for use in electrocardiography and allied fields of biology and medicine. An improved design was completed for a recording cosmic ray meter, and Professor A. H. Compton of the University of Chicago is having an instrument constructed from the design. Considerable progress was made in developing the instrument which we call a cinema-integraph. Other interesting researches continue regarding absolute power-factors of insulating oils, the reactance of cylindrical coils, certain aspects of electrical machinery, certain aspects of illumination, sound waves related to speech, field strength surrounding antennas, the penetration of light through fog, dissipation of fog, and other topics.

Greater convenience for both staff and students in carrying on work in our laboratories has been provided by moving the acoustics laboratory from the basement to the third floor and also moving the student shop, thereby securing some additional area for the basement instrument room and for the electronics laboratory. Hereafter the instrument rooms will be open for service in the evenings in addition to the usual daylight hours. Changes thus made merely emphasize the importance of the addition of a building wing which can serve to expand floor space available to the department work.

Professor Elihu Thomson, non-resident professor of applied electricity, became eighty years of age on March 29, 1933. His eminent achievements in electrical engineering and long-time devoted service to the Institute made it appropriate for the Institute to provide for a suitable birthday celebration. Planning and executing the occasion fell to the Electrical Engineering Department. A distinguished committee of scientists, engineers and executives within Professor Thomson's field was formed, and notable affairs in the way of a conference and a dinner

were carried out in the afternoon and evening of the day. A striking collection of early Thomson apparatus and inventions was established at the Institute and opened to the public for several days as a feature of the celebration, with the result that the general public also had an opportunity to participate in this significant event.

We are indebted to the Detroit Edison Company for a very desirable hot-filament cathode ray oscillograph.

A survey of street lighting conditions in Cambridge was made at the request of the mayor of the city.

DUGALD C. JACKSON.

Electrochemical Engineering. The curriculum of this course has undergone revision during the past year, chiefly with the view of consolidating and extending the professional work in electrochemistry of the fourth year. With the completion of the Eastman Research Laboratories, Dr. Stockbarger transferred his headquarters from the Electrochemical Laboratory to the new building in order to be near his laboratory of advanced Radiation Measurements. This has made it impossible for him to give his personal supervision to the laboratory work in Electrochemical Measurements, which he has directed in recent years. For this reason, as well as the increasing demand upon his time made by the development of his courses in Radiation, he has been obliged, much to the regret of the Department, to give up his course in Electrochemical Measurements. The Electrochemical Laboratory has therefore been placed under the immediate direction of Professor M. deK. Thompson.

The first term course in measurements has been increased from seven to nine hours per week. Professor Thompson has prepared a new set of laboratory directions in which practical applications of fundamental principles will be introduced throughout the course instead of following at the end of the course as heretofore. The work has moreover been arranged to closely follow the lecture course on theoretical electrochemistry given by Professor Goodwin at the same time. Applied electrochemistry, with its accompanying work in the electric furnace laboratory, will continue to be given by Pro-

fessor Thompson throughout the second term. These changes necessitated transferring the Electrical Engineering Laboratory of the senior year from a required to an optional subject.

Another change which has proved efficacious has been the transfer of Electronics from the Department of Physics to the Department of Electrical Engineering. This was found necessary as the students in Electrochemistry did not have the prerequisites in mathematical physics required of students in physics.

The number of students applying for admission to the course in Electrochemical Engineering appears to be increasing. The small registration in recent years undoubtedly reflected conditions which have existed in the electrochemical and metal industries, where the call for graduates has been small.

Professor Thompson spent the summer with the Goodyear Company in Akron, Ohio, working on an electrochemical problem in the development of which the company was interested. He also visited various plants both there and at Niagara Falls, where a number of Course XIV graduates are located. He reports that some of these plants are now running at full capacity.

H. M. GOODWIN.

Mechanical Engineering. During the latter half of the year, the welding equipment which had been located in an overcrowded section of the Machine Tool Laboratory was moved into the room formerly occupied by the Heat Treatment Laboratory. To this equipment was added six sets of oxyacetylene welding apparatus which were presented to the Institute.

A new elective entitled "Welding Engineering and Practice," graded as a "B" subject and covering the entire field of gas, electric and thermite welding, has been added to the Mechanical Engineering curriculum.

Two Sprague electric dynamometers of one hundred horse power and seventy-five horse power have been purchased as a much-needed addition to the equipment for Power Measurement.

The Air Conditioning Laboratory apparatus has been increased by the gift of three types of radiators—a humidifying radiator, a concealed fin tube radiator and an electric steam radiator—and the purchase of a room cooler. Increase of facilities for instruction and research in this field is desirable in view of the widespread increase in air conditioning and dehumidification in public buildings, transportation agencies, and private houses.

Professor Spannhake has continued to give the instruction in advanced courses in the field of Hydrodynamics and has carried on experimental work on Cavitation with the apparatus designed by him a year ago.

He was obliged to return to Germany in April, however, and since then the experimental work has been continued by the members of the staff and students who had worked under him during the year.

An instrument for calibrating extensometers of various types used in the Testing Materials Laboratories has been designed and constructed by Mr. R. W. Vose, a member of the staff. With this apparatus a precision of one one-hundred-thousandth of an inch can be obtained directly, and Mr. Vose is engaged in adapting the instrument to measure strains with a precision of one-five hundred-thousandth of an inch.

Two researches in the field of Testing Materials which have been carried on during the past year by graduate students in the Department may be mentioned: one on the Testing of Metals at Elevated Temperatures and one on the Cold Working Process as Applied to Steel.

A special six weeks' course for textile executives and research directors was again conducted during the second term. On Wednesday evenings for twenty-four weeks, a combined lecture and laboratory course in textile microscopy and technical analysis was offered for the first time at the request of the Division of University Extension of the State Department of Education under the direction of Professor E. R. Schwarz. More than forty men enrolled and completed the work. The Summer Session classes in these subjects were also well attended by teachers, advanced students, and men from the industry. Because of the increased interest in the optical analysis of textiles, rearrangement of machinery in the textile

laboratory was completed to provide sufficient space to double the present available room.

Research of particular interest includes the design, construction, and calibration of apparatus for determining certain thermodynamic and physical chemical properties of textile fibers, which work is to be continued in the coming year by a research assistant. The foundation for a rational analysis of yarn structure by optical methods was laid, and are search assistant is to continue the work.

The appointment by the Textile Foundation of Mr. Gordon Osborne as a senior fellow in textile microscopy has enabled us to devote a year of work to the micro-analysis of fiber structure and has resulted in the development of new techniques and pieces of equipment of considerable value in this field.

The employment of a mechanician has made possible the construction of a number of new and very important pieces of accessory equipment for the microscopical laboratory and an automatic thickness gage for the testing laboratory. Because of these facilities no extra equipment was purchased.

After a year's leave of absence, following an attack of illness last summer, Professor William A. Johnston retired at the end of the year with the title of Professor Emeritus, having served for forty-one years and engaged mainly in instruction in the field of Applied Mechanics.

Professor Harrison W. Hayward died suddenly on October 18, 1932, as the result of a heart attack. He had been a member of the Department staff for over thirty years and during the larger part of this time was in charge of the Laboratory of Testing Materials as well as the class instruction in Materials of Engineering, along which lines he was an expert.

Popular with their students and highly respected by their colleagues, always active and carrying a large share of the work to be done, the loss of these two men has been severely felt by the Department.

On June 12 Professor Edward F. Miller died after an illness of a little more than two weeks. He had served continuously as a member of the staff since 1886 and had been Head of the Department for the past twenty-two years. During the interim between the death of President Maclaurin in 1920 and the appointment of President Stratton in 1923, he was a member

of the Administrative Committee which carried on the general administrative affairs of the Institute.

During his administration of the Mechanical Engineering Department, the plans for and the continued growth in the equipment of the various laboratories under his direction, the development of a well-balanced curriculum, the contacts with the national government, which have resulted in establishing a number of special courses of study for both Army and Naval officers, have been due to his tremendous energy and untiring efforts directed solely and always in behalf of the Institute.

In addition to these, his professional contacts with state and municipal governments and a wide diversity of engineering and industrial concerns have added much to the prestige of the Institute and the engineering profession.

An expert in his chosen field, he brought into the classroom a vast fund of knowledge gained from practical experience and was able to impart to his students a far more thorough and vivid appreciation of what the Mechanical Engineer might be called upon to do in the practice of his profession than could ever be derived from the study of books alone.

Outside of the classroom he took a fatherly interest in his students. He was a friend to them and always ready and willing to give freely of his time to talk over their problems and advise them regarding their difficulties, not alone in connection with their studies, but often in relation to their personal affairs.

It may be said that no man in his profession was regarded with a greater degree of respect and gratitude and affection by his former students than he.

With the surviving members of his staff there abides an intimate sense of loss, not only of a fair and generous chief but also of an honorable colleague and a sincere friend, for whom they cherish the memories of pleasant associations and inspiring leadership through many years of service.

CHARLES E. FULLER.

Meteorology. During the year advanced studies in Meteorology were pursued by six civilian students, five of whom are continuing their work at the Institute.

One of our graduate students carried on theoretical studies of the ozone distribution in the stratosphere at the Astro-

physical Observatory in Oslo under the direction of Professor Rosseland.

Professor Rossby, on leave of absence, spent most of the winter at the Geophysical Institute in Bergen, working on the problem of atmospheric turbulence.

Through a joint arrangement with the Blue Hill Observatory, we were able to invite Dr. B. Haurwitz, then connected with the University of Leipzig, to visit the Institute. Dr. Haurwitz gave a series of lectures on the mathematical theory of atmospheric perturbations.

In June Dr. J. Bjerknes, Professor of Meteorology at the Geophysical Institute in Bergen, visited Cambridge and gave three lectures here. Plans were also made for a sounding balloon investigation by the Massachusetts Institute of Technology and the Geophysical Institute in Bergen of the vertical structure of cyclones.

The daily weather map work was carried on throughout the year. The analysis was greatly facilitated by the airplane soundings which were recorded by the Institute plane in the course of its flights from the East Boston airport.

Professor Willett's study of American air masses was completed and published in the spring of 1933. The synoptic work of the meteorological group will now be concentrated upon a study of front structures.

The airplane work was continued throughout the year, aided by a grant from the Rockefeller Foundation. The Cessna monoplane was exchanged for a Curtiss-Robin with higher climbing speed and higher ceiling. Particular efforts were made to obtain serial flights on days with front passages over Boston.

Special flights were made during the spring for the Gipsy Moth Laboratory of the United States Department of Agriculture.

A meteorological group, headed by Dr. Lange, organized and maintained a meteorological station at the National Soaring Contest in Elmira during the summer of 1933. During this period regular soundings were made every morning with our plane. This service proved very helpful to the participants in the contest.

C. G. A. ROSSBY.

Mining and Metallurgy. The field of ceramics, under development for a number of years in the Division of Industrial Coöperation, has been annexed to this Department. The staff, as well as a number of graduate students, have for several years carried on a considerable amount of research in relation to the nature of clay and its plasticity, the effects of dehydration, and the control of color in glazes. Further work has been done on insulating refractories at high temperature and the utilization of New England clays.

There has been an unusual amount of activity in the field of physical metallurgy with research done on a number of problems yielding important results, which will be published shortly. The increasing interest in the various branches of physical metallurgy shown by students of other departments has been most gratifying. In this relation, it is significant to note that the number of students electing subjects in this field is actually greater than the number for whom metallography is required. This imposes a large, although invisible, teaching load for the members of the staff as well as congestion of facilities and crowding of laboratories.

In the instruction in mining engineering there has been a strengthening of the idea and importance of dealing with economic problems incident to the natural resource industries, mining and petroleum. Much enthusiasm is evinced on the part of students, spontaneous rivalry engendered, and real progress achieved both in undergraduate classes and in the Graduate School. The graduate instruction in mining engineering is characterized by a greater diversity of subjects and problems and by participation of all staff members teaching in the field. The diverse character of these researches may be observed in the following titles: Mining Costs on the Witwatersrand; Layout of a Plan of Prospecting and Development, M. I. T. Iron Mine No. 3; Application of the Gompertz Law to the Mineral Industries; The Economic Effects of Cartels in the Mineral Industry; Analysis and Interpretation of the Annual Reports of Mining Companies; The Relation of the Price of Copper to the Wholesale Price Index; The Rise of Anthracite Coal; Estimate of Scale of Mining for M. I. T. Iron Mines No. 1 and No. 2; Computation of Maximum Total Capital which may be spent economically in development and equipment of

the same mines; Study of Air Leakage in a Mine Ventilating System; Bibliography: Methods of Fighting Mine Fires.

The amount of research at present in progress in the various branches of the Department renders it desirable to have better control of the direction and coördination of research. Accomplishment of these aims will be sought by means of selected committees, whose recommendations of research problems will be subject to action by the Departmental Committee on Graduate Students.

The laboratories of physical metallurgy now have adequate equipment for research in the following important fields: radiology; x-ray studies of alloy constitution; nitriding; corrosion and heat resistance. There have been during the year four reports of research by staff members and students printed in the publications of technical societies.

Professor Waterhouse was Howe Memorial Lecturer at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York in February. Professor Walsted lectured on applications of metallography before the Providence Section of the American Society for Steel Treating. Professor Homerberg lectured on nitriding before sections of the American Institute of Chemical Engineers in Boston, Providence and Toronto. He also wrote the chapter on nitriding for the Handbook of the American Society for Steel Treating. Professor Hutchinson delivered two lectures on content of courses and methods of teaching mine prospecting and development at Madison, Wisconsin, in July, at the meeting of the Society for Promotion of Engineering Education.

The problem of supplying industry with new men is not peculiar to this Department. It is, nevertheless, real; so much so that mention is here made of two special needs which exist today, namely, an insistent demand for men trained for research in metallurgy. It must be inferred that the members of last year's freshman class were unaware of the opportunity, otherwise there would be more than two men registered for metallurgy in the second year class. Likewise, there is a demand for men trained in ceramics, yet little interest appears on the part of students. The present trend promises, in some part, supply of men for both fields by graduate students coming from other schools, a trend which may have been caused by the publication

of research by students and members of the staff. Recommendation is made that a plan be devised for promoting the interest of students in high and preparatory schools in the fields where conditions herein described are known to exist. The problem proposed is to interpret the less spectacular fields of engineering to the students and their advisers.

W. SPENCER HUTCHINSON.

Naval Architecture and Marine Engineering. In spite of the inactivity in the shipping industry during the last few years, the enrollment in this course has maintained its steady increase for some time past, so that the facilities of the Department have been taxed to their fullest capacity at times during the session.

The course continues to attract a number of graduates from other colleges who come as Special Students to take the professional work of the Department without planning to take a degree. In Course XIII-A there was an additional class, as a result of the inauguration of the new three-year course. The work in Naval Construction is now under the guidance of Professor Rossell; Professor Hovgaard having retired, although he continues as an honorary lecturer without specific duties.

Owing to the great advance of electric welding in ship construction Professor Rossell has devoted considerable time in accumulating data and classifying it for the use of the students in this course.

It is to be regretted that the present financial situation has definitely stopped all work on the proposed experimental tank. Want of this seriously handicaps graduate work in the Department, and an unusually brilliant student who completed the work for the doctor of science degree had to take his major subject in Applied Mathematics, as the Department had no facilities for research within itself.

The Nautical Museum has been enriched by the transfer of the Henry Hastings' Collection of models and prints from the Old State House to the Institute. This collection is particularly valuable as it is a record of the old-time Massachusetts sailing ships, which era previously had not been represented in our collection.

J. R. JACK.

SCHOOL OF SCIENCE

Biology and Public Health. The year has been signalized by the successful operation of the full four-year course in each of the undergraduate options, the first students to be graduated in Public Health Engineering having completed the work during the year. There has been an increasing demand for a bachelor's degree in Biological Science without reference to a specific field of application and in anticipation of graduate work, medical study, or research. To meet this demand a program has been arranged whereby an undergraduate may make a substitution of substantial pure science courses in biology or related fields in chemistry or physics in place of those of more limited technical application. The number of students desiring to secure a scientific training preliminary to the study of medicine continues to increase, and several subjects, among them Functional Pathology and Serological Methods, have been most advantageously incorporated in these programs.

Interest in the work in technology of food products has not only been maintained but has shown constant development. This is in accordance with the recognized plans of the Department to make this important work a major interest, both in undergraduate and research programs.

Work in food technology has centered about the public health aspects of the so-called quick freezing process, although the technical procedures involved have also received consideration. The studies on the viability of microörganisms at low temperatures, closely related to the investigations just mentioned, have been continued. The problems in these fields of research have engaged not only members of the staff and graduate students but volunteer research assistants and undergraduates as well.

The Department has been engaged in research to a larger degree than ever before. All members of the staff are active in this respect, and the researches have been of comprehensive character. From funds allocated to this Department from the Rockefeller Foundation grant in aid of research, it has been possible to add to our equipment in electrical and physical apparatus for use in biological investigations. This phase of

our organized research program has been materially accelerated by the generous coöperation and loans of equipment from other departments of the Institute.

The researches on radiations in relation to disease prevention, which has been fruitfully pursued for two or three years by Professor Bunker and his assistants, have proceeded successfully and will be continued during the coming year.

Dr. Blake has been engaged on a series of investigations of much zoölogical interest. His researches on the classification of Isopods and of the Ostracods of New England have been continued and have resulted in the discovery of several species not hitherto reported. Dr. Blake's excellent scientific work has led to the request that he serve as Curator of Mollusks for the Boston Society of Natural History.

The outstanding work of Professor Turner in Health Education has led to satisfactory accomplishment. The group of graduate students in this subject was the largest in the history of the Department. A report on "Health Education in the City of Boston" has been published, this survey having been made at the request of the school authorities. An investigation of the relation between the annual growth of children and their health status has also been completed by Dr. Turner. It is the purpose of the Department to continue these investigations in the field of growth and health in the attempt to develop an ideal health education program.

The study of the biology of the air at high altitudes has been continued by Dr. Proctor in coöperation with the staff engaged in meteorological work and it is hoped that the work will be continued during the coming year.

Much progress has been made on the textbooks mentioned in the last report as under preparation, and these should approach completion during the coming year. Their publication will greatly aid in the presentation of the broad aspects, as well as specialized class material in the fields of Sanitation and Food Technology.

The Department acknowledges with gratitude the support of its Visiting Committee, and the generous and valuable assistance given by the Lecturers who have admirably presented special aspects of our work with skill and effectiveness.

S. C. PRESCOTT.

Chemistry. The year has been unusual in many respects due to the adaptation of the Department to the new George Eastman Research Laboratories and new or modified undergraduate laboratories arising from a more efficient reallocation of space made possible by the consolidation of all graduate work in the new building. Good progress has been made in utilizing the advantages growing out of the Department's new laboratories, and continued progress is assured.

The consolidation of all graduate activities in the new laboratories should in no respect be taken to indicate a separation of the Department into isolated undergraduate and graduate divisions. Any division of this kind would mean a weakening of the wonderfully stimulating influences which research has had in lifting the undergraduate curriculum to a higher and broader intellectual level. The Forris Jewett Moore Room is now used for informal but regular staff meetings. These are pleasant social events, and contribute materially to consolidate and unify the aims and aspirations of the whole Department staff.

The new quarters for graduate study were occupied for active work during September, 1932. Staff and students entered with enthusiasm upon the settling and installation of research equipment. In an amazingly short time everyone had his equipment installed in improved fashion and was pursuing research under the conditions the staff had been "dreaming" about for many years. If the support for research which has been provided in the past can be continued and perhaps reasonably augmented, the Department will unquestionably contribute increasingly to the progress of education and the growth of knowledge.

Reference is made again to the great need of liquid air for general purposes, not alone in this Department but also in the Department of Physics. Liquid air, or preferably liquid nitrogen, is the first step in providing the facilities for low temperature research, a field which was entered by the Department some years ago. From every point of view the Institute is a most suitable place for the development and prosecution of fundamental investigations at very low temperatures. The equipment would, of course, also constitute an important addition to the Institute from the point of view of refrigeration

engineering. In this connection it is apropos to recall that many millions of dollars are invested in the fractionation of liquid air to recover oxygen in pure form for continually expanding uses, as well as rare gases, yet no institution has taken the step of providing effective instruction in the subject. The whole art of low temperature operations is bristling with unsolved problems, many of which are closely related to profitable commercial exploitation.

Constant efforts for improvement in the manner of presenting the difficult first-year course in Chemistry are being made, and the Department is trying out various innovations which may or may not result in adopted practice. Certain new and untried procedures have been tested in summer school practice for two years, and the possibility of introducing them during the regular session is being considered. It is perhaps worth stating that the rapid change in the number of students registering for the course during recent years (14 per cent reduction in October, 1931, and 8 per cent in 1932) has given rise to certain difficulties in organizing the teaching schedule.

The plan of assigning the two hundred fifty students registering for analytical chemistry into sections based on their general rating and ability in Chemistry has been continued. The further step has also been taken of evaluating the individual qualifications of these students with a view to assisting them in a wiser selection of courses and electives. The equipment for instruction in analysis has been augmented, thereby improving instructional conditions for both students and staff.

The preceding report mentioned the reorganization of the basic course in organic chemistry. The new plan provides a basic course for all regular students, consisting of fifteen weeks of experimental lectures and classroom instruction designed to give a comprehensive survey of the entire field. The plan has proven to be very satisfactory and procedures have been suggested which have assisted students in organizing their knowledge. It is believed that interest in organic chemistry has been stimulated and the inherent vitality of the subject demonstrated.

During the year the students in Chemistry and chemical engineering were allowed to select "experimental problems in synthesis" from a carefully selected list, and to proceed with

the solution in the laboratory by a method based on their own study of the literature. A report on the method of solution was submitted to the instructor for criticism and approval before actual experimental work was started. The general scheme has many advantages and as it develops may be adopted in other Chemistry courses, thereby furthering the working out of procedures whereby the student plays a more positive rôle in the educational process.

The Comprehensive Examination was again given with certain modifications of procedures based on experience. It appears too early to attempt the formulation of any definite opinions regarding the benefits to be derived from this type of examination in the case of our Chemistry students. The Department is planning to continue its study of the comprehensive examination. The staff hopes to determine from this study the extent to which the quality of continuity or its deficiency exists in our Chemistry course as a whole. It is, without question, highly desirable that the student have a well-correlated grasp of science, and he can be materially assisted in attaining the desired result if the work of the four years is a carefully planned curricular structure rather than an uncoördinated collection of subjects.

Several conferences with the Visiting Committee gave opportunity for the discussion of the work of the Department, its needs, its problems, its plans. One conference was a joint meeting with the Physics Department and proved to be especially stimulating. It is a pleasure to acknowledge the Department's appreciation for the sustaining interest and helpfulness of its Visiting Committee.

FREDERICK G. KEYES.

General Science and General Engineering. The greater opportunity for placement in special fields during the economic depression has prompted many students to select the optional facilities of Courses IX-A and IX-B. In some instances a program of study has been composed which will prepare the student for a definite position.

In consequence of this experience it is probable that some of the special curricula may become sufficiently attractive to

suggest standard options in other courses. The courses in General Science and General Engineering in this sense may therefore be regarded as a proving ground for future courses of study.

R. G. HUDSON.

Geology. As in previous years, the Department of Geology has given instruction to a large number of students from other departments, three hundred and seventy this past year in addition to the twenty regularly enrolled in Geology.

There have been a large number of accessions to the collections of the Department and these have been properly labelled and catalogued. A plane table outfit with alidade was acquired for the course in Field Geology.

The new X-ray Laboratory for the study of crystal structure was installed last year and is now in operation. An important addition to this laboratory has been planned and will be finished before the opening of the fall term.

The appropriations from the Rockefeller Fund have given opportunity to carry out research which would otherwise have been impossible. Professor Buerger has continued his work in experimental mineralogy, and Professor Newhouse has made a study of mineralization processes in the field of the Triassic intrusions in the Eastern States, and also similar investigations relating to Triassic and older intrusions in Nova Scotia. Professor Morris has also been greatly aided in field work studies in New Mexico.

Professor Lindgren has continued the editing of the *Annotated Bibliography of Economic Geology* issued semi-annually under the auspices of the National Research Council. Five volumes have now appeared. Professor Newhouse and Dr. Whitehead, as well as several of the advanced students, have contributed reviews to this bibliography. Professor Lindgren also devoted much time to a new edition of his book on "Mineral Deposits." Professor Shimer has completed a revision of his volumes on "Index Fossils," and also prepared a new edition of his book on "An Introduction to the Study of Fossils."

Professor Slichter has devoted much time to the study of electrical methods of geophysical prospecting, and has published several papers on this subject. His research in general

is largely devoted to the problem of the structure of the earth's upper crust, particularly by the electrical method. The determination of the electrical conductivity function at depth in terms of observed potentials at the surface due to a direct current source has been developed. Similarly unique solutions for both dielectric constant and the conductivity function in the case of an oscillatory, or electromagnetic source have been obtained in terms of the observable electromagnetic vectors at the surface. Experimentally, extensive tests have been begun using facilities provided by the New England power companies, which will permit the use of the direct current method for obtaining knowledge of the variation of the electrical conductivity in the crust at great depth. An area including the power line between Clinton (Massachusetts) and Boston is being used in this study.

Professor Morris has continued the preparation of the work on the results of the Roy Chapman Andrews expedition in Central Asia, of which four volumes are now published which contain the contributions from Professor Morris.

Professor Newhouse continued his research work during the year on the areal and structural relations of the Appalachian ore deposits. During the past summer about six weeks were devoted to field work of a variable mineralization in Nova Scotia ranging in age from Cambrian to Triassic. Professor Newhouse has also made extensive investigations of vanadium, molybdenum, tungsten, and chromium in oxidized lead ores which will be published at an early date. He will also present a paper at the coming meeting of the Sixteenth International Geological Congress, in Washington, on the Triassic mineralization. A new investigation, which will be concluded and published at an early date, relates to the temperature of formation of the Mississippi Valley lead-zinc deposits.

Professor Buerger, in part aided by R. D. Butler, has completed several studies on immersion liquids, which will be published early in the fall. Papers are in press prepared by Professor Buerger, in part aided by Newton W. Buerger.

The combination of the libraries of the Departments of Geology and Mining and Metallurgy will make available to both Departments facilities for reference and reading which will be easily accessible and convenient.

Professor Lindgren retired in June, 1933, with the title of Professor Emeritus and will remain during the coming year as an honorary lecturer without specific duties. Professor Shimer will assume the position as Acting Head of the Department.

WALDEMAR LINDGREN.

Mathematics. In general the work of the Department has proceeded along usual lines, smoothly and efficiently. A new departure has been the establishment of a seminar in mathematics, in which papers have been presented by students. For more advanced work of this nature, members of the Department have been active in the "Cambridge Colloquium" — a joint activity of Harvard, Brown and Technology. A seminar in Probability has also been conducted.

The most important event of the year has been the establishment of Course XVIII, leading to the degree of Bachelor of Science in Mathematics. A student graduating in this course will have had a training equivalent to that given to candidates for a master's degree in many colleges.

Although a list of publications appears elsewhere, it may not be out of place to call attention to the fact that three books of more than usual importance have been published by members of the Department this year. Other books are in preparation.

F. S. WOODS.

Physics. The George Eastman Research Laboratory, into which the Department moved at the beginning of the year, provides for the first time a suitable home for research in Physics at the Institute. Moving was accomplished with relatively small interruption of work, and there have been many researches satisfactorily progressing during the year. Gratifying as an indication of the outside recognition of the Institute's growing importance in investigation in Physics has been the increasing number of national and international research fellows, there having been six National Research Fellows, one International, and one Rockefeller Research Fellow in the Department during the year.

The laboratory was dedicated in May, with suitable ceremonies, and addresses by notable speakers. Many guests from outside the Institute attended the exercises, and inspected the laboratory. In addition to this, there have been several other occasions during the year on which the Department has been the host for scientific meetings. In September, 1932, some of the sessions of the International Astronomical Union were held in the laboratory, and in February, 1933 the New England Section of the American Physical Society met here. Finally, during July, 1933, a Spectroscopic Conference was held at the Institute, attracting a large group of visitors. A week's program included the presentation of valuable papers dealing with all phases of spectroscopy and various social events. This conference was the principal event of a summer's activity in the Spectroscopy Laboratory, which included a new course in practical spectroscopy, attracting a number of industrial spectroscopists as well as those from the fields of science. At the same time, the facilities of the laboratory were extended to a number of visiting spectroscopists during the summer, coming for longer or shorter periods to do research with the excellent equipment available. It is hoped that the summer spectroscopic program may be continued another year.

In general the year has been one of settling down to work under satisfactory conditions, after the more difficult transition period of the preceding year. Some problems connected with the research program still remain, however. The lack of a cryogenic laboratory, mentioned in last year's report, continues to be felt, despite helpful activity of members of the Visiting Committee and others with the object of finding temporary sources of liquid air. More serious, though not immediate, is the question of research funds. The Rockefeller fund has been the mainstay of the Department's research during the last two years of difficult finances, and the Department feels profound gratitude that such a means of developing and continuing the research has been available. However, the other departments have been generous to Physics, allotting large appropriations from the fund in recognition of our expanding program, and this should not be expected to continue. Further, the payments from the fund have now reached their peak, and begin to

decrease. A research fund to supplement and eventually replace the Rockefeller fund seems to be the greatest problem which will face the Institute in the matter of scientific research in the next few years.

JOHN C. SLATER.

SCHOOL OF ARCHITECTURE

Architecture. The present reputation and past accomplishments of the Department are in so large a part attributable to the services rendered by the four teachers who retired at the end of the past academic year, that no annual report would be complete without paying tribute to the devoted work of W. Felton Brown in Freehand Drawing, Jacques Carlu in Design, John O. Sumner in History and Civilization, and C. Howard Walker in Philosophy of the Fine Arts. Their individual personal qualities quite as much as their high scholarly attainments endeared them to many generations of students and assured to the School of Architecture its eminence among the schools of the country.

Certain changes in procedure will characterize future work for the degree of Master in Architecture. The study in History, which has hitherto been carried on by lectures and reading, will be marked by research work and conferences supplemented by lectures. The facilities of the Public Library and Museum of Fine Arts will be utilized for this purpose. Furthermore, applicants for the master's degree will hereafter be required to present a thesis covering at least ten weeks of work in addition to satisfactorily meeting the existing requirements for this degree. These changes both tend to enhance the quality, and thereby the desirability, of the master's degree.

Final preparations have been completed for the opening of the new course in City Planning. This accomplishment is the more noteworthy because of the assistance assured by the Carnegie Corporation and the distinction gained through the participation of Sir Raymond Unwin in the group of outside lecturers.

Changes are constantly being made in Design teaching procedure. Of these particular note might be made of the effort

to organize and unify the sequence of programs in the successive grades so that the student should benefit from a reasoned succession of problems throughout his years of study. The policy in regard to teaching abstract design in the early years, alluded to in a previous report, is being satisfactorily developed. One of our instructors, Mr. S. B. Zisman, secured a scholarship enabling him to pursue his studies on these lines during the present summer at the University of Oregon under the noted Viennese teacher, Professor Steinhof. Another one of our instructors, Mr. J. L. Reid, is correspondingly using this summer to study better methods of coördinating freehand drawing with architectural design under the direction of M. Despujols at Fontainebleau.

Curriculum changes that will broaden the scope and improve the quality of our schedule of courses were accomplished during the year by the creation of a new subject in the field of general studies entitled General Science, and by the modification and better articulation of the teaching of mathematics and applied mechanics.

The School of Architecture is indebted, as in the past, to friends who have made it possible to send one or more students annually for a summer of study at Fontainebleau. The Department wishes to express its appreciation to Mrs. Robert W. Emmons, Mr. and Mrs. Richard Wheatland, Mr. Edwin S. Webster, and Mr. J. Lawrence Mauran for their friendly generosity in this connection.

WILLIAM EMERSON.

Architectural Engineering. The general policy already established has been continued during the year without important change. There has been some demand on the part of certain students for a somewhat greater flexibility in the professional courses of the third and fourth years. In one instance it was desired to include certain courses in refrigeration by a young man expecting to enter construction work in connection with the frosted food enterprise; in another, a student interested in the lighting of buildings wished to include certain courses in electricity, color and illumination. Both cases were met through consultation with other departments and the sub-

stitution of the desired courses for some of the strictly professional work in architectural engineering. This procedure was somewhat in line with a suggestion which has since been made for coöperative work among certain departments, a policy which if properly safeguarded seems to be highly desirable.

W. H. LAWRENCE.

Drawing. While there has been no important change during the year in the method of teaching Drawing and Descriptive Geometry, the course has been constantly studied and minor modifications have been introduced, always with the object of reducing the matter presented in class to its simplest and most obviously fundamental form. The students are thus given a concise but very effective equipment with which to work and are required to adapt this equipment to the solution of many types of original illustrative problems. The result is a facility and confidence in approaching new work and a most gratifying response and interest on the part of the students.

Through retirement, the Division has lost the member who has been longest on its staff, Associate Professor Ervin Kenison, appointed Assistant in Drawing and Descriptive Geometry in 1893 and actively engaged in teaching in the Division since that time.

W. H. LAWRENCE.

DIVISION OF HUMANICS

Economics and Statistics. Apart from the efforts of the Staff to improve instruction in the several courses in Economics, there is little to report. Most of the members of the Department rendered public service in discussions of economic questions before clubs, churches and business organizations, and particularly during the months when "Technocracy" was a favorite subject for discussion.

Plans have been devised for supplementary notes for the courses in Elementary Economics. Chapters supplementary to the textbook have been prepared by several members of the Staff. In view of the rapid changes which have taken place in our economic structure, it is believed that these additions will

be of service and increase the interest in the subject matter.

Professor Doten continued to serve as a member of the North American Economic Advisory Committee of Rotary International, assisting in the preparation of a report on the laws of Canada, Mexico and the United States concerning commercial bribery.

Professor Dewey served as a member of an Arbitration Board in a dispute between the Order of Railway Conductors, Brotherhood of Railroad Trainmen *vs.* the Illinois Central Railroad Company in February, 1933.

DAVIS R. DEWEY.

English and History. An increase in serious interest in their work in English and history, and an appreciation of its value to them, both as a part of their general education and as giving them practical training in the command of written and spoken English, has marked the attitude of the students during the past year. This is due in considerable measure to the policy of the Department in offering options in the required courses of the first two years. The fundamental training is maintained in all these options; but the subject matter is varied in order to appeal to the interests of different types of students. With their understanding of the importance of English thus enlarged, the men do better work in the courses in writing and speaking required in the upper years. Members of the Department take advantage of every opportunity to encourage and assist students in related activities outside the formal courses of instruction. The Dramashop has been developed by Professor Fuller into a well-established and highly successful organization; the men working on the student publications, besides obtaining regular criticism in class of their writing, consult Mr. Fassett regularly on their general problems. Men who are writing articles for publication or preparing papers for presentation before the undergraduate professional societies, or who intend to enter the contest for the Stratton prizes in public speaking request and receive suggestions for improving their work; students organizing in groups for social purposes or for discussion also seek advice. Perhaps most important of all is the counsel given in the regular conferences between the individual student and his instructor with the purpose of extending the range of the

student's reading and developing his taste for literature. In all this informal work, which is necessarily on a personal basis, the attitude of the instructor counts for much; the Department is fortunate in having a staff of men who see the value of thus rounding out and reënforcing their classroom instruction.

HENRY G. PEARSON.

Military Science and Tactics. During the year an effort has been made to broaden the scope of the subjects taught by the Department to freshmen and sophomores. The total number of hours allotted to the mechanics of infantry drill has been reduced for the purpose of adding to the program of the first year a few lectures on such subjects as the obligations of citizenship and the current international situation. This change should add interest to these courses, but improvement of the courses of the second year has not yet been satisfactorily completed. To bridge the interval between the first year, when the student appears in ranks, and the third year, when he appears as a drill instructor, it will probably be desirable to divide the time now allotted to freshman infantry drill equally between the freshman and sophomore classes. This will enable the student to pass normally through the various military grades and, by doubling the size of the regiment, will double the number of students receiving practical instruction in leadership and command. At the same time, it will eliminate armory drills and the costs connected therewith, but it will also entail an increase in rifles and uniforms kept on hand and for which storage space is not now fully available.

The only change in the programs of the third and fourth years has been toward an increased emphasis on instruction in leadership. The large enrollment in the Advanced Course has made it difficult to give students as much practical work in leadership as is to be desired, but it has been possible to prepare a special program for juniors which is reasonably satisfactory.

The Varsity, R. O. T. C., and Freshman Rifle Teams again had a successful year, although, as in the past, they were handicapped by the small range available.

S. C. VESTAL.

Modern Languages. There have been few changes in the policies or general activities of the Department in the last year. Owing to the decline in the number of students, classes have been smaller, but the quality of the work has been improved. Successful experimentation has been carried on in new textbooks and class materials. For the first time the practice of holding final examinations in the regular examination period of each term in all the larger courses has been replaced by exclusive reliance on recitation grades and fairly frequent hour examinations, two of the latter having the character of a final. Altogether the results have been satisfactory.

The interest of students has been stimulated by the frequent opportunities of seeing foreign language films at greatly reduced rates, thanks to the courtesy of the Fine Arts Theater of Boston, and especially to the generosity of the Harvard French Films Association which has frequently sent us free tickets to distribute to the students in our courses. The collections of reference books and foreign language phonograph records have received important additions.

More departments than ever before have referred their graduate students to our Department for the special examinations to meet the language requirements for higher degrees. The policy has been to offer these examinations at the mutual convenience of the individual student and the Department, thus reducing the interference with graduate studies to a minimum.

During the second term a group of students petitioned to have a course in elementary Russian offered at the Institute in view of the increasing importance of Russian as a language for scientific research and the increasing opportunities for young American engineers to secure contracts with Russian firms. Though for various reasons it was impossible to comply with this request, a room was placed at the disposal of the students interested, and a native Russian teacher secured with whom they made private arrangements. About twenty students took advantage of these lessons for which, of course, no academic credit was given.

Finally, it is a pleasure to report that the interest of our students in foreign languages, not only as scientific tools, but as an opportunity for knowing and appreciating other nations has shown a most gratifying increase during the last five years and particularly this last year. E. F. LANGLEY.

The Treasurer

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, 1933, 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:

George Blackburn Memorial Fund (additional)	$52,650.00	
Albert G. Boyden Fund, for Scholarship (additional)	28,390.00	
Howard A. Carson Fund, for Endowment	1,000.00	
Coleman duPont Fund, for Endowment (additional)	5,448.69	
J. A. Grimmons, Perpetual Loan Scholarship (additional)	3,139.23	
James H. Haste Fund, for Student Aid (additional)	27,400.00	
Industrial Fund, Contributions	9,000.00	
Preston Player Fund, for Endowment	20,000.00	
John P. Schenkl Fund, for Scholarships	23,821.12	
Elihu Thomson Fund, for Professorship in Electrical Engineering	1,479.60	
William Lyman Underwood Fund, for Biology (additional)	2,128.00	
Horace Herbert Watson Fund, for Endowment (additional)	207.44	
		$174,664.08

Miscellaneous Gifts:

J. E. Aldred, for Lectures	$1,671.22
Albert Fund, for Student House (additional)	4,000.00
American Tel. & Tel. Co., for Course VI-A	3,750.00
Anonymous, for Dean's Special Fund	500.00
Anonymous, for Electrical Engineering Department	5,000.00
Anonymous, for Special Salary	5,000.00
Anonymous, for Special Salary	2,000.00
F. M. Becket, for Aldred Lecture Fund	225.00
Boston & Maine Railroad, for Course I-A	3,000.00
Godfrey L. Cabot, for Fog Research at Round Hill	500.00
Contributions, Professors' Fund	14,526.38
Contributions, Richard's Portrait Fund	50.00
Contributions, Stratton Prize Fund	1,780.00
Lammot duPont, for Course XV Fellowship	1,500.00
Lammot duPont, for Boat House	2,000.00
E. I. duPont de Nemours Co., for Fellowship	1,500.00
Eastman Kodak Co., for Biocinema Research	87.05
William Emerson, for Town Planning Course	941.66
Edward A. Filene, for Aldred Lecture Fund	100.00
General Electric Company, for Course VI-A	3,750.00
Col. E. H. R. Green, for Research at Round Hill	20,000.00
Charles Hayden, for Course XV Fellowship	1,500.00
L. J. and Mary E. Horowitz, for Course in Building Construction	8,000.00

John R. Macomber, for Business and Engineering Department	$500.00	
John R. Macomber, for Course XV Fellowship	500.00	
Redfield Proctor, for Traveling Fellowship	2,500.00	
Rockefeller Foundation, for Fluid Research (additional)	41,250.00	
Rockefeller Foundation, for Meteorological Research	3,000.00	
Alfred P. Sloan, Jr., for Graduate Scholarship	1,000.00	
Charles A. Stone, for Course XV Fellowship	1,500.00	
		$131,631.31
Total Capital and Miscellaneous Gifts		$306,295.39

During the past year no new construction has been undertaken. Alterations have been reduced to a minimum, but all necessary repairs have been made and the plant and facilities are in good condition.

Operating income dropped $250,000 under the previous year. The student fees were $114,000 less and income from investments, gifts and miscellaneous sources, $136,000 less. The income from investments was reduced only $7,500 in total, additional income available under the Eastman Contract being nearly sufficient to offset the considerable fall-off in dividends and the interest defaults on nine bond issues held in our list.

To meet this drop in income, operating expenses were reduced $265,000 under the previous year — academic $180,000, administration $19,000, plant $54,000, miscellaneous $12,000.

The application of the so-called Salaries Reserve Plan to all persons on the Institute pay roll — in force for the past year and again the coming year — resulted in savings by the entire personnel.

The operating deficit for the year of $4,772.72 compares with $20,191.81, a year ago. This brings the current deficit of the Institute to $35,426.95.

The book value of the endowment funds $32,731,000 is an increase of about $80,000 over the previous year.

The market value of all securities in which these funds are invested was, on June 30, 1933, approximately 82 per cent of the book value — a considerable improvement over the figures of a year ago.

The net yield on all of the investments of the Institute for the past year was 4.47 per cent compared with 4.54 per cent in 1931-32.

August 15, 1933.

Executive Committee,
Massachusetts Institute of Technology,
Cambridge, Massachusetts

Report of Technology Loan Fund Committee

Dear Sirs:

I desire to make the following report of the Technology Loan Fund Committee for the fiscal year ended June 30, 1933.

The cash subscriptions amounting to $357,634.18 were received from the Estate of George Eastman in full settlement of his remaining subscriptions discounted at 4 per cent. Other subscriptions amount to $3,700, income from securities and interest on uninvested cash amounts to $25,423.65, making a total of $386,757.83 received by the Fund this year.

At the request of the Institute we have paid $189,695.92 to reimburse it for loans made to students during the year.

I enclose cumulative statement for the three fiscal years ended June 30, 1931, 1932, and 1933, together with statements showing how the balance of the Fund is now constituted.

STATEMENT OF RECEIPTS AND DISBURSEMENTS

	Fiscal Year Ended June 30, 1931	*Fiscal Year Ended June 30, 1932*	*Fiscal Year Ended June 30, 1933*	*Total*
Subscriptions received from Contributors in cash	$654,792.25	$25,000.00	$357,634.18	$1,037,426.43
Subscriptions received from Contributors in securities in lieu of cash-value when received	73,093.75	11,000.00	3,700.00	87,793.75
TOTAL SUBSCRIPTIONS	$727,886.00	$36,000.00	$361,334.18	$1,125,220.18
Income on securities and interest on Cash on hand	17,966.01	18,202.66	25,423.65	61,592.32
TOTAL RECEIPTS	$745,852.01	$54,202.66	$386,757.83	$1,186,812.50
†Advances to Institute for loans to students	53,848.00	173,484.01	189,695.92	417,027.93
BALANCE OF FUNDS	$692,004.01	*$119,281.35	$197,061.91	$769,784.57

*Deficit for year.
†See Schedule P.

STATUS OF FUND AS OF JUNE 30, 1933

Securities received from Contributors in lieu of cash and included herein at the value when received		
195	Consol. Gas Elec. Lt. & Power Co. of Baltimore. .	$25,000.00
65 98/600	Electric Bond & Share Co.	10,000.00
250	Intl. Power Securities $6 pfd.	6,000.00
356 111/200	North American Co. com.	22,075.00
250	Stone & Webster	24,718.75
		$87,793.75
Securities Purchased		*Cost*
$27,000	Atl. Gulf & W. I. S/S 5s 1959.	$14,580.00
50,000	Balt. & Ohio R.R. conv. 4½s 1960	50,625.00
50,000	Bost. Elevated Rwy. 6½s 1957	50,000.00
126,000	Bklyn Man Transit 6s 1968.	119,110.00
25,000	Ches. & Ohio Rwy. 6s 1934	24,937.50
75,000	Chgo. No. Western Rwy. conv. 4¾s 1949	74,625.00
75,000	Chgo. R. I. & Pac. Rwy. conv. 4½s 1960.	74,812.50
20,000	Eastern Util. Assoc. 5s 1935	19,700.00
50,000	Edison Elec. Illuminating Co. 5s 1936	49,500.00
50,000	Intl. Cement Corp. 5s 1948	39,250.00
20,000	Toledo Edison 1st Mtge. 5s 1962	19,100.00
	Prepaid Income on Investments	76.39
		$536,316.39
	TOTAL INVESTMENTS	$624,110.14
	Cash on hand	145,674.43
	TOTAL FUND	$769,784.57

Respectfully submitted,

(Signed) CHARLES HAYDEN, *Chairman.*

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

BALANCE SHEET, JUNE 30, 1933

Assets

Investments (as listed below)	$639,376.75
Cash	66,325.92
Total	$705,702.67

Liabilities

Teachers' Annuity Fund (5% salary deduction, plus interest)	$392,128.70
M. I. T. Pension Fund (3% of salary deducted, plus interest)	265,164.52
Reserve Fund (and interest)	26,899.88
Special Reserve for Annuity Payments	21,509.57
Total	$705,702.67

Par	*Investments* (as above)			*Book Value*
$10,000	Dominion of Canada	4½%	1936	$9,825.00
10,000	City of Montreal	5%	1936	10,000.00
30,000	City of Montreal	5%	1942	29,750.00
35,000	Gov't of U. K., G. B. & Ireland	5½%	1937	35,731.00
35,000	Allis Chalmers Mfg. Co.	5%	1937	35,003.00
2,000	American Sugar Refining Co.	6%	1937	2,025.00
15,000	Chicago P. O. Service Bldg.	5½%	1936	15,000.00
10,000	Chile Copper Co.	5%	1947	9,587.50
35,000	Standard Oil Co. of N. Y.	4½%	1951	33,720.00
25,000	Texas Corp. Conv. Deb.	5%	1944	25,420.00
35,000	Am. Tel. & Tel. Co.	5%	1946	35,929.00
30,000	Bell Tel. Co. of Penna.	5%	1948	32,533.00
10,000	Cedars Rapids Mfg. & Power Co.	5%	1953	10,000.00
25,000	Central Hudson Gas & Elec. Co.	5%	1957	25,000.00
25,000	Conn. Light & Power Co.	5%	1962	23,812.50
29,000	Mississippi River Power Co.	5%	1951	29,436.00
30,000	New York Edison Co.	5%	1951	29,025.00
30,000	New York Power & Light Corp.	4½%	1967	29,400.00
30,000	Public Service Elec. & Gas Co.	4%	1971	29,775.00
30,000	Tenn. Elec. Power Co.	5%	1956	29,900.00
10,000	Canadian National Railways	4½%	1957	9,775.00
25,000	Canadian Pacific Ry., Eq. Tr.	5%	1944	25,468.00
5,000	Chicago & N. W. Ry. Co., Eq. Tr.	5%	1937	5,000.00
21,000	Cleveland Union Term. Co.	4½%	1977	21,393.00
16,000	Kans. City, Memphis & Birm. R. R.	5%	1934	16,000.00
25,000	Pere Marquette Rwy. Co.	4½%	1980	24,812.50
22,000	Southern Ry. Dev. & Gen. Mtge.	4%	1956	19,580.00
27,000	Union Pacific R. R.	4½%	1967	23,976.25
7,000	Central Mfg. District 1st Mtge. "B"	5½%	1937	7,000.00
5,000	General Electric Special Stock (500 shares)			5,500.00
$644,000				$639,376.75

Respectfully submitted,

EVERETT MORSS,
Treasurer.

September 15, 1933.

SCHEDULE A

FINANCIAL RESULT OF OPERATION FOR YEAR ENDED JUNE 30, 1933 COMPARED WITH THE PREVIOUS YEAR

	1931–1932	*1932–1933*
Current Operating Expense (Schedule C)	$3,938,801.20	$3,327,863 44
Current Operating Income (Schedule B)	3,702,184.89	3,288,536.07
Excess Expense	$236,616.31	$39,327.37
PROFIT AND LOSS		
Net Loss (Schedule S)	.....	954.68
Net Profit	4,616.59	.....
Net Loss	$231,999.72	$40,282.05
Excess Expense of Funds, charged to Funds	216,424.50	34,554.65
Increase of Current Deficit, 1931–32	$15,575.22	.....
Increase of Current Deficit, 1932–33, Schedule S	.....	$5,727.40

SCHEDULE B

OPERATING INCOME FOR YEAR 1932–1933

	Regular Courses	*Research and Funds*	*Total*
INCOME FROM STUDENTS:			
(*a*) Tuition Fees	$1,425,684.12	.....	.....
Locker Fees	1,081.85	.....	.....
Entrance Examination Fees	2,645.00	.....	.....
Condition Examination Fees	6,110.00	.....	.....
Late Registration Fees	1,315.00	.....	.....
Net Dormitory Income (Schedule C-20)	38,615.72	.....	.....
	$1,475,451.69	.....	$1,475,451.69
INCOME FROM INVESTMENTS:			
Endowments, General Purposes (Schedule M)	$1,163,822.13	$5,832.39	$1,169,654.52
Endowments, Designated Purposes (Schedule M)	67,010.60	209,546.20	276,556.80
(*b*) Net (Schedule M)	$1,230,832.73	$215,378.59	$1,446,211.32
INCOME FROM OTHER SOURCES:			
Federal Aid from Acts, 1862–90	$22,255.01	.....	.....
American Telephone and Telegraph Co., Course VI-A	3,750.00	.....	.....
General Electric Co., Course VI-A	3,750.00	.....	.....
Boston & Maine R.R., Course I-A	3,000.00	.....	.....
Horowitz Foundation	8,000.00	.....	.....
W. E. Nickerson Fund	5,319.60	.....	.....
Division of Laboratory Supplies	4,799.71	.....	.....
Trustees H. C. Frick Estate	6,060.61	.....	.....
Bank Interest	3,095.38	.....	.....
Huntington Hall Rentals	3,500.00	.....	.....
Walker Building, Boston	10,000.00	.....	.....
	$73,530.31	.....	$73,530.31
MINOR FUND EARNINGS:			
Total (Schedule R)	.....	293,342.75	293,342.75
TOTAL OPERATING INCOME (Schedule A)	$2,779,814.73	$508,721.34	$3,288,536.07

(*a*) TUITION FEES — Cash, Institute Year 1932–33 $967,839.60
Cash, Summer Session 1932 118,582.43
Fees Receivable 3,307.84
Undergraduate Scholarships 75,050.00
Graduate Scholarships 52,124.25
Technology Loan Fund, Loans 203,780.00
Emerson Fund, Loans 5,000.00
Total $1,425,684.12

(*b*) Additional Income offset by Accrued Interest, etc. $39,679.98

SCHEDULE C

OPERATING EXPENSE FOR YEAR 1932–1933

	Regular Courses	*Research and Funds*	*Total*
ACADEMIC EXPENSES:			
Salaries of Teachers (C-1)	$1,554,041.70	.....	.....
Wages Accessory to Teaching (C-1)	46,311.03	.....	.....
Wages, Laboratory Service (C-1)	62,691.75	.....	.....
Department Expenses (C-2)	133,651.88	.....	.....
General Library (C-3)	62,418.45	.....	.....
	$1,859,114.81	.....	$1,859,114.81
ADMINISTRATION EXPENSES:			
Salaries, Officers	$98,666.58	.....	.....
Wages, Clerical Staff (C-4)	75,386.92	.....	.....
Expenses, Offices (C–5)	24,376.65	.....	.....
Bulletins and Publicity (C-6)	12,347.13	.....	.....
General Expense (C-7)	102,932.82	.....	.....
	$313,710.10	.....	$313,710.10
PLANT EXPENSES:			
Wages, Building Service (C-8)	$125,413.73	.....	.....
Power Plant Operation (C-9)	86,243.70	.....	.....
Fire Insurance (Net)	1,588.31	.....	.....
Repairs and Alterations (C-10)	110,483.94	.....	.....
	$323,729.68	.....	$323,729.68
MISCELLANEOUS EXPENSES:			
Department of Hygiene (C-11)	$62,304.81	.....	.....
Summer Camps 1932 (C-12 and C-13)	6,255.26	.....	.....
Athletic Field, Boat House and Launches (C-14)	14,542.81	.....	.....
Special Appropriations (C-16)	188,108.72	.....	.....
*Walker Memorial (C-17)	16,821.26	.....	.....
	$288,032.86	.....	$288,032.86
EXPENSES OF MINOR FUNDS:			
Total (Schedule R)	.....	$362,812.77	$362,812.77
AWARDS FROM FUNDS:			
Total (Schedule C-18)	.....	$158,096.58	$158,096.58
PAYMENTS FROM SPECIAL FUNDS:			
Total (Schedule C-19)	.....	$22,366.64	$22,366.64
TOTAL OPERATING EXPENSE (Schedule A)	$2,784,587.45	$543,275.99	$3,327,863.44

* Not including Dining Service (see Schedule C-15).

SCHEDULE C-1

SALARIES OF TEACHERS, WAGES ACCESSORY TO TEACHING AND LABORATORY SERVICE

Department	*Teachers Salaries*	*Wages Accessory to Teaching*	*Wages Laboratory Service*
Summer Session	$95,825.41	.....	.....
Aeronautical Engineering	87,066.61	$2,097.00	*.....
Architecture	73,383.34	3,596.37	$2,346.16
Biology and Public Health	43,825.00	1,400.00	1,820.00
Business and Eng. Administration	54,403.00	1,583.00	.....
Chemistry	171,502.42	5,576.20	4,353.00
Chemical Engineering	62,000.00	1,500.00	1,820.00
Chemical Engineering Practice School	13,050.00	*.....	*.....
Civil Engineering	106,028.00	4,244.00	.....
Division of Laboratory Supplies	.....	.....	17,319.96
Drawing	28,500.00	312.00	.....
Economics	39,800.00	2,952.00	.....
Electrical Engineering	141,213.33	5,448.00	11,562.18
English and History	64,700.00	956.42	.....
General Eng. and General Science	1,000.00	.....	.....
General Studies	1,600.00	.....	.....
Geology	37,200.00	1,766.26	.....
Humanics	5,000.00	.....	.....
Lantern Operation	.....	.....	1,003.95
Mathematics	74,325.00	1,100.00	.....
Mechanical Engineering	156,960.00	6,037.78	14,028.70
Military Science	7,495.00	1,000.00	.....
Mining and Metallurgy	71,950.00	2,653.00	4,744.60
Modern Languages	20,150.00	499.00	.....
Naval Architecture	40,950.00	1,318.00	1,873.20
Physics	156,114.59	2,272.00	1,820.00
Totals (Schedule C)	$1,554,041.70	$46,311.03	$62,691.75

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

SCHEDULE C-2

*DEPARTMENT EXPENSES (Net)

Department	*Expense (Net)*
Aeronautical Engineering	*$5,361.18
Architecture	3,036.83
Biology	*3,043.28
Business and Engineering Administration	*5,944.78
Chemistry	14,318.16
Chemical Engineering	5,575.13
Chemical Engineering Practice School	11,743.09
Civil Engineering	*2,022.30
Drawing	373.02
Economics	1,681.63
Electrical Engineering	*27,274.69
English and History	263.04
General Engineering and General Science	567.98
General Studies	148.50
Geology	1,778.76
Humanics	321.10
Mathematics	*263.68
Mechanical Engineering	*15,439.75
Military Science	1,402.45
Mining and Metallurgy	6,511.19
Modern Languages	120.09
Naval Architecture	998.56
Physics	*25,000.00
United States Army and Navy Officers	462.69
Totals	$133,651.88
	(Schedule C)

SCHEDULE C-3

GENERAL LIBRARY

Salaries of Officers	$14,838.00
Wages, Clerical Staff	31,875.90
Expenses	15,704.55
Total (Schedule C)	$62,418.45

*Certain special appropriations not included (see Schedule C-17).

SCHEDULE C-4
WAGES, CLERICAL STAFF, ADMINISTRATION OFFICES

Offices of the President and Vice-President	$6,547.15
Dean of Science	780.00
Dean's Office	2,040.00
Registrar's Office	26,069.13
Secretary's Office	8,244.25
Bursar's Office	20,569.63
Superintendent's Office	7,677.76
Undergraduate Scholarship and Loan Fund Board	3,459.00
Total (Schedule C)	$75,386.92

SCHEDULE C-5
EXPENSES, ADMINISTRATION OFFICES

Offices of the President and Vice-President	$2,595.24
Dean of Science	37.98
Dean's Office	427.40
Registrar's Office	10,583.18
Secretary's Office	1,562.21
Bursar's Office	3,999.83
Superintendent's Office	2,587.72
Undergraduate Scholarship and Loan Fund Board	1,207.87
Graduate School and Scholarship Committee	302.79
New Student Publicity Account	1,072.43
Total (Schedule C)	$24,376.65

SCHEDULE C-6
BULLETINS AND PUBLICITY

Advertising — M. I. T. Publications	$1,646.59
Printing — President's and Treasurer's Reports	1,278.00
Directory	1,226.50
Summer Session 1933	1,235.00
General Catalogue	4,289.50
Graduate Pictorial Booklet	2,671.54
Total (Schedule C)	$12,347.13

SCHEDULE C-7
GENERAL EXPENSE

News Service	$6,153.30
Allowances	19,400.00
Pensions	7,120.00
Care of Securities	20,000.00
Workman's Compensation and General Liability Insurance, etc.	6,406.82
Taxes, Cambridge and Maine	8,078.24
Auditing	1,000.00
Miscellaneous Dues, Fees, etc.	1,276.08
Receptions, Graduation	5,493.22
Ice — ice water	779.41
Trucking of Mail	831.68
Travel	5,256.27
Telephone Service	20,663.77
Catalogue of Former Students	2,538.44
Total	$104,997.23
Less Credits	2,064.41
Total (Schedule C)	$102,932.82

SCHEDULE C-8

WAGES, BUILDING SERVICE

Shop Foremen (net)	$4,559.02
Janitors: Supervisory and Staff	58,688.83
Night Cleaners	20,889.00
Watchmen (including Cambridge Police)	15,811.47
Window Cleaning	7,406.25
Heating and Ventilation	8,487.10
Messengers, Mail, Elevator, Shipper, Stock Room, Matron	9,572.06
Total (Schedule C)	$125,413.73

SCHEDULE C-9

POWER PLANT OPERATION (Net)

Coal	$65,835.93
Water	2,688.80
Supplies	2,151.15
Repairs	8,565.74
Trucking, etc.	290.26
Salaries	29,217.98
Electricity, Rogers Building	2,997.60
Total	$111,747.46
Less Transfers and Credits	25,503.76
Total (Schedule C)	$86,243.70

SCHEDULE C-10

REPAIRS, ALTERATIONS AND MAINTENANCE

Buildings 1, 2, 3, 4, 5, 6, 8, 10, 11	$42,035.38
Rogers Building, Boston	2,887.96
Buildings No. 30, 31, 33, 35, 36, 38, 46	1,814.90
Miscellaneous Wooden Buildings, etc.	908.12
Alterations	13,472.34
President's House	2,922.30
Furniture	3,498.42
Elevators	1,803.26
Mains and Conduits	5,600.07
Water	7,602.76
Gas	2,943.64
Grounds, Roads, Tennis Courts, etc.	20,202.48
Building Protection	1,284.95
Rubbish	2,291.20
Undistributed (net)	1,216.16
Total (Schedule C)	$110,483.94

SCHEDULE C-11

DEPARTMENT OF HYGIENE

Salaries, Medical Director, Assistants and Infirmary Staff		$30,981.95
Additional Medical Services		1,040.00
Physical Training and Coaching		21,229.00
Medical and Other Supplies		1,317.62
Physical Examinations		3,218.33
Nutrition Class		1,200.00
Equipment		829.10
Food Account, Cost	$2,806.35	
Less Income	2,493.89	
		312.46
Laundry		845.53
Miscellaneous		1,330.82
Total (Schedule C)		$62,304.81

SCHEDULE C-12

CIVIL ENGINEERING SUMMER CAMP (1932) TECHNOLOGY, MAINE

**Income:*		
From Students and Staff	$4,143.93	
Miscellaneous	192.23	
Total Income		$4,336.16
**Expenses:*		
Travelling Expenses	$313.27	
Construction and Repairs	1,102.28	
Caretaker	1,440.00	
Taxes and Insurance	1,399.08	
Administration, Telephone, etc.	747.77	
Wages — Operating	1,424.98	
Provisions and Supplies	2,035.59	
Coal, Wood, Gas and Ice	693.66	
Express and Freight, Laundry	204.73	
Total Expense		9,361.36
Net Expense		$5,025.20

SCHEDULE C-13

MINING ENGINEERING SUMMER CAMP (1932) DOVER, N. J.

**Income:*		
From Students and Staff	$1,016.51	
Miscellaneous	40.46	
Total Income		$1,056.97
**Expenses:*		
Travelling Expenses	$187.03	
Repairs and Equipment	175.13	
Caretaker, Insurance, Tel. Adm., Light	926.56	
Wages — Operating	504.00	
Provisions and Supplies	494.31	
Total Expense		2,287.03
Net Expense		$1,230.06
Total Expense of Camps (Schedule C)		$6,255.26

*Tuition Receipts and Staff Salary Payments included in Summer Session, pp. 111 and 113.

SCHEDULE C-14

ATHLETIC FIELD, BOAT HOUSE, LAUNCHES

Athletic Field, Maintenance	$7,838.11
Boat House, Maintenance	4,587.12
Launches, Maintenance	2,117.58
Total (Schedule C)	$14,542.81

SCHEDULE C-15

DINING SERVICE (Net)

Inventory, June 30, 1932:		
Utensils	$8,409.47	
Stock	2,016.95	
		$10,426.42
Expenditures:		
Food	$41,729.60	
Salaries	40,197.55	
Light, Heat and Water	6,641.12	
Ice, Refrigeration	248.65	
Laundry	2,333.26	
Dining Room and Kitchen Equipment	1,496.87	
Repairs	1,445.97	
Printing and Advertising	706.49	
Administration Expense	845.89	
Insurance	708.54	
Occupancy (Schedule C-17)	5,000.00	
		101,353.94
Total		$111,780.36

Income:			
Coupon Books	$46,013.31		
Less Outstanding Coupons (Schedule D)	35.80		
		$45,977.51	
Cash		49,642.99	
Drawn from Dining Service Reserve Fund		5,572.58	
			$101,193.08
Inventory, June 30, 1933:			
Utensils		$8,707.01	
Stock		1,880.27	
			10,587.28
Total			$111,780.36

SCHEDULE C-16
SPECIAL APPROPRIATIONS

Undergraduate Dues	$19,341.00
Pension and Insurance Plan — Staff	68,660.52
Insurance Plan — Employees	5,720.65
New Equipment	892.88
Society of Arts	2,095.38
Withdrawal Allowances	860.00
No. 938, Technology Review	600.00
No. 962, Dedication of Eastman Laboratories	2,169.38
No. 968, Century of Progress Exhibit	4,000.00
No. 966, Departmental Circulars	2,500.00
Graduate Dormitory Expenses	10,000.00
Library, Eastman Laboratories	14,000.00
No. 952, Publicity, Open House, Motion Picture, etc.	3,059.29
No. 953, Corporation Tea Dance	235.00
No. 954, Publication of A. F. Bemis' Book	125.00
For new grass, curbs, walks	6,500.00
W. P. Ryan Special Fund	3,000.00
Dormitory Heat Control Installation	2,200.00
Rogers Building Heating System	4,500.00
Special Repairs	5,000.00
Engineering Research	5,000.00
To Departments:	
Aeronautical Engineering — Total	2,342.58
No. 927 $2,000.00 No. 935 $342.58	
Biology and Public Health — Total	1,750.00
No. 949 $1,750.00	
Business and Engineering Administration — Total	2,000.00
No. 972 $2,000.00	
Civil Engineering — Total	1,356.33
Soil Mechanics $400.00 Hydraulics $956.33	
Electrical Engineering — Total	3,200.00
No. 937 $500.00 Analyzer $2,700.00	
Mathematics — Total	2,600.00
Journal of Mathematics and Physics, $2,500.00	
No. 950 $100.00	
Mechanical Engineering — Total	450.71
Textile School $450.71	
Physics — Total	13,950.00
No. 933 $8,950.00 Round Hill $5,000.00	
Total (Schedule C)	$188,108.72

SCHEDULE C-17

WALKER MEMORIAL (Net)

Income:		
Games	$237.61	
Occupancy — Dining Service (Schedule C-14)	5,000.00	
		$5,237.61
Expenses:		
Salaries	$9,660.64	
Light, Heat, Power	5,131.76	
Water	608.15	
Repairs, Alterations, Maintenance	5,799.79	
Trucking, Administration, Equipment	191.09	
Supplies, Magazines and Papers	667.44	
Total		22,058.87
Net Expense (Schedule C)		$16,821.26

SCHEDULE C-18

AWARDS FROM FUNDS

Teachers' Fund, for Retiring Allowances	$2,600.00
Robert A. Boit Fund, for Prizes	200.00
Class of 1904 Fund, for Prize	15.00
Arthur Rotch Prize Funds, for Prizes	200.00
Class of '98 Loan Fund, for Tuition	500.00
Roger Defriez Hunneman Fund, for Prizes	50.00
Samuel W. Stratton Fund, for Prizes	100.00
John A. Grimmons Fund, for Student Loans	760.00
Frances and William Emerson Fund, for Student Aid	5,000.00
William Barton Rogers Fund, for Student Loans	3,541.00
Bursar's Fund, for Student Loans	5,653.73
Dean's Fund, for Student Loans	637.50
Summer Surveying Camp Fund, for Loans	680.00
Edward Austin Fund, for Graduate Scholarships	23,000.00
Jonathan Whitney Fund, for Graduate Scholarships	24,481.75
Misc. Funds, for Graduate Scholarships and Fellowships	14,127.60
Misc. Funds for Undergraduate Scholarships	75,050.00
Jonathan Whitney Fund, for Technology Christian Association	1,500.00
Total (Schedule C)	$158,096.58

SCHEDULE C-19

PAYMENTS FROM INCOME OF SPECIAL FUNDS

Edward Whitney, for Research	$3,071.01	
Walter S. Barker, for Books	473.61	
Frank Harvey Cilley, for Books, etc.	3,293.75	
Charles Lewis Flint, for Books	217.28	
William Hall Kerr, for Books	13.46	
George A. Osborne, for Books	223.54	
Technology Matrons' Fund, for Teas	409.20	
John Hume Tod, for Books	96.64	
Theodore N. Vail, for Vail Library	1,869.48	
Ednah Dow Cheney, for Margaret Cheney Room	76.78	
F. Jewett Moore, for Chemical Department	5,653.57	
F. W. Boles Memorial, for Architectural Department	245.99	
Edmund K. Turner, for Annuity and Tax	2,077.52	
Pratt Naval Architectural, for Nautical Museum and Annuity	2,570.05	
Edward D. Peters, for Mineralogy	80.00	
Samuel Cabot, for Applied Chemistry Research	1,994.76	
Total (Schedule C)		$22,366.64

SCHEDULE C-20

DORMITORY OPERATION (Net)

Income:			
From Rentals		$130,732.75	
Less Refunds		6,870.66	
		$123,862.09	
From Miscellaneous		1,411.86	
Total			$125,273.95
Expenses:			
Salaries		$37,096.75	
Laundry		3,839.43	
Heat, Light, Power		16,061.97	
Water		2,127.20	
Repairs		12,998.54	
Supplies	$8,707.19		
Less Inventory (June 30, 1933) (Schedule D-2)	4,592.56		
		4,114.63	
Printing, Administration, Telephone		2,579.21	
New Equipment		340.50	
Interest on Mortgage Loan (Whitney Fund)		7,500.00	
Total			86,658.23
Net Income (Schedule B)			$38,615.72

SCHEDULE D
TREASURER'S BALANCE SHEET

1
ENDOWMENT FUNDS, ASSETS

Securities and Real Estate (Schedule H)	$32,322,795.55
Cash: For Investment (Schedule D-3)	408,437.04
Total June 30, 1933	$32,731,232.59

2
STUDENT LOAN ASSETS

Notes Receivable (Schedule P)	$462,454.70
Total June 30, 1933	$462,454.70

3
CURRENT ASSETS

Cash: For General Purposes (Schedule D-3)	$89,336.48
Accounts Receivable (Schedule D-1)	10,845.84
Students' Fees, Receivable	3,307.84
Students' Deposits, Receivable	252.49
Deposit on Fire Insurance Account	45,000.00
Inventories and Advances for 1933-34 (Schedule D-2)	100,022.37
Current Deficit (Schedule S)	35,426.95
Total June 30, 1933	$284,191.97

4
PLANT ASSETS

Land, Buildings, and Equipment, June 30, 1932	$15,643,748.55
Additions during year	59,510.00
Total June 30, 1933 (Schedule J)	$15,703,258.55
Total Assets June 30, 1933	$49,181,137.81

SCHEDULE D

JUNE 30, 1933

1

ENDOWMENT FUNDS, CAPITAL

Endowment Funds (Schedule M)	$32,731,232.59
Total June 30, 1933	$32,731,232.59

2

STUDENT LOAN CAPITAL

Total (Schedule P)	$462,454.70
Total June 30, 1933	$462,454.70

3

CURRENT LIABILITIES

Minor Funds (Schedule R)	$207,972.73
Accounts Payable	10,896.00
Students' Fees and Deposits (Schedule D-4)	53,014.39
*Undergraduate Dues, Balance	553.01
Dining Room Coupons, Outstanding	35.80
Unexpended Appropriations, Library and Graduate House	11,720.04
Total June 30, 1933	$284,191.97

4

EDUCATIONAL PLANT CAPITAL

Endowment for Educational Plant, June 30, 1932	$15,706,340.50
Over-appropriation — returned to Funds	3,081.95
Total June 30, 1933 (Schedule K)	$15,703,258.55
Total Liabilities June 30, 1933	$49,181,137.81

*See also Undergraduate Dues Reserve (Schedule M, p. 159).

SCHEDULE D-1
DETAIL OF ACCOUNTS RECEIVABLE

T. C. A. Advisory Board Account	$2,836.83
Division of Industrial Coöperation	686.50
Investment Income	2,328.75
United States Government, Chief of Engineers	500.00
Miscellaneous Accounts	4,493.76
Total (Schedule D)	$10,845.84

SCHEDULE D-2
DETAIL OF ADVANCES AND INVENTORIES FOR 1933-1934

Summer Session Salaries, Advanced	$3,210.00
Civil Engineering Summer Camp 1933, Advanced	554.09
Mining Engineering Summer Camp 1933, Advanced	59.79
Premiums Paid on Unexpired Insurance	7,038.43
Inventories — Notes held by Coöperative Society and M.I.T.	5,457.56
Dormitory Supplies (including Rugs)	4,733.56
Dining Service, Food, Utensils, etc.	10,587.28
Coal	617.50
Walker Memorial Games, Candy, Cigars, etc.	346.27
Letter Shop Supplies	735.46
Stamps	295.11
Office Supplies	1,804.68
Building and Janitors' Supplies	2,054.80
Architectural Students' Supply Room, Stock	857.41
Stock Room: Pipe, Fittings, Lumber, Hardware, Paint, Oil, Glass and Miscellaneous Supplies	10,432.60
Photostat Service, Supplies, Equipment, etc.	1,604.98
Photographic Service, Supplies and Equipment	7,168.90
Division of Laboratory Supplies: Chemicals, Glassware, Platinum, etc.	39,057.34
Liquid Soap	169.68
Blue Print Service, Supplies and Equipment	3,236.93
Total (Schedule D)	$100,022.37

SCHEDULE D-3

TOTAL CASH RECEIPTS AND DISBURSEMENTS FOR THE YEAR

Total Cash Receipts	$6,148,763.45
Total Cash Disbursements	6,037,945.36
Excess of Receipts	$110,818.09
Cash, June 30, 1932	386,955.43
Cash, June 30, 1933	$497,773.52

CASH BALANCE

Cash for Investment — on Deposit (Schedule D)		$408,437.04
Cash for Current Purposes (Schedule D)		
On Deposit	$87,371.67	
In Office	1,964.81	
		89,336.48
Total Cash (Schedule D)		$497,773.52

SCHEDULE D-4

STUDENTS' FEES IN ADVANCE, AND DEPOSITS RETURNABLE

Tuition Fees, Summer Session 1933	$43,779.24
Students' Deposits Returnable	2,515.61
Students' Deposits, Summer Session 1933	3,068.54
Dormitory Deposits in Advance	325.00
Dormitory Rentals, Summer Session 1933	3,086.00
Students' Deposits, account C. E. Summer Camp	240.00
Total (Schedule D)	$53,014.39

SCHEDULE H

INVESTMENTS, BONDS, STOCKS,

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	GOVERNMENT AND MUNICIPAL BONDS			
$6,000	Allegheny, County of, Penn. Road	4¼%	1934	$6,000.00
26,000	Allegheny, County of, Penn. Road	4¼%	1935	26,000.00
500,000	Boston Met. Dist., Serial Gold	4¾%	1944–59	483,534.60
50,000	British Columbia, Province of	4½%	1939	48,325.00
260,000	Canada, Dominion of, 30-Yr. Gold	5%	1952	258,511.88
1,000	Cincinnati, City of, Street Imp..	4½%	1933	1,001.00
500	Cincinnati, City of, Street Imp..	4½%	1935	503.00
1,000	Cincinnati, City of, Street Imp..	4½%	1935	1,012.00
24,000	Denmark, Kingdom of, External	4½%	1962	14,040.00
1,000	Erie, City of, Penn. Griswold Plaza	4¼%	1934	1,000.00
25,000	German Govt. International Loan.	5½%	1965	22,437.50
3,000	Greensburg Borough, Penn. School	4%	1953–5	2,795.67
18,000	Kansas City, Sewer, 2d Issue	4½%	1935	18,203.00
5,000	Kansas City, 23d St. Trafficway	4½%	1935	5,055.00
2,000	Lawrence, City of, Sewer Loan	4%	1942–3	.....
50,000	Maisonneuve, City of (Montreal)	5%	1954	49,000.00
30,000	Manitoba, Province of	4½%	1945	28,650.00
70,000	Manitoba, Province of	5%	1944	70,532.00
15,000	Montreal, City of	5%	1936	15,000.00
70,000	Montreal, City of	5%	1942	68,250.00
100,000	Montreal, City of	5%	1958	101,280.00
100,000	Montreal, City of	5%	1963	101,418.00
20,000	New York, City of, Corporate Stock.	4¼%	1964	20,591.00
5,000	New York, City of, Corporate Stock.	4½%	1967	4,625.00
50,000	Omaha, City of, Nebraska	4½%	1934	50,235.00
50,000	Omaha, City of, Water Works	4½%	1941	51,619.00
150,000	Ontario, Province of	5%	1942	151,274.00
50,000	Ontario, Province of	4½%	1934	48,314.30
50,000	Ontario, Province of	5½%	1937	50,197.00
50,000	Ontario, Province of	6%	1943	52,473.00
100,000	Ontario, Province of	5%	1952	99,934.00
25,000	Ontario, Province of	5%	1959	24,875.00
1,000	Ottawa, City of, Ontario	4½%	1935	945.00
5,000	Ottawa, City of, Ontario	5%	1933	5,004.00
35,000	Ottawa, City of, Ontario	5%	1945	35,176.00
36,000	Ottawa, City of, Ontario	5%	1934	36,068.00
35,000	Ottawa, City of, Ontario	5%	1940	35,239.00
25,000	Ottawa, City of, Ontario	5%	1946	25,213.00
5,000	Ottawa, City of, Ontario	5%	1947	5,042.00

SCHEDULE H

REAL ESTATE AND MORTGAGES

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$6,000.00	.....	$255.00
.....	.....	26,000.00	.....	1,105.00
.....	.....	483,534.60	.....	23,750.00
.....	.....	48,325.00	.....	2,250.00
.....	.....	258,511.88	.....	13,000.00
.....	$1.00	1,000.00	.....	45.00
.....	2.00	501.00	.....	22.50
.....	6.00	1,006.00	.....	45.00
.....	.....	14,040.00	.....	1,080.00
.....	.....	1,000.00	.....	42.50
.....	.....	22,437.50	.....	1,375.00
.....	.....	2,795.67	.....	60.00
.....	102.00	18,101.00	.....	810.00
.....	28.00	5,027.00	.....	225.00
$1,840.00	.....	1,840.00	.....	40.00
.....	.....	49,000.00	.....	2,500.00
.....	.....	28,650.00	.....	1,350.00
.....	49.00	70,483.00	.....	3,500.00
.....	.....	15,000.00	.....	750.00
.....	.....	68,250.00	.....	3,500.00
.....	50.00	101,230.00	.....	5,000.00
.....	46.00	101,372.00	.....	5,000.00
.....	19.00	20,572.00	.....	850.00
.....	.....	4,625.00	.....	225.00
.....	235.00	50,000.00	.....	2,250.00
.....	180.00	51,439.00	.....	2,250.00
.....	142.00	151,132.00	.....	7,500.00
.....	.....	48,314.30	.....	2,250.00
.....	49.00	50,148.00	.....	2,750.00
.....	225.00	52,248.00	.....	3,000.00
.....	.....	99,934.00	.....	5,000.00
.....	.....	24,875.00	.....	1,250.00
.....	.....	945.00	.....	45.00
.....	4.00	5,000.00	.....	250.00
.....	16.00	35,160.00	.....	1,750.00
.....	34.00	36,034.00	.....	1,800.00
.....	30.00	35,209.00	.....	1,750.00
.....	16.00	25,197.00	.....	1,250.00
.....	3.00	5,039.00	.....	250.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	GOVERNMENT AND MUNICIPAL BONDS (*Continued*)			
$29,000	Ottawa, City of, Ontario	5%	1954	$29,507.00
60,000	Ottawa, City of, Ontario	5½%	1939	60,902.00
5,000	Ottawa, City of, Ontario	6%	1936	5,100.00
1,000	Ottawa, City of, Ontario	6%	1938	1,031.00
8,000	Ottawa, City of, Ontario	6%	1939	8,276.00
8,000	Ottawa, City of, Ontario	6%	1940	8,312.00
1,000	Ottawa, City of, Ontario	6%	1948	1,060.00
10,000	Ottawa, City of, Ontario	6%	1951	10,644.00
100,000	Quebec, Province of	4½%	1950	97,000.00
10,000	San Francisco,City&Cty.ofHetchHetchy	4½%	1954	.....
15,000	San Francisco,City&Cty.of, Hospital	4½%	1952	.....
25,000	San Francisco,City&Cty.of, Hospital	4½%	1953	.....
24,325	Toronto, City of, Consol. Loan Deb.	4%	1948	22,622.25
10,000	Toronto, City of, Ontario	5%	1935	9,845.00
35,000	Toronto, City of, Ontario	5%	1936	34,475.00
18,000	Toronto, City of, Ontario	5%	1937	17,721.00
23,000	Toronto, City of, Ontario	5%	1939	22,655.00
9,000	Toronto, City of, Ontario	5%	1942	8,830.80
5,000	Toronto, City of, Ontario	6%	1934	5,036.00
23,000	Toronto, City of, Consolidated Loan	6%	1944	23,742.00
18,000	Toronto, City of, Consolidated Loan	6%	1945	18,620.00
9,000	Toronto, City of, Consolidated Loan	6%	1946	9,324.00
225,000	U. S. Treasury Notes, Series A	3%	1935	.....
200,000	Winnipeg, City of, Debenture	4½%	1944	189,000.00
	Sold or matured during year			570,321.00
$2,920,825	*Total Government and Municipal Bonds*			$3,173,397.00
	INDUSTRIAL BONDS			
$15,000	Allis-Chalmers Mfg. Co., Gold Deb.	5%	1937	$14,812.50
50,000	American Radiator Co., Gold Deb.	4½%	1947	48,000.00
200,000	Armour & Co., Real Est. 1st Mtge.	4½%	1939	175,116.25
50,000	Armour & Co. of Del., 1st Mtge. "A"	5½%	1943	41,125.00
23,000	Armstrong Cork Co. Conv. Gold	5%	1940	16,100.00
20,000	Brown Co., 1st Mtge. "A"	5½%	1946	14,000.00
35,000	Chicago Post Off. Serv. Bldg.1stMtge.	5½%	1936	34,562.50
90,000	Chile Copper Co. Gold	5%	1947	87,080.00
300,000	Consolidation Coal Co.,1st & Ref.S.F.	5%	1950	268,806.25
25,000	Fruit Growers Ex. Co., Equip. Tr."G"	4½%	1934	24,607.25
25,000	Fruit Growers Ex. Co., Equip. Tr."G"	4½%	1935	24,573.75
25,000	General Motors Acceptance Corp.	5%	1934	4,950.00

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	$23.00	$29,484.00	.....	$1,450.00
.....	129.00	60,773.00	.....	3,300.00
.....	25.00	5,075.00	.....	300.00
.....	6.00	1,025.00	.....	60.00
.....	40.00	8,236.00	.....	480.00
.....	39.00	8,273.00	.....	480.00
.....	4.00	1,056.00	.....	60.00
.....	34.00	10,610.00	.....	600.00
.....	.....	97,000.00	.....	4,500.00
$10,137.20	7.20	10,130.00	$55.00	.....
15,190.35	10.35	15,180.00	82.50	.....
25,327.90	16.90	25,311.00	137.50	.....
.....	.....	22,622.25	.....	973.32
.....	.....	9,845.00	.....	479.75
.....	.....	34,475.00	.....	1,750.00
.....	.....	17,721.00	.....	900.00
.....	.....	22,655.00	.....	1,150.00
.....	.....	8,830.80	.....	450.00
.....	18.00	5,018.00	.....	282.00
.....	62.00	23,680.00	.....	1,380.00
.....	48.00	18,572.00	.....	1,080.00
.....	25.00	9,299.00	.....	540.00
227,390.63	797.63	226,593.00	608.61	6,750.00
.....	.....	189,000.00	.....	9,000.00
.....	570,321.00	.....	.....	11,679.58
$279,886.08	$572,843.08	$2,880,440.00	$883.61	$147,769.65
.....	.....	$14,812.50	.....	$750.00
.....	.....	48,000.00	.....	2,250.00
.....	.....	175,116.25	.....	9,000.00
.....	.....	41,125.00	.....	2,750.00
.....	.....	16,100.00	.....	1,150.00
.....	.....	14,000.00	.....	1,100.00
.....	.....	34,562.50	.....	1,925.00
.....	.....	87,080.00	.....	4,500.00
.....	.....	268,806.25	.....	.....
.....	.....	24,607.25	.....	1,125.00
.....	.....	24,573.75	.....	1,125.00
19,996.25	.....	24,946.25	403.47	1,250.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	INDUSTRIAL BONDS (*Continued*)			
$25,000	General Motors Acceptance Corp.	5%	1935	$24,302.50
7,000	Glen Alden Coal Co., 1st Mtge.	4%	1965	.....
100,000	Glidden Co. Gold	5½%	1935	99,750.00
100,000	Gulf Oil Corp. of Penn., 15-Yr. Gold	5%	1937	96,750.00
100,000	International Cement Corp.	5%	1948	99,500.00
18,000	Midvale Steel & Ordnance Co.	5%	1936	16,200.00
100,000	Owens-Illinois Glass Co., Deb.	5%	1939	49,600.00
387,000	Pocahontas Corp., Gold	6%	1943	469,600.00
110,000	Royal Dutch Co., Deb. "A"	4%	1945	102,675.00
100,000	Shell Union Oil Corp. S. F. Deb.	5%	1949	98,885.00
17,000	Smith & Wesson, Inc., 1st Mtge. S. F.	5½%	1938	16,830.00
12,000	Standard Oil Co. of N. J.	5%	1946	12,035.00
65,000	Standard Oil Co. of N. Y.	4½%	1951	62,156.25
25,000	Sun Oil Co., Gold Deb.	5½%	1939	25,328.00
74,000	Swift & Co., 1st S. F.	5%	1944	69,883.13
50,000	Swift & Co., 10-Yr. Gold	5%	1940	50,901.00
75,000	Texas Corp. Conv. Deb.	5%	1944	75,634.00
100,000	United Drug Co.	5%	1953	100,000.00
25,000	U. S. Cold Storage Co., 1st Mtg. R. E.	6%	1945	25,372.00
50,000	Waltham Watch & Clock Co., 1st Mtg.	6%	1943	49,000.00
190,000	Western Electric Co. Deb.	5%	1944	188,288.75
50,000	Woodward Iron Co., 1st & Cons. Mtge.	5%	1952	42,750.00
	Sold or matured during year			29,598.00
$2,638,000	*Total Industrial Bonds*			$2,558,772.13
	INDUSTRIAL STOCKS	*Div.*	*Shares*	
$25,000	Algonquin Printing Co.	8%	250	$67,500.00
12,500	American Can Co., Com.	4%	500	71,312.50
*50,000	American Car & Foundry Co., Com.	..	500	25,875.00
105,300	American Manufacturing Co., Pref.	5%	1,053	46,332.00
66,000	American Manufacturing Co., Com.	..	660	16,500.00
13,750	American Pneumatic Serv. Co., 1st Pf.	..	275	13,750.00
700	American Thread Co., Pfd.	25c	140	455.00
50,000	Amoskeag Mfg. Co., Pref.	4½%	500	41,395.00
51,000	Anaconda Copper Mining Co., Cap.	..	1,020	28,744.00
*37,000	Cerro de Pasco Copper Corp.	..	370	18,870.00
2,500	Corn Products Ref. Co., Com.	3%	100	6,950.00
*50,000	Curtis Publishing Co., Pref.	..	500	59,375.00
10,000	Devoe & Raynolds Co., Inc., 1st Pref.	7%	100	9,800.00
*.....	Eastern Mfg. Co., New Common	..	1,000	.....
25,000	Eastern Mfg. Co., Pref.	..	500	15,000.00

* No par value.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$24,302.50	.....	$1,250.00
$7,542.87	$317.87	7,225.00	.....	291.51
.....	.....	99,750.00	.....	5,500.00
.....	.....	96,750.00	.....	5,000.00
.....	.....	99,500.00	.....	5,000.00
.....	.....	16,200.00	.....	900.00
34,950.00	.....	84,550.00	$302.22	2,500.00
16,250.00	194,750.00	291,100.00	.....	28,051.09
.....	.....	102,675.00	.....	4,400.00
.....	.....	98,885.00	.....	5,000.00
.....	.....	16,830.00	.....	935.00
.....	3.00	12,032.00	.....	600.00
.....	.....	62,156.25	.....	2,925.00
.....	47.00	25,281.00	.....	1,375.00
.....	.....	69,883.13	.....	3,700.00
.....	129.00	50,772.00	.....	2,500.00
.....	57.00	75,577.00	.....	3,750.00
.....	.....	100,000.00	.....	5,000.00
.....	31.00	25,341.00	.....	1,500.00
.....	.....	49,000.00	.....	3,000.00
.....	.....	188,288.75	.....	9,500.00
.....	.....	42,750.00	.....	1,250.00
1,149.44	30,747.44	.....	.....	2,033.45
$79,888.56	$226,082.31	$2,412,578.38	$705.69	$122,886.05
.....	.....	$67,500.00	.....	$2,000.00
.....	.....	71,312.50	.....	2,000.00
.....	.....	25,875.00	.....	.....
.....	.....	46,332.00	.....	5,265.00
.....	.....	16,500.00	.....	.....
.....	.....	13,750.00	.....	.....
.....	.....	455.00	.....	35.00
.....	.....	41,395.00	.....	2,250.00
.....	.....	28,744.00	.....	.....
.....	.....	18,870.00	.....	.....
.....	.....	6,950.00	.....	300.00
.....	.....	59,375.00	.....	2,625.00
.....	.....	9,800.00	.....	700.00
.....	.....	.....	.....	.....
.....	.....	15,000.00	.....	.....

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Div.*	*Shares*	*Balance June 30, 1932*
	INDUSTRIAL STOCKS (*Continued*)			
*$3,125,000	Eastman Kodak Co., Common . .	3%	31,250	$2,713,306.25
180,000	Eastman Kodak, Pref.	6%	1,800	198,000.00
*.....	Fall River Laundry Co.	..	12	.....
*400,000	General Electric Company, Common	40c	4,000	40,762.50
14,710	General Electric Co., Special . . .	60c	1,471	14,850.00
13,500	General Motors Corp., Common . .	$1.00	1,350	49,958.75
*110,200	Gillette Safety Razor Co.	$1.00	1,102	78,914.45
1,230	Harmony Mills, Common	..	246	246.00
70,000	Int. Match Corp., Part. Pref. . . .	..	2,000	129,753.80
50,000	Nashua Mfg. Company, Common .	..	500	15,000.00
1,500	Pan-American Pet. & Trans., Com.	..	300	9,150.00
*.....	Pan-American Southern Corp. . . .	..	300	.....
*12,500	Patchogue-Plymouth Mills Corp. .	..	125	1,250.00
*49,700	Pullman Incorporated, Capital . .	3%	497	36,961.83
*.....	Quebradas Company	..	2,249	.....
6,500	Queen City Cotton Co., Capital . .	..	65	1,300.00
*122,700	Radio Corp. of America, Com. . . .	..	1,227	4/6 .....
25,000	Rhode Isl.Malleable Iron Wks. Pref.	..	250	25,000.00
4,020	Royal Dutch Co. (N. Y. shares) . .	..	300	9,000.00
*7,500	Samson Cordage Company	4%	75	5,000.00
100,000	Shell Union Oil Co., Conv. Pfd. . .	..	1,000	97,750.00
*2,800	Shell Union Oil Co., Common . . .	..	28	140.00
*67,600	Standard Oil Co. of California,Capital	$1.00	676	29,149.25
4,075	Standard Oil Co. of N. J.	$1.00	163	.....
60,000	Stevens Linen Works	8%	600	39,000.00
4,500	Stevens Mfg. Corp., Pref.	..	90	2,700.00
*535,700	United Fruit Company, Capital . .	$2.00	5,357	220,979.50
14,175	Texas Corporation	$1.00	567	14,175.00
33,000	U. S. Steel Corp., Common	..	330	29,436.00
50,000	U. S. Steel Corp., Cum. Pref. . . .	2%	500	55,162.50
32,100	Wamsutta Mills, Capital	..	321	3,638.00
5,000	Westinghouse Elec. & Mfg. Co., Pref.	$3.50	100	6,393.90
51,100	Westinghouse Elec. & Mfg. Co., Com.	..	1,022	45,151.92
	Sold during year			26,711.91
$5,652,860	*Total Industrial Stocks*			$4,320,700.06

	PUBLIC UTILITY BONDS	*Rate*	*Maturity*	
$50,000	Alabama Power Co., 1st & Ref. Mtge.	4½%	1967	$49,125.00
200,000	Alabama Power Co., 1st Mtge. "A".	5%	1946	191,501.25
62,000	Am. Tel. & Tel. Co., Col. Trust . .	5%	1946	60,902.09

*No par value.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$2,713,306.25	.....	$109,375.00
.....	.....	198,000.00	.....	10,800.00
.....	.....	.....	.....	.....
.....	$2,666.67	38,095.83	.....	1,600.00
.....	.....	14,850.00	.....	882.60
.....	.....	49,958.75	.....	1,350.00
.....	.....	78,914.45	.....	1,102.00
.....	.....	246.00	.....	.....
.....	.....	129,753.80	.....	.....
.....	.....	15,000.00	.....	.....
.....	.....	9,150.00	.....	255.00
.....	.....	.....	.....	.....
.....	.....	1,250.00	.....	.....
.....	.....	36,961.83	.....	1,491.00
.....	.....	.....	.....	1,125.00
.....	.....	1,300.00	.....	.....
$4,910.67	.....	4,910.67	.....	.....
.....	.....	25,000.00	.....	.....
.....	.....	9,000.00	.....	241.50
.....	.....	5,000.00	.....	300.00
.....	.....	97,750.00	.....	.....
.....	.....	140.00	.....	.....
.....	.....	29,149.25	.....	1,183.00
5,542.00	.....	5,542.00	.....	285.25
.....	.....	39,000.00	.....	4,800.00
.....	.....	2,700.00	.....	.....
.....	.....	220,979.50	.....	10,714.00
.....	.....	14,175.00	.....	567.00
.....	.....	29,436.00	.....	.....
.....	.....	55,162.50	.....	2,250.00
.....	.....	3,638.00	.....	.....
.....	200.00	6,193.90	.....	175.00
.....	2,044.00	43,107.92	.....	.....
375.00	27,086.91	.....	.....	.....
$10,827.67	$31,997.58	$4,299,530.15	.....	$163,671.35
.....	.....	$49,125.00	.....	$2,250.00
.....	.....	191,501.25	.....	10,000.00
.....	.....	60,902.09	.....	3,100.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	PUBLIC UTILITY BONDS (*Continued*)			
$225,000	Am. Tel. & Tel. Co., 35-Yr. Deb. . .	5%	1960	$216,928.00
200,000	Appalachian Elec.P'r Co.,1st&Ref.Mt.	5%	1956	203,754.00
70,000	Arkansas Pow.&Lgt.Co.,1st&Ref.Mt.	5%	1956	70,777.50
86,000	Associated Gas & Elec. Co. (Reg.) .	4½%	1949	72,240.00
45,000	Bell Telephone Co. of Penn.	5%	1948	.....
25,000	Birmingham Waterworks Co.,1stMtg.	5½%	1954	19,360.00
50,000	Blackstone Valley Gas & El. Co., Mt.	5%	1939	50,063.00
5,000	Boston Elevated Ry. Co.	4%	1935	4,600.00
100,000	Boston Elevated Ry. Co.	5%	1937	99,875.00
15,000	Brooklyn Edison Co.,Gen. Mtge."E"	5%	1952	14,512.50
290,000	Cedars Rapids Mfg.&P.Co.,1stMt.S.F.	5%	1953	276,853.85
25,000	Chesa. & Potomac Tel. Co., S.F."A"	5%	1943	24,500.00
45,000	Chicago City Railway Co., 1st Mtge.	5%	1927	44,750.00
50,000	Chic.N.Sh.&Mil.R.R.Co.,1st&Ref."A"	6%	1955	49,000.00
4,000	Chicago Railways Co., 1st Mtge. . .	5%	1927	3,000.00
50,000	Cincinnati Gas & Elec. Co., 1st Mtge	4%	1968	.....
25,000	Cities Service Co., Gold Deb. . . .	5%	1958	16,500.00
150,000	Cleveland Elec. Ill. Co., 1st Mtge. .	5%	1939	150,503.00
25,000	Commonwealth Water Service,1stMtg.	5½%	1947	22,750.00
46,000	Conn.Lt.& Pr. Co., 1st Mt. S.F."A" .	7%	1951	43,324.48
52,000	Conn.Lt. & Pr. Co., 1st Mtg. "C" .	4½%	1956	49,465.00
75,000	Consolidated Gas Co., N. Y., Gold .	4½%	1951	75,532.00
200,000	Consolidated Gas Co., N. Y., Deb. .	5½%	1945	201,875.00
200,000	Consumers Pow. Co., 1st & Ref. . .	5%	1936	199,000.00
50,000	Cont. Gas. & Elec. Corp., Deb. "A" .	5%	1958	42,500.00
55,000	Cumberland Cty.Pow.&Lt.Co.,1stMt.	4½%	1956	51,837.50
51,000	Cumberland Tel.&Tel.Co.,1st Mtge.	5%	1937	50,305.75
10,000	Dallas Power & Lt. Co., 1st Mtg."A"	6%	1949	10,473.00
15,000	Dallas Power & Lt.Co.,1stMtge. "B"	7½%	1949	.....
50,000	Dallas Ry. & Terminal Co., 1st Mtge.	6%	1951	48,125.00
100,000	Dayton Pow.& Lt.Co.,1st & Ref.Mtg.	5%	1941	.....
25,000	Des Moines City Ry.Co.,Gen.&R.Mt.	5%	1936	8,125.00
100,000	Detroit Edison Co.,Gen.&Ref.Mt."D"	4½%	1961	100,000.00
25,000	Detroit Edison Co.,Gen.&Ref.Mtg."E"	5%	1952	.....
100,000	Duquesne Light Co., 1st Mt., Gold .	4½%	1967	94,750.00
175,000	Edison Elec. Ill. Co. of Boston, Gold	5%	1934	.....
275,000	Edison Elec. Ill. Co. of Boston, Gold	5%	1936	.....
50,000	Fall River Elec. Light Co.,1st Mt."A"	5%	1945	.....
50,000	Great Lakes Power Co.,Ltd.,1st Mtg.	6%	1943	43,187.50
50,000	Gulf States Util. Co.,1st & Ref.Mt."A"	5%	1956	46,875.00
173,000	HydraulicPr.Co.of Niag.F'lls,Ref.&Im.	5%	1951	165,139.00
59,000	Illinois Bell Tel. Co., 1st & Ref. "A"	5%	1956	56,712.50

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$216,928.00	.....	$11,250.00
.....	$164.00	203,590.00	.....	10,000.00
.....	34.50	70,743.00	.....	3,500.00
.....	.....	72,240.00	.....	3,870.00
$48,825.00	255.00	48,570.00	$281.25	.....
2,640.00	.....	22,000.00	40.79	1,375.00
.....	11.00	50,052.00	.....	2,500.00
.....	.....	4,600.00	.....	200.00
.....	.....	99,875.00	.....	5,000.00
.....	.....	14,512.50	.....	750.00
.....	.....	276,853.85	.....	14,500.00
.....	.....	24,500.00	.....	1,250.00
.....	.....	44,750.00	.....	2,250.00
.....	.....	49,000.00	.....	1,500.00
.....	250.00	2,750.00	.....	206.25
49,750.00	.....	49,750.00	744.45	1,000.00
.....	.....	16,500.00	.....	1,250.00
.....	84.00	150,419.00	.....	7,500.00
.....	.....	22,750.00	.....	1,375.00
.....	.....	43,324.48	.....	3,220.00
.....	.....	49,465.00	.....	2,340.00
.....	30.00	75,502.00	.....	3,375.00
.....	156.00	201,719.00	.....	11,000.00
.....	.....	199,000.00	.....	10,000.00
.....	.....	42,500.00	.....	2,500.00
.....	.....	51,837.50	.....	2,475.00
.....	76.75	50,229.00	.....	2,550.00
.....	28.00	10,445.00	.....	600.00
16,050.00	65.00	15,985.00	.....	.....
.....	.....	48,125.00	.....	3,000.00
103,600.00	450.00	103,150.00	1,648.62	5,000.00
.....	.....	8,125.00	.....	1,250.00
.....	.....	100,000.00	.....	4,500.00
24,812.50	.....	24,812.50	65.97	625.00
.....	.....	94,750.00	.....	4,500.00
174,335.00	.....	174,335.00	121.52	4,375.00
272,250.00	.....	272,250.00	420.85	.....
51,250.00	104.00	51,146.00	604.16	1,250.00
.....	.....	43,187.50	.....	3,000.00
.....	.....	46,875.00	.....	2,500.00
.....	.....	165,139.00	.....	8,650.00
.....	.....	56,712.50	.....	2,950.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	PUBLIC UTILITY BONDS (*Continued*)			
$50,000	Illinois Pow. & Lt. Corp.,1st&Ref.Mt.	5½%	1954	$48,500.00
25,000	Illinois Pow.&Lt.Cor.,1st&Ref.Mt."A"	6%	1953	26,071.00
50,000	Indianapolis Water Co., 1st Lien &Ref.	5½%	1953	48,250.00
25,000	Iowa Falls Elec. Co., 1st Mtge. "A".	6%	1937	24,625.00
50,000	Jersey Cent.Pow.&Lt.Co.,1stMt."B"	5%	1947	50,880.75
100,000	Kansas City Pow.& Lt.Co.,1st Mt.Gold	4½%	1961	.....
10,000	Koppers Gas & Coke Co.,S.F.GoldDeb.	5½%	1950	7,250.00
100,000	Los Angeles Gas & El.Corp.,Ref."F".	5½%	1943	95,750.00
50,000	Los Angeles Gas & El.Corp.,Gen'l Mt.	5%	1961	49,125.00
200,000	Louisville Gas & El. Co., 1st & Ref.Mt.	5%	1952	184,546.25
50,000	Memphis Pow.& Lt.Co.,1st & Ref."A"	5%	1948	47,000.00
200,000	Massachusetts Gas Cos., S. F. Deb.	5%	1955	195,500.00
50,000	Milwaukee El. Ry. & Lt. Co., 1st Mt.	5%	1961	46,125.00
50,000	Minnesota Pow. & Lt.Co.,1st &Ref.Mt.	4½%	1978	48,500.00
50,000	Minneapolis Gen. Elec. Co., Mtge. .	5%	1934	50,043.00
110,000	Mississippi River Power Co., 1st Mt.	5%	1951	102,414.84
25,000	Mississippi Power Co.,1st & Ref.Mt.	5%	1955	23,250.00
50,000	Nevada California Electric Co. . . .	5%	1956	47,750.00
100,000	Narragansett Elec. Co., 1st Mtg.Gold	5%	1957	94,470.00
150,000	New Orleans Pub.Serv.,Inc.,1stRef.Mt.	5%	1952	134,375.00
50,000	New York Edison Co., 1st & Ref"C".	5%	1951	48,375.00
200,000	New York Telephone Co., 1st Mtge..	4½%	1939	99,343.36
92,000	New York Pow. & Lt. Corp., 1st Mtg.	4½%	1967	87,949.87
5,000	New York & Queen Gas Co.,1st & G.M.	5%	1934	4,900.00
1,000	Nia., Lock & Ont. P. Co., 1st&Ref.Mt.	5%	1955	1,000.00
100,000	North American Co., Deb.	5%	1961	101,260.00
150,000	Northern States Pow. Co., Ref. Gold	4½%	1961	147,125.00
50,000	North. States Pr. Co., 1st & Ref. Mt.	5%	1941	45,000.00
100,000	Ohio Power Co., 1st & Ref. Mtge. Gold	4½%	1956	86,216.00
100,000	Oklahoma Gas & Electric Co.,1st Mtg.	5%	1950	94,750.00
50,000	Ontario Power Co., 1st Mtge. S. F. .	5%	1943	49,312.50
100,000	Pacific Gas & El.Co.,1st&Ref.Mt.Gold	4½%	1960	98,368.75
175,000	Pacific Gas & El. Co., 1st Ref.Mt."B"	6%	1941	179,381.00
75,000	Pacific Tel.&Tel.Co.,1stMt.Col.Tr.S.F.	5%	1937	73,915.10
165,000	Penn.-Ohio Edison Co., Gold Deb. .	5½%	1959	169,130.00
100,000	Penn. Power & Lt. Co., 1st Mtge. Gold	4½%	1981	96,250.00
50,000	Philadelphia Elec. Co., 1st & Ref. .	4%	1971	46,750.00
95,000	Potomac Elec. Power Co., Mtge. "B"	6%	1953	97,353.00
75,000	Providence Gas Co., 1st Mtge "B" .	4%	1963	.....
99,000	Public Ser. Co. of No. Ill., 1st Mtge. .	4½	1980	97,294.72
70,000	PublicSer.Elec.&GasCo.,1st&Ref.Mt.	4%	1971	.....
50,000	Salmon River Power Co., 1st Mtge .	5%	1952	47,625.00

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$48,500.00	.....	$2,750.00
.....	$54.00	26,017.00	.....	1,500.00
.....	.....	48,250.00	.....	2,750.00
.....	.....	24,625.00	.....	1,500.00
.....	63.75	50,817.00	.....	2,500.00
$99,721.25	.....	99,721.25	$565.51	2,250.00
.....	.....	7,250.00	.....	550.00
.....	.....	95,750.00	.....	5,500.00
.....	.....	49,125.00	.....	2,500.00
.....	.....	184,546.25	.....	10,000.00
.....	.....	47,000.00	.....	2,500.00
.....	.....	195,500.00	.....	10,000.00
.....	.....	46,125.00	.....	2,500.00
.....	.....	48,500.00	.....	2,250.00
.....	22.00	50,021.00	.....	2,500.00
.....	.....	102,414.84	.....	5,500.00
.....	.....	23,250.00	.....	1,250.00
.....	.....	47,750.00	.....	2,500.00
.....	.....	94,470.00	.....	5,000.00
.....	.....	134,375.00	.....	7,500.00
.....	.....	48,375.00	.....	2,500.00
100,500.00	.....	199,843.36	912.50	9,000.00
.....	.....	87,949.87	.....	4,140.00
.....	.....	4,900.00	.....	250.00
.....	.....	1,000.00	.....	50.00
.....	45.00	101,215.00	.....	5,000.00
.....	.....	147,125.00	.....	6,750.00
.....	.....	45,000.00	.....	2,500.00
11,872.50	.....	98,088.50	99.75	4,500.00
.....	.....	94,750.00	.....	5,000.00
.....	.....	49,312.50	.....	2,500.00
.....	.....	98,368.75	.....	4,500.00
.....	548.00	178,833.00	.....	10,500.00
.....	.....	73,915.10	.....	3,750.00
.....	159.00	168,971.00	.....	9,075.00
.....	.....	96,250.00	.....	4,500.00
.....	.....	46,750.00	.....	2,000.00
.....	118.00	97,235.00	.....	5,700.00
74,437.50	.....	74,437.50	293.34	.....
.....	.....	97,294.72	.....	4,455.00
66,362.50	.....	66,362.50	125.56	.....
.....	.....	47,625.00	.....	2,500.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	PUBLIC UTILITY BONDS (*Continued*)			
$50,000	SanJoaquinL&PCo.,Gen.&Ref.GoldD	5%	1957	$49,125.00
100,000	Shawinigan Water & Pow.Co.,1st Mt.	4½%	1967	97,218.75
6,000	Shawinigan Water & Pow.Co.,1st Mt.	4½%	1968	4,320.00
100,000	Shawinigan Water & Pow.Co.,1st Mt.	5%	1970	101,317.00
50,000	Sierra Pacific Pow.Co., 1st Mtge. . .	5½%	1957	.....
30,000	Sierra & San. Fran. Pow. Co.,1st Mtge.	5%	1949	31,133.00
100,000	SouthernBellTel.&Tel.Co.,1stMt.S.F.	5%	1941	100,477.00
165,000	SouthernCalif.EdisonCo.,Gen. Mtge..	5%	1939	163,218.75
100,000	Southern Calif.Gas Co.,1st&Ref.Mtge.	4½%	1961	.....
50,000	Syracuse Lighting Co.	5%	1951	.....
50,000	Syracuse Lighting Co.,1st&Ref.Mtge.	5½%	1954	50,541.00
20,000	Tennessee Elec.Pow.Co.,1st&Ref.Mt.	5%	1956	19,775.00
50,000	Tennessee Power Co., 1st Mtge. . .	5%	1962	46,625.00
300,000	Texas Power & Light Co., 1st Mtge.	5%	1937	291,437.50
20,000	Toho Elec. Pow. Co., Ltd.,1stMt."A"	7%	1955	.....
100,000	Union Elec. Lt. & Pow.Co., 1st Mtge.	5%	1957	.....
25,000	Utah Light & Tras. Co.,1st Mtge."A"	5%	1944	24,750.00
50,000	Virginia Elec.& Pow.Co., Sec. Conv. .	5½%	1942	47,625.00
50,000	Virginia Ry. & Pr. Co., 1st Mtge. . .	5%	1936	46,375.00
100,000	West Penn. Power Co., 1st Mtge."E"	5%	1963	93,482.50
100,000	Western Massachusetts Cos.	5%	1937	.....
200,000	Western Union Tel. Co.	5%	1951	200,992.00
25,000	Wisconsin Minn.Lt. & Pow.Co.1stMt.	5%	1944	25,229.00
	Sold or matured during year			872,158.75
$9,071,000	*Total Public Utility Bonds*			$8,190,247.31
	PUBLIC UTILITY STOCKS	*Div.*	*Shares*	
$338,400	American Tel. & Tel. Co., Capital. .	9%	3384	$390,081.92
*21,600	Brooklyn Union Gas Co., Capital . .	5%	216	11,887.50
*50,000	Central Illinois Pub. Ser. Co., Pfd. .	2%	500	42,937.50
*50,000	Commonwealth & SouthernCorp.Pfd.	6%	500	51,625.00
*2,200	Consolidated Gas Co. of N. Y., Com.	3.40	22	1,936.00
*200,000	Consolidated Gas Co. of N.Y., Pfd. .	5%	2000	194,975.00
*40,000	Eastern Gas & Fuel Asso., Com. . .	15c	400	6,972.00
20,000	Eastern Gas & Fuel Asso.,Cum.Pref.	6%	200	18,232.13
24,500	Eastern Gas & Fuel Asso., Pr. Pref. .	4½%	245	20,765.00
34,500	Edison Elec. Ill. Co., Capital . . .	10%	345	70,469.59
*65,000	Electric Bond & Share Co. $5 Pfd. .	5%	650	59,312.50
50,000	Faraday Coal & Coke Co.		500	.....
*50,000	Memphis Pow. & Lt. Co., Pfd. . . .	7%	500	49,375.00
*150,000	Public Service Corp. of N. J., Pref. .	5%	1500	148,665.88
25,000	Southern Cal. Edison Co. Com. . .	2%	1000	43,150.00

*No par value.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$49,125.00	.....	$2,500.00
.....	.....	97,218.75	.....	4,500.00
.....	.....	4,320.00	.....	270.00
.....	$36.00	101,281.00	.....	5,000.00
$44,875.00	.....	44,875.00	$271.18	1,375.00
.....	67.00	31,066.00	.....	1,500.00
.....	60.00	100,417.00	.....	5,000.00
.....	.....	163,218.75	.....	8,250.00
89,250.00	.....	89,250.00	648.76	2,250.00
55,250.00	292.00	54,958.00	520.84	1,250.00
.....	26.00	50,515.00	.....	2,750.00
.....	25.00	19,750.00	.....	1,000.00
.....	.....	46,625.00	.....	2,500.00
.....	.....	291,437.50	.....	15,000.00
9,000.00	.....	9,000.00	.....	.....
98,875.00	.....	98,875.00	1,737.50	3,750.00
.....	.....	24,750.00	.....	1,250.00
.....	.....	47,625.00	.....	2,750.00
.....	.....	46,375.00	.....	2,500.00
.....	.....	93,482.50	.....	5,000.00
99,750.00	.....	99,750.00	125.00	2,500.00
.....	57.00	200,935.00	.....	10,000.00
.....	21.00	25,208.00	.....	1,250.00
39,862.81	912,021.56	.....	111.52	33,598.07
$1,533,269.06	$915,323.56	$8,808,192.81	$9,339.07	$442,499.32
.....	.....	$390,081.92	.....	$30,456.00
.....	.....	11,887.50	.....	1,080.00
.....	.....	42,937.50	.....	2,500.00
.....	.....	51,625.00	.....	3,000.00
.....	.....	1,936.00	.....	84.70
.....	.....	194,975.00	.....	10,000.00
.....	.....	6,972.00	.....	60.00
.....	.....	18,232.13	.....	1,200.00
.....	.....	20,765.00	.....	1,102.52
.....	.....	70,469.59	.....	3,967.50
.....	.....	59,312.50	.....	3,250.00
.....	.....	.....	.....	.....
.....	.....	49,375.00	.....	3,500.00
.....	.....	148,665.88	.....	7,500.00
.....	.....	43,150.00	.....	2,000.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Div.*	*Shares*	*Balance June 30, 1932*
	PUBLIC UTILITY STOCKS (*Continued*)			
$*50,000	Stone & Webster, Inc., Capital	...	500	$27,680.74
1,250	Springfield Ry. Cos. Pfd.	8%	25	2,125.00
*30,300	Tampa Elec. Co. Com.	$2.24	303	.....
35,000	Western Union Tel. Co.	...	350	49,400.00
20,000	West Penn. Pow. Co. Pfd.	6%	200	.....
$1,257,750	*Total Public Utility Stocks*			$1,189,590.76

		Rate	*Maturity*	
	RAILROAD BONDS			
$335,000	Albany&SusquehannaR.R.1stMt.Reg.	3½%	1946	.....
75,000	Atch. Top. & S.F., Cal.&Ariz. Lines	4½%	1962	$73,143.75
100,000	Atch. Top. & Santa Fe, Gen. Mtge.	4%	1995	96,470.00
10,000	Atch.Top. & Santa Fe,Gen.Mt.(Reg.)	4%	1995	8,900.00
13,000	Atch. Top & Santa Fe, 20-Yr.	4½%	1948	13,000.00
50,000	Atlantic Coast Line R.R.Co.,Gen.Un.	4½%	1964	48,875.00
41,500	B. & O. R.R. Co., Gen.&Ref.Mtg."F"	5%	1996	.....
10,000	Boston & Albany RailroadImprovement	4%	1934	9,450.00
1,000	Boston & Maine Railroad	4½%	1944	850.00
150,000	Boston&MaineR.R.,1stMt.GoldNo.2	5%	1955	150,660.00
50,000	Boston & Maine R.R.,1st Mtge. "AC"	5%	1967	46,500.00
10,000	Boston Terminal Co., (Reg.)	3½%	1947	.....
90,000	Canadian Nat'l Railways Co.	4½%	1957	88,425.00
100,000	Canadian Nat'l Rwys. Co.,25-Yr.Gold	4½%	1956	98,000.00
22,000	Canadian Nat'l Rwys. Equip. Tr."H"	4½%	1935	18,535.00
26,000	Canadian Nat'l Rwys.Equip.Tr. "H"	4½%	1937	21,905.00
25,000	Canadian Nat'l Rwys.Equip.Tr."J"	4½%	1937	24,605.00
25,000	Canadian Nat'l Rwys.Equip.Tr. "J"	4½%	1938	24,575.00
4,000	Canadian Pacific Ry.Equip.Tr."B"	4½%	1938	3,595.00
59,000	Canadian Pacific Ry.Co.,Equip. Tr.	5%	1944	60,048.00
75,000	CentralNewEnglandRwys.,1st Mtge.	4%	1961	56,281.25
50,000	Cen. Pacific Ry. Co., Short Line Mtge.	4%	1954	40,918.75
100,000	Ches.& Ohio Ry.Co.,Cons'd 1st Mtge.	5%	1939	102,268.00
51,000	Chicago, Burlington & Quincy, Mtge.	4%	1958	50,307.00
100,000	Chic.,Burl.&Quincy,1stRef.Mtg."B"	4½%	1977	96,750.00
100,000	Chic.J.Rys.&Un.St.Yds.Mt.&Co.Tr.	4%	1940	94,250.00
75,000	Chic.J.Rys.&Un.St.Yd.Ref.Mt.&Co.Tr	5%	1940	74,143.75
17,000	C.M.St.P.& Pacific R.R.Co.,Gold"A"	5%	1975	10,410.00
68,000	C.M.St.P.& Pac. R.R. Conv.Gold "A"	5%	2000	41,640.00
50,000	Chic., Rock Is. & Pac., 1st & Ref.	4%	1934	42,406.25
65,000	Chicago Union Station,1st Mtge."A"	4½%	1963	65,317.00
100,000	Chicago Union Station, 1st Mtge."C"	6½%	1963	111,592.00
100,000	Chic. & N. W. Ry. Co., Gen. Mtge.	4%	1987	96,500.00

*No par value

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$27,680.74	.....	.....
.....	.....	2,125.00	.....	$137.50
$7,726.50	.....	7,726.50	.....	339.36
.....	.....	49,400.00	.....	.....
17,656.65	.....	17,656.65	.....	480.00
$25,383.15	.....	$1,214,973.91	.....	$70,657.58
$234,500.00	.....	$234,500.00	$4,462.00	$11,725.00
.....	.....	73,143.75	.....	3,375.00
.....	.....	96,470.00	.....	4,000.00
.....	.....	8,900.00	.....	400.00
.....	.....	13,000.00	.....	585.00
.....	.....	48,875.00	.....	2,250.00
41,292.50	.....	41,292.50	.....	.....
.....	.....	9,450.00	.....	400.00
.....	.....	850.00	.....	45.00
.....	$30.00	150,630.00	.....	7,500.00
.....	.....	46,500.00	.....	2,500.00
8,550.00	.....	8,550.00	.....	175.00
.....	.....	88,425.00	.....	4,050.00
.....	.....	98,000.00	.....	4,500.00
.....	.....	18,535.00	.....	990.00
.....	.....	21,905.00	.....	1,170.00
.....	.....	24,605.00	.....	1,125.00
.....	.....	24,575.00	.....	1,125.00
.....	.....	3,595.00	.....	180.00
.....	95.00	59,953.00	.....	2,950.00
.....	.....	56,281.25	.....	3,000.00
.....	.....	40,918.75	.....	2,000.00
.....	378.00	101,890.00	.....	5,000.00
.....	.....	50,307.00	.....	2,040.00
.....	.....	96,750.00	.....	4,500.00
.....	.....	94,250.00	.....	4,000.00
.....	.....	74,143.75	.....	3,750.00
.....	.....	10,410.00	.....	850.00
.....	.....	41,640.00	.....	.....
.....	.....	42,406.25	.....	2,000.00
.....	11.00	65,306.00	.....	2,925.00
.....	386.00	111,206.00	.....	6,500.00
.....	.....	96,500.00	.....	4,000.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	RAILROAD BONDS (*Continued*)			
$200,000	Chic.& N.W.Ry.Co.,1st & Ref.Mtge.	4½%	2037	$189,500.00
135,000	Chic. & N.W. Ry. Co., 20-Yr. Gold. .	4¾%	1949	168,291.00
5,000	Chic.& N.W.Ry.Co.,Equip.Tr.of 1922	5%	1934	4,907.10
5,000	Chic.& N.W.Ry.Co.,Equip.Tr.of 1922	5%	1935	4,902.90
5,000	Chic.& N.W.Ry.Co.,Equip.Tr.of 1922	5%	1936	4,899.30
5,000	Chic.& N.W.Ry.Co.,Equip.Tr.of 1922	5%	1938	5,000.00
75,000	Cinn. UnionTerminal Co.,1st Mt. "C"	5%	1957	.....
100,000	Clev.,Cinn.,Chic.& St. Louis Ry. Co.	4½%	1977	98,891.25
79,000	Cleveland Union TerminalsCo.,1stMt.	4½%	1977	77,864.27
25,000	Cleveland & Pittsburg R.R.Co.,Mtge.	4½%	1942	25,267.00
100,000	Florida East Coast Ry. Co.,1st & Ref.	5%	1974	95,633.75
35,000	Fort St. Union Depot Co., 1st Mtge.	4½%	1941	34,825.00
100,000	Grand Trunk & West. Ry., Eq. Tr. .	5%	1942	99,495.70
150,000	Great Northern Railway Co.,Gen.Mt.	4½%	1976	144,344.25
20,000	Great Northern Ry.Co.,Gen.Mt. "C"	5%	1973	20,390.00
100,000	Hudson & Man.R.R.Co.,1st&Ref.Mt.	5%	1957	99,712.25
4,000	Illinois Central R.R.Equip.Trust "K"	4½%	1933	3,943.20
5,000	Illinois Central R.R.Equip.Trust "K"	4½%	1934	4,922.50
11,000	Illinois Central R.R.Equip.Trust "K"	4½%	1935	10,818.05
27,000	Illinois Central R.R.Equip.Trust "K"	4½%	1936	26,524.02
21,000	Illinois Central R.R.Equip.Trust "K"	4½%	1937	20,606.71
12,000	Illinois Central R.R.Equip.Trust "K"	4½%	1938	11,762.28
5,000	Illinois Central R.R.Equip.Trust "K"	4½%	1939	4,895.79
10,000	Illinois Central R.R.Equip.Trust "J"	5%	1935	9,825.00
10,000	Illinois Central R.R.Equip.Trust "J"	5%	1936	9,825.00
10,000	Illinois Central R.R.Equip.Trust "J"	5%	1937	9,825.00
5,000	Illinois Central R.R. Co., Ref. Mtge.	4%	1955	4,700.00
75,000	Illinois Central R.R. Co., Sec. Gold .	4%	1952	67,875.00
59,000	Ill. Cen. R.R. Co., West. Lines Mtge.	4%	1951	54,526.25
9,000	Ill.Cen.R.R.Co.,West.LinesMt.(Reg.)	4%	1951	8,291.25
50,000	Ill.Cent.&Chic.&St.L.& New O.R.R.	4½%	1963	48,687.50
50,000	Indianapolis Un. Ry. Co., Gen.Mtge.	5%	1965	49,468.75
50,000	Kan. City. Ft. Scott & MemphisConsol.	4%	1936	41,243.75
8,500	Kan.City,Mem.& Birm.R.R.Co.,Mt.	4%	1934	8,287.50
37,000	Kan.City,Mem.&Birm.R.R.Co.,In.Mt.	5%	1934	34,225.00
125,000	Kansas City Terminal Co., 1st Mtge.	4%	1960	108,187.50
50,000	Long Island R.R.Co., Ref.	4%	1949	.....
50,000	Long Island R.R.Co.,Unified Mtge.	4%	1949	48,068.75
50,000	Long Island R.R.Co.,Un.Mtge.(Reg.)	4%	1949	48,068.75
75,000	Maine Central R.R.,1st & Ref. Mtge.	4½%	1935	73,500.00
25,000	MichiganCent.R.R.Co.,Ref.&Imp."C"	4½%	1979	25,597.00
300,000	Minn., St. Paul & S.St.Marie Ry.Co.	4%	1938	269,135.00

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$189,500.00	.....	$9,000.00
.....	$33,109.00	135,182.00	.....	7,257.21
.....	.....	4,907.10	.....	250.00
.....	.....	4,902.90	.....	250.00
.....	.....	4,899.30	.....	250.00
.....	.....	5,000.00	.....	250.00
$77,468.75	95.75	77,373.00	$1,090.28	1,875.00
.....	.....	98,891.25	.....	4,500.00
.....	.....	77,864.27	.....	3,555.00
.....				
.....	27.00	25,240.00	.....	1,125.00
.....	.....	95,633.75	.....	.....
.....	.....	34,825.00	.....	1,575.00
.....	.....	99,495.70	.....	5,000.00
.....	.....	144,344.25	.....	6,750.00
.....	10.00	20,380.00	.....	1,000.00
.....	.....	99,712.25	.....	5,000.00
.....	.....	3,943.20	.....	180.00
.....	.....	4,922.50	.....	225.00
.....	.....	10,818.05	.....	495.00
.....	.....	26,524.02	.....	1,215.00
.....	.....	20,606.71	.....	945.00
.....	.....	11,762.28	.....	540.00
.....	.....	4,895.79	.....	225.00
.....	.....	9,825.00	.....	500.00
.....	.....	9,825.00	.....	500.00
.....	.....	9,825.00	.....	500.00
.....	.....	4,700.00	.....	200.00
.....	.....	67,875.00	.....	3,000.00
.....	.....	54,526.25	.....	2,360.00
.....	.....	8,291.25	.....	360.00
.....	.....	48,687.50	.....	2,250.00
.....	.....	49,468.75	.....	2,500.00
.....	.....	41,243.75	.....	1,000.00
.....	.....	8,287.50	.....	340.00
.....	.....	34,225.00	.....	1,850.00
.....	.....	108,187.50	.....	5,000.00
45,500.00	.....	45,500.00	911.11	1,000.00
.....	.....	48,068.75	.....	2,000.00
.....	.....	48,068.75	.....	2,000.00
.....	.....	73,500.00	.....	3,375.00
.....	13.00	25,584.00	.....	1,125.00
.....	.....	269,135.00	.....	12,000.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	RAILROAD BONDS (*Continued*)			
$10,000	Minn.,St.Paul&S.St.MarieRy.Co.Gold	5½%	1949	$7,438.10
100,000	Missouri, Pacific R.R.,1st & Ref. "F"	5%	1977	99,750.00
21,000	Miss.& Ill.Bridge & Belt R.R.Co.,Mt.	4%	1951	13,650.00
100,000	Morris & Essex Ry. Co.,Constr. "B"	4½%	1955	96,250.00
43,000	N. Y. C. & H. R. R. R.	4%	1934	41,537.50
14,000	New York Central Lines Equip.Trust	4½%	1933	13,434.36
9,000	New York Central Lines Equip.Trust	4½%	1937	8,536.50
25,000	New York Central R.R.,Equip.Trust	4½%	1936	24,702.50
11,000	New York Central R.R.,Equip.Trust	7%	1934	11,150.00
52,000	New YorkCen.R.R.Co.,Cons.Mt."A"	4%	1998	46,046.65
100,000	N.Y.,Chic.&St.LouisR.R.Co.,Gold"C"	4½%	1978	97,000.00
50,000	N. Y., Chic. & St. Louis R.R. Co. . .	5½%	1974	47,350.00
100,000	New York Connect. R.R., 1st Mtge.	4½%	1953	98,625.00
4,000	N. Y., N. H. & H. R.R. Co., Deb. . .	3½%	1947	2,145.00
8,000	N. Y., N. H. & H. R.R. Co., Deb. . .	4%	1955	6,320.00
50,000	N. Y., N. H. & H. R.R. Co., Deb. . .	4%	1957	36,865.00
31,200	N.Y., N.H. & H.Co.,Con.Deb.(Reg.)	6%	1948	32,985.00
75,000	No. Pacific R.R. Co., Prior Lien Ry. .	4%	1997	67,875.00
482,000	No. Pacific Ry.Co.,Ref. & Imp. "B"	6%	2047	567,897.60
84,000	Oregon R.R. & Nav. Co.,Cons.Mtge.	4%	1946	82,668.25
14,500	Oregon Short Line R.R.,Cons. Mtge.	5%	1946	14,884.00
18,000	Pennsylvania R.R. Co., Cons. Mtge. .	4½%	1960	18,405.00
100,000	Pennsylvania R.R. Co., Gen. Mtge. .	4½%	1965	100,744.00
18,000	Pennsylvania R.R. Co., 40-yr. Gold .	4½%	1970	11,880.00
125,000	Pere Marquette Ry., 1st Mtge. Gold .	4½%	1980	120,987.50
117,900	Pere Marquette Ry.,1st Mtge. "A" .	5%	1956	104,719.59
37,500	Pere Marquette Ry., 1st Mtge. "B" .	4%	1956	37,500.00
51,000	Rio Grande Western Ry. Co., Mtge. .	4%	1939	49,935.00
5,000	St. Louis Iron Mt. & So. Ry. (Reg.) .	4%	1933	4,812.50
83,000	St. Louis, Iron Mt. & So. Ry.	4%	1933	72,542.50
5,000	Southern Pacific Co. Gold	4%	1949	4,575.00
212,000	Southern Pacific Co.	4½%	1969	192,280.00
100,000	Southern Pac.Co.OregonLines,1stMt.	4½%	1977	97,250.00
141,000	So. Ry. Co., Dev. & Gen. Mtge. . .	4%	1956	117,583.47
25,000	So.Ry.Co.,St.Louis Div.,1stMt.(Reg.)	4%	1951	24,875.00
100,000	Term.R.R.Asso.of St. Louis,1st Mtge.	4½%	1939	100,105.00
100,000	Term.R.R.Asso.of St.Louis,Gen.Mtg.	4%	1953	83,860.00
6,000	Texas & PacificRy.Co.,Gen.&Ref.Mt.	5%	1979	3,900.00
100,000	Un.Pac. R.R.Co.,1st Mtge.& L. Gr. .	4%	1947	100,534.00
60,000	Union Pacific R.R. Co.	4½%	1967	58,200.00
100,000	UnionTerminalCo.ofDallas,1stMt.S.F.	5%	1942	99,673.75
10,000	Western Pacific R.R.Co.,1st Mt. "A"	5%	1946	8,000.00

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$7,438.10	.....	$550.00
.....	.....	99,750.00	.....	5,000.00
.....	.....	13,650.00	.....	840.00
.....	.....	96,250.00	.....	4,500.00
.....	.....	41,537.50	.....	1,720.00
.....	.....	13,434.36	.....	630.00
.....	.....	8,536.50	.....	405.00
.....	.....	24,702.50	.....	1,125.00
.....	$150.00	11,000.00	.....	770.00
.....	.....	46,046.65	.....	2,080.00
.....	.....	97,000.00	.....	4,500.00
.....	.....	47,350.00	.....	2,750.00
.....	.....	98,625.00	.....	4,500.00
.....	.....	2,145.00	.....	140.00
.....	.....	6,320.00	.....	320.00
.....	.....	36,865.00	.....	2,000.00
.....	119.00	32,866.00	.....	1,872.00
.....	.....	67,875.00	.....	3,000.00
.....	53,659.83	514,237.77	.....	32,553.34
.....	.....	82,668.25	.....	3,360.00
.....	30.00	14,854.00	.....	725.00
.....	15.00	18,390.00	.....	810.00
.....	24.00	100,720.00	.....	4,500.00
.....	.....	11,880.00	.....	810.00
.....	.....	120,987.50	.....	5,625.00
.....	.....	104,719.59	.....	5,895.00
.....	.....	37,500.00	.....	1,500.00
.....	.....	49,935.00	.....	2,040.00
.....	.....	4,812.50	.....	200.00
.....	.....	72,542.50	.....	3,320.00
.....	.....	4,575.00	.....	200.00
.....	.....	192,280.00	.....	9,540.00
.....	.....	97,250.00	.....	4,500.00
.....	.....	117,583.47	.....	5,640.00
.....	.....	24,875.00	.....	1,000.00
.....	15.00	100,090.00	.....	4,500.00
.....	.....	83,860.00	.....	4,000.00
.....	.....	3,900.00	.....	300.00
.....	38.00	100,496.00	.....	4,000.00
.....	.....	58,200.00	.....	2,700.00
.....	.....	99,673.75	.....	5,000.00
.....	.....	8,000.00	.....	500.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	RAILROAD BONDS (*Continued*)			
$200,000	Virginian Ry. Co., 1st Mtge "A"	5%	1962	$191,737.50
75,000	Washington Terminal Co.	3½%	1945	.....
50,000	Winston Salem South.Ry.Co.,Mtge.	4%	1960	43,875.00
	Sold or matured during year			513,288.61
$7,643,100	*Total Railroad Bonds*			$7,325,427.95

	RAILROAD STOCKS		*Div.*	*Shares*
$33,600	Atchison,Topeka & SantaFeCo.,Pref.	5%	336	$25,200.00
150,000	Atchison, Topeka & Santa FeCo.,Com.		1500	209,328.30
50,000	Atlanta,Birmingham&CoastR.R.,Pfd.	5%	500	50,000.00
40,500	Baltimore & Ohio R.R. Common		405	20,723.95
8,800	Bangor & Aroostook R.R. Com.	2%	176	10,560.00
20,000	Bangor & Aroostook R.R. Pfd.	7%	200	19,000.00
58,800	Boston & Albany R.R.Co., Capital	8¾%	588	108,904.75
13,300	Chic.Jct.Rwys.& Union St.Yds.Co.	6%	133	12,718.13
190,000	Chicago & Northwestern Ry.,Common		1900	110,475.00
103,200	Delaware & Hudson R.R., Cap.		1032	126,604.00
12,500	Del., Lack & Western R.R.		250	26,800.00
82,500	Great Northern Ry. Co., Preferred		825	68,615.00
13,900	Illinois Central R.R. Pref. "A"		139	13,900.00
63,300	Illinois Central R.R. Co., Com.		633	58,401.00
115,000	Louisville & Nashville R.R.		1150	99,251.04
213,600	New York Central R.R.Co.,Capital		2136	262,268.22
50,000	N. Y., N. H. & H. R.R. Co., Pref.		500	61,461.00
59,600	N. Y., N. H., & H. R.R. Co., Com.		596	41,754.00
33,500	Norfolk & Western Ry.Co., Common	8%	335	38,860.00
53,000	Northern Pacific Ry., Capital		530	35,623.75
33,800	Old Colony R.R. Co., Capital	7%	338	39,612.50
82,400	Pennsylvania R.R. Co.	1%	1648	129,880.00
100,000	Pere Marquette Ry. Pr. Pref. Cum.		1000	80,024.40
65,000	Southern Pacific Co., Capital		650	58,500.00
100,000	Union Pacific R.R., Common	6%	1000	142,573.13
30,000	Vicksburg,Shreveport&PacificRwy.Co.	5%	300	29,250.00
	Sold during year			4,900.00
$1,776,300	*Total Railroad Stocks*			$1,885,188.17

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$191,737.50	.....	$10,000.00
$68,196.37	.....	68,196.37	$142.44	.....
.....	.....	43,875.00	.....	2,000.00
19,226.59	$532,515.20	.....	.....	11,892.73
$494,734.21	$620,720.78	$7,199,441.38	$6,605.83	$346,745.28
.....	.....	$25,200.00	.....	$1,680.00
.....	.....	209,328.30	.....	.....
.....	.....	50,000.00	.....	2,500.00
.....	.....	20,723.95	.....	.....
.....	.....	10,560.00	.....	352.00
.....	.....	19,000.00	.....	1,400.00
.....	.....	108,904.75	.....	5,145.00
.....	.....	12,718.13	.....	798.00
.....	.....	110,475.00	.....	.....
.....	.....	126,604.00	.....	3,096.00
.....	.....	26,800.00	.....	.....
.....	.....	68,615.00	.....	.....
.....	.....	13,900.00	.....	.....
.....	.....	58,401.00	.....	.....
.....	.....	99,251.04	.....	.....
.....	.....	262,268.22	.....	.....
.....	.....	61,461.00	.....	.....
.....	.....	41,754.00	.....	.....
.....	.....	38,860.00	.....	2,680.00
.....	.....	35,623.75	.....	.....
.....	.....	39,612.50	.....	2,366.00
.....	.....	129,880.00	.....	824.00
.....	.....	80,024.40	.....	.....
.....	.....	58,500.00	.....	.....
.....	.....	142,573.13	.....	6,000.00
.....	.....	29,250.00	.....	1,500.00
.....	$4,900.00	.....	.....	63.75
.....	$4,900.00	$1,880,288.17	.....	$28,404.75

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	REAL ESTATE BONDS			
$20,000	AmericanFurn.MartBldg.Corp.1stMt.	6%	1946	$16,400.00
4,000	Cent. Mfg. Dist., 1st Mtge.R.E. Imp.	5½%	1940	3,970.00
9,000	Cent.Mfg.Dist.,1st Mtge.R.E. Imp. .	5½%	1941	8,955.00
397,000	Equitable Office Bldg.Corp.,35-Yr.Deb.	5%	1952	406,000.00
50,000	43 Exchange Pl.Bldg.,1st Mtge. S. F.	6%	1938	49,625.00
200,000	Lawyers Mtg. Invest.Corp. of Boston	5½%	1940	199,500.00
50,000	Steiger Bldg., 1st Mtge. Gold	5½%	1952	49,875.00
89,500	Trinity Bldg.Corp. of N.Y., 1stMtge.	5½%	1939	86,533.33
	Sold or matured during year			36,522.50
$819,500	*Total Real Estate Bonds*			$857,380.83
	REAL ESTATE STOCKS	*Div.*	*Shares*	
$58,800	Alaska Building Trust		588	$58,251.22
20,000	Boston Cham. of Com. Realty Tr. 1st pf. . .		200	19,200.00
68,000	Boston Real Estate Trust Capital .	2%	680	71,661.64
$146,800	*Total Real Estate Stocks*			$149,112.86
	BANK STOCKS			
$104,160	First National Bank of Boston . . .	$2.00	5208	$318,902.76
4,000	First National Bank of New York .	100%	40	104,328.00
21,200	Guaranty Trust Co. of New York . .	20%	212	76,519.54
2,000	Methuen National Bank, Methuen .	...	20	.....
4,700	National Shawmut Bank of Boston .	2.00	188	9,400.00
10,000	New England Trust Co., Boston . .	20%	100	40,000.00
	Sold during year			3,040.00
$146,060	*Total Bank Stocks*			$552,190.30
	MORTGAGE NOTES	*Rate*	*Maturity*	
$6,500.00	Beta Nu House Corporation . . .	5½%	1934	$7,500.00
4,500.00	E. V. and C. H. Bigelow	5%	....	4,500.00
40,394.40	F. J. Holderried (2 at $19,000 each)	3%	1935	38,000.00
4,000.00	Nicola Lomuscio	5%	1938	.....
75,000.00	Ella C. Martin	5%	1933	75,000.00
5,000.00	P. Nickerson	4%	....	.....
2,400.00	Edward & Alina Orlogski	5%	....	2,400.00
14,000.00	Theta Chi	5%	1931	15,000.00
	Sold during year		....	7,000.00
$151,794.40	*Total Mortgage Notes*			$149,400.00

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$16,400.00	.....	$1,200.00
.....	.....	3,970.00	.....	220.00
.....	.....	8,955.00	.....	495.00
.....	$9,000.00	397,000.00	.....	20,300.00
.....	.....	49,625.00	.....	3,000.00
.....	.....	199,500.00	.....	5,500.00
.....	.....	49,875.00	.....	2,750.00
.....	.....	86,533.33	.....	4,922.50
$32.50	36,555.00	.....	.....	1,118.48
$32.50	$45,555.00	$811,858.33	.....	$39,505.98
.....	.....	$58,251.22	.....	$147.00
.....	.....	19,200.00	.....	.....
.....	.....	71,661.64	.....	1,700.00
.....	.....	$149,112.86	.....	$1,847.00
.....	.....	$318,902.76	.....	$10,416.00
.....	.....	104,328.00	.....	4,000.00
.....	.....	76,519.54	.....	4,240.00
$1,600.00	.....	1,600.00	.....	.....
.....	.....	9,400.00	.....	376.00
.....	.....	40,000.00	.....	3,000.00
.....	$3,040.00	.....	.....	32.00
$1,600.00	$3,040.00	$550,750.30	.....	$22,064.00
.....	$1,000.00	$6,500.00	.....	$438.75
.....	.....	4,500.00	.....	225.00
$2,394.40	.....	40,394.40	.....	570.00
4,000.00	.....	4,000.00	$232.28	90.76
.....	.....	75,000.00	.....	3,750.00
5,000.00	.....	5,000.00	.....	150.00
.....	.....	2,400.00	.....	120.00
.....	1,000.00	14,000.00	.....	725.00
.....	7,000.00	.....	1,545.11	155.75
$11,394.40	$9,000.00	$151,794.40	$1,777.39	$6,225.26

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	REAL ESTATE			
$205,632.55	Avon St. Land and Building (11–13)			$205,632.55
385,364.53	Franklin St. Land and Building (64–70)			385,364.53
100.00	Dorchester Land			100.00
40,000.00	Memorial Drive, Cambridge			40,000.00
15,000.00	No. 7 Central St., Winchester, Land and Building			15,000.00
$646,097.08	*Total Real Estate*			$646,097.08
	MISCELLANEOUS			
$100,000.00	Aldred Investment Trust Deb.	4½%	1967	$110,409.00
100,000.00	Solvay American Invest. Corp. Ser. Gold	5%	1942	99,500.00
*	Aldred Investment Trust Common		1000†	.....
5,000.00	Mass. Hospital Life Insurance Co.	3¾%	..	5,000.00
*60,000.00	Old Colony Trust Associates	...	600†	30,000.00
285,000.00	Gannett Co., Inc., Note	5%	...	285,000.00
$550,000.00	*Total Miscellaneous*			$529,909.00

		Per cent of total 1933	*Per cent of total 1932*	
	RECAPITULATION, GENERAL INVESTMENTS			
$2,920,825.00	Government and Municipal Bonds	9.10	8.30	$3,173,397.00
2,638,000.00	Industrial Bonds	7.70	6.70	2,558,772.13
5,652,860.00	Industrial Stocks	13.60	17.30	4,320,700.06
9,071,000.00	Public Utility Bonds	28.00	25.10	8,190,247.31
1,257,750.00	Public Utility Stocks	3.80	4.40	1,189,590.76
7,643,100.00	Railroad Bonds	22.80	22.10	7,325,427.95
1,776,300.00	Railroad Stocks	6.00	6.00	1,885,188.17
819,500.00	Real Estate Bonds	2.60	2.80	857,380.83
146,800.00	Real Estate Stocks	0.50	0.50	149,112.86
146,060.00	Bank Stocks	1.70	1.80	552,190.30
151,794.40	Mortgage Notes	0.50	0.50	149,400.00
646,097.08	Real Estate	2.00	2.10	646,097.08
550,000.00	Miscellaneous	1.70	2.40	529,909.00
$33,420,086.48	*Total General Investments*	100.00	100.00	$31,527,413.45

INVESTMENTS, MALCOLM COTTON BROWN FUND		*Rate*	*Maturity*	
$15,000	Metro. West Side Elev. Ry. Co., Mtge.	4%	1938	$6,750.00
10,000	Metro. West Side Elev. Ry. Co., Mtge.	4%	1938	4,100.00
1,000	Public Ser. Co. Nor. Ill. 1st & Ref. "E"	4½%	1980	990.00
2,000	Southern Ry. Co., Dev. & Gen. Mtge.	4%	1956	1,795.00
$28,000	*Total*			$13,635.00

*No par value.
†Shares.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$205,632.55	$5,558.34	$12,134.14
.....	.....	385,364.53	13,822.99	19,096.88
.....	.....	100.00	92.30	.....
.....	.....	40,000.00	.....	.....
.....	.....	15,000.00	825.31	810.00
.....	.....	$646,097.08	$20,298.94	$32,041.02
.....	$306.00	$110,103.00	.....	$4,500.00
.....	.....	99,500.00	.....	5,000.00
.....	.....	.....	.....	.....
.....	.....	5,000.00	.....	187.50
.....	.....	30,000.00	.....	360.00
.....	.....	285,000.00	.....	14,250.00
.....	$306.00	$529,603.00	.....	$24,297.50
$279,886.08	$572.843.08	$2,880,440.00	$883.61	$147,769.65
79,888.56	226,082.31	2,412,578.38	705.69	122,886.05
10,827.67	31,997.58	4,299,530.15	.....	163,671.35
1,533,269.06	915,323.56	8,808,192.81	9,339.07	442,499.32
25,383.15	.....	1,214,973.91	.....	70,657.58
494,734.21	620,720.78	7,199,441.38	6,605.83	346,745.28
.....	4,900.00	1,880,288.17	.....	28,404.75
32.50	45,555.00	811,858.33	.....	39,505.98
.....	.....	149,112.86	.....	1,847.00
1,600.00	3,040.00	550,750.30	.....	22,064.00
11,394.40	9,000.00	151,794.40	1,777.39	6,225.26
.....	.....	646,097.08	20,298.94	32,041.02
.....	306.00	529,603.00	.....	24,297.50
$2,437,015.63	$2,429,768.31	$31,534,660.77	$39,610.53	$1,448,614.74
.....	.....	$6,750.00	.....	.....
.....	.....	4,100.00	.....	.....
.....	.....	990.00	.....	$45.00
.....	.....	1,795.00	.....	80.00
.....	.....	$13,635.00	.....	$125.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	INVESTMENTS, COFFIN MEMORIAL FUND			
$35,000	Light & Power Securities Co., Pref.	6%	350†	$35,000.00
*1,000	United Gas & Imp. Co., Pref.	$5.00	10†	973.04
$36,000	*Total*			$35,973.04
	INVESTMENTS, EBEN S. DRAPER FUND			
$22,000	Province of Ontario Deb.	5%	1959	$21,890.00
4,000	Brooklyn Edison Co. Gen.Gold "E"	5%	1952	3,870.00
20,000	New York Tel.Co.,1st &Gen. Mtge.	4½%	1939	19,395.00
14,000	Ohio Power Co., 1st & Ref.Mtge. Gold	4½%	1956	12,202.50
4,000	Chic.Mil.,St.Paul&Pac.R.R.Gold"A"	5%	1975	4,061.00
16,000	C.M.,St.P. & Pac.R.R.Conv.Gold"A"	5%	2000	16,259.00
24,000	Indianapolis Un. Ry. Co., Gen. Mtge.	5%	1965	23,880.00
$104,000	*Total*			$101,557.50
	INVESTMENTS, RICHARD LEE RUSSELL FELLOWSHIP FUND			
$3,000	Trinity Bldgs.Corp.of N.Y.,1st Mtge.	5½%	1939	$3,000.00
	INVESTMENTS, SUSAN H. SWETT SCHOLARSHIP FUND			
$10,000	Mass. Hospital Life Insurance Co.	3¾%	...	$10,000.00
2,000	Trinity Bldgs.Corp. of N.Y.,1st Mtge.	5½%	1939	2,000.00
$12,000	*Total*			$12,000.00
	INVESTMENTS, WILLIAM LYMAN UNDERWOOD FUND			
$4,000	Consolidated Gas of N. Y. Com.	3.40	40†	$4,880.00
3,400	Boston Woven Hose & Rubber Co. Com.		34†	2,992.00
2,000	Boston Woven Hose & Rubber Co. Pfd.		20†	2,000.00
$9,400				$9,872.00
	INVESTMENTS, FRANCES E. WESTON FUND			
$10,000	Mortgage Note, Anna C. Bartlett	4%	1936	$10,000.00
	INVESTMENTS, JONATHAN WHITNEY FUND			
$25,000	Montreal, City of, Canada	5%	1936	$25,000.00
25,000	New York, City of,Corporate Stock	4¼%	1964	25,802.00
54,000	Canada, Dominion of, 10-Yr. Gold	4½%	1936	53,257.50
21,000	Standard Oil Co. of New York	4½%	1935	21,028.00
24,000	Swift & Co., 1st Sinking Fund	5%	1944	21,720.00
28,000	Western Electric Co., Deb.	5%	1944	27,720.00

*No par value.
†Shares.

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$35,000.00	.....	$2,100.00
.....	.....	973.04	.....	50.00
.....	.....	$35,973.04	.....	$2,150.00
.....	.....	$21,890.00	.....	$1,100.00
.....	.....	3,870.00	.....	200.00
.....	.....	19,395.00	.....	900.00
.....	.....	12,202.50	.....	630.00
.....	$2.00	4,059.00	.....	200.00
.....	4.00	16,255.00	.....	.....
.....	.....	23,880.00	.....	1,200.00
.....	$6.00	$101,551.50	.....	$4,230.00
.....	.....	$3,000.00	.....	$165.00
.....	.....	$10,000.00	.....	$375.00
.....	.....	2,000.00	.....	110.00
.....	.....	$12,000.00	.....	$485.00
.....	.....	$4,880.00	.....	$154.00
.....	.....	2,992.00	.....	.....
.....	.....	2,000.00	.....	120.00
.....	.....	$9,872.00	.....	$274.00
.....	.....	$10,000.00	.....	$400.00
.....	.....	$25,000.00	.....	$1,250.00
.....	$26.00	25,776.00	.....	1,062.50
.....	.....	53,257.50	.....	2,430.00
.....	19.00	21,009.00	.....	945.00
.....	.....	21,720.00	.....	1,200.00
.....	.....	27,720.00	.....	1,400.00

Schedule H (*Continued*)

Par Value	*Description of Securities*	*Rate*	*Maturity*	*Balance June 30, 1932*
	INVESTMENTS, JONATHAN WHITNEY FUND (*Continued*)			
$27,000	Brooklyn Edison Co. Inc. Gen."E"	5%	1952	$26,122.50
25,000	Detroit Edison Co., Gen.& Ref."E"	5%	1952	.....
16,000	MemphisPow.&Lt.Co.1st&Ref.Mt."A"	5%	1948	15,040.00
25,000	N.Y.Tel. Co., 1st & Gen. Mtge.	4½%	1939	24,150.39
9,000	Sierra & San Fran.Pow.Co.1st Mtge.	5%	1949	8,077.50
25,000	Atch.,Top.&S.F.,Cal.&Ar.Lines,1stMt.	4½%	1962	24,381.25
35,000	Chicago Union Station,1st Mtge."A"	4½%	1963	35,171.00
25,000	Illinois Cen. R.R.Co., Sec. Gold	4%	1952	22,625.00
50,000	Kansas City Terminal Ry.Co.,1stMt.	4%	1960	42,750.00
25,000	Maine Cen. R.R.Co.,1st & Ref.Mt.	4½%	1935	25,002.00
7,000	New York Central Equip. Tr.	4½%	1935	7,000.00
9,000	New York Central Lines, Eq. Tr.	4½%	1936	8,558.10
5,000	Penn. R. R. Eq. Tr. "A"	5%	1936	4,950.00
10,000	Southern Ry. Co.Dev.& Gen. Mtge.	4%	1956	8,975.00
150,000	Mortgage Note, M. I. T. Dormitory	5%	...	150,000.00
	Sold or matured during year			25,000.00
$620,000	*Total*			$602,330.24
$34,242,486.48	Grand Total, All Investments (*Schedule D*)			$32,315,781.23

RECAPITULATION, ALL INVESTMENTS

	Per cent of total 1933	*Per cent of total 1932*	*Book Value*
Government and Municipal Bonds	9.30	10.10	$3,006,363.50
Industrial Bonds	7.70	8.20	2,491,577.38
Industrial Stocks	13.30	13.40	4,304,522.15
Public Utility Bonds	27.80	25.80	8,953,715.70
Public Utility Stocks	3.90	3.80	1,255,826.95
Railroad Bonds	22.80	23.40	7,416,285.73
Railroad Stocks	5.80	5.90	1,880,288.17
Real Estate Bonds	2.50	2.60	816,858.33
Real Estate Stocks	.50	.50	149,112.86
Bank Stocks	1.70	1.70	550,750.30
Mortgage Notes	1.00	.90	311,794.40
Real Estate	2.00	2.00	646,097.08
Miscellaneous	1.70	1.70	539,603.00
	100.00	100.00	$32,322,795.55

Schedule H (*Continued*)

Purchases and Charges during the year	*Sales and Credits during the year*	*Balance June 30, 1933*	*Accrued Interest, etc.*	*Income Received*
.....	.....	$26,122.50	.....	$1,350.00
$24,825.00	.....	24,825.00	$69.45	625.00
.....	.....	15,040.00	.....	800.00
.....	.....	24,150.39	.....	1,125.00
.....	.....	8,077.50	.....	450.00
.....	.....	24,381.25	.....	1,125.00
.....	$6.00	35,165.00	.....	1,575.00
.....	.....	22,625.00	.....	1,000.00
.....	.....	42,750.00	.....	2,000.00
.....	1.00	25,001.00	.....	1,125.00
.....	.....	7,000.00	.....	315.00
.....	.....	8,558.10	.....	405.00
.....	.....	4,950.00	.....	250.00
.....	.....	8,975.00	.....	400.00
.....	.....	150,000.00	.....	7,500.00
72.72	25,072.72	.....	.....	1,115.06
$24,897.72	$25,124.72	$602,103.24	$69.45	$29,447.56
$2,461,913.35	$2,454,899.03	$32,322,795.55	$39,679.98	$1,485,891.30

SCHEDULE J

EDUCATIONAL PLANT

Land, Buildings and Equipment

Land, Boylston, Clarendon and Newbury Streets, Boston	$1,500,000.00
Rogers Building, Boylston Street, Boston	204,534.76
Walker Building, Boylston Street, Boston	150,000.00
Land, east of Massachusetts Avenue, Cambridge	1,125,766.67
Land, west of Massachusetts Avenue	854,014.82
Main Educational Building Group	4,071,492.13
George Eastman Research Laboratories	1,225,098.58
Pratt School of Naval Architecture	674,971.70
Guggenheim Aeronautical Laboratory	293,637.46
Aeronautical Engine Testing Laboratory	121,101.92
Mechanic Arts Building	83,658.89
Power Plant (including Machinery and Equipment)	302,569.27
Homberg Memorial Infirmary	188,441.60
Educational Equipment, Cambridge	2,039,953.60
Steam and Electrical Distribution System, Cambridge	155,448.64
Gas Engine Laboratory	26,301.88
Hydraulic Laboratory	11,000.00
Compression Laboratory	31,000.00
Tractor Garage	6,400.00
Service Garage	5,981.54
Athletic Field	24,815.14
Walker Memorial Building	575,111.50
Walker Memorial Building, Equipment	139,475.52
Dormitories (1916) ($331,357.67 less mortgage $150,000)	181,357.67
Dormitories (1916) Equipment	26,967.85
Alumni Dormitories (1924)	185,718.91
Alumni Dormitories (1924) Equipment	9,518.04
Alumni Dormitories (1928)	291,274.49
Alumni Dormitories (1928) Equipment	18,971.05
Alumni Dormitories (1930)	562,485.62
Alumni Dormitories (1930) Equipment	32,630.16
Service Building	42,988.20
Boathouse	54,244.13
Squash Courts	29,042.54
Summer Camp, East Machias, Maine	120,558.00
Summer Camp, Dover, New Jersey	35,000.00
Miscellaneous	301,726.27
Total, June 30, 1933 (Schedule D)	$15,703,258.55

SCHEDULE K

PRINCIPAL GIFTS AND APPROPRIATIONS FOR EDUCATIONAL PLANT

George Eastman, for New Buildings	$4,724,098.58
Maria A. Evans, for Dormitories	161,192.55
Class of 1893, for Dormitory	100,000.00
Appropriation, Maria A. Evans Fund	169,080.60
T. C. du Pont, for Land	625,000.00
T. C. du Pont, for Dormitories	100,000.00
T. C. and P. S. du Pont, Charles Hayden, for Mining Building	215,000.00
Pratt Fund, for School of Naval Architecture	675,150.00
Alumni Fund, Equipment, Dormitories and Walker Memorial	622,119.38
Alumni Dormitory Fund	516,945.66
Appropriation, E. D. Barbour Fund, for Dormitories	258,599.40
Appropriation, K. F. Wood Fund, for Dormitories	28,750.00
Appropriation, F. S. Hodges Fund, for Dormitories	57,316.26
Appropriation, Russell Robb Fund, for Dormitories	28,750.00
Appropriation, S. H. Thorndike Fund, for Dormitories	15,000.00
Walker Memorial Fund, for Walker Memorial	167,303.96
Appropriation of Emma Rogers Fund, for Equipment	528,077.06
Daniel Guggenheim Fund, for Aeronautical Laboratory	230,000.00
Estate of F. W. Emery, for Equipment	126,423.80
Appropriation of Charles C. Drew Fund	305,171.52
Subscriptions to Homberg Memorial Infirmary	110,225.00
A. P. Sloan, Jr., for Aero Engine Laboratory	65,000.00
Appropriation of Frank E. Peabody Fund	52,238.89
Appropriation of French Fund, for Equipment	100,843.34
Appropriation of George B. Dorr Fund, for Equipment	49,573.47
Land in Boston, Grant of Commonwealth (estimated)	1,500,000.00
Appropriation of A. F. Estabrook Fund, for Land	85,000.00
Appropriation of Ida F. Estabrook Fund, for Land	20,000.00
Appropriation of Miscel. Unrestricted Funds, for Land	151,697.89
Subscriptions, for Land	125,525.00
Sale of Land and Buildings in Boston	656,919.45
Equipment from Buildings in Boston (estimated)	500,000.00
Other Funds, Donations, Appropriations, etc.	2,632,256.74
Total, June 30, 1933 (Schedule D)	$15,703,258.55

SCHEDULE M
[1]ENDOWMENT FUNDS FOR GENERAL PURPOSES

No.	Restricted Funds	Funds, June 30, 1932	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1933
101	George Robert Armstrong	$5,250.00	$230.88	.....	$230.88	$5,250.00
102	George Blackburn Mem.	852,514.87	38,317.20	$62,584.95	58,213.41	895,203.61
103	Charles Choate	37,608.15	1,670.44	.....	1,670.44	37,608.15
104	Eben S. Draper	102,400.00	4,230.00	.....	4,230.00	102,400.00
105	Coleman du Pont	117,017.11	5,269.28	5,448.69	5,269.28	122,465.80
107	Eastman Contract	9,546,268.15	423,842.40	.....	423,842.40	9,546,268.15
108	George Eastman (Building)	1,422,000.00	63,136.80	901.42	63,136.80	1,422,901.42
109	Charles W. Eaton	251,987.03	11,188.80	.....	11,188.80	251,987.03
112	Educational Endowment	7,960,264.60	353,424.00	.....	353,424.00	7,960,264.60
113	Martha Ann Edwards	31,500.00	1,398.60	.....	1,398.60	31,500.00
114	William Endicott	26,250.00	1,163.28	.....	1,163.28	26,250.00
117	Francis Appleton Foster	1,051,100.00	46,664.40	.....	46,664.40	1,051,100.00
118	Alexis H. French	5,000.00	222.00	.....	222.00	5,000.00
119	Jonathan French	26,462.48	1,172.16	.....	1,172.16	26,462.48
121	Henry C. Frick	1,837,263.69	82,051.20	16,250.00	82,051.20	1,853,513.69
122	General Endowment	1,605,499.00	71,284.20	.....	71,284.20	1,605,499.00
123	James Fund	171,904.21	7,632.36	.....	7,632.36	171,904.21
125	Katherine B. Lowell	5,250.00	230.88	.....	230.88	5,250.00
126	Thomas McCammon	15,000.00	666.00	.....	666.00	15,000.00
127	M. I. T. Alumni (Fund Bal.)	1,601.64	71.04	.....	.....	1,672.68
130	Kate M. Morse	26,250.00	1,163.28	.....	1,163.28	26,250.00
131	Richard Perkins	52,550.00	2,331.00	.....	2,331.00	52,550.00
132	J. W. and B. L. Randall	87,702.36	3,893.88	.....	3,893.88	87,702.36
135	Wm. Barton Rogers Mem.	262,975.00	11,677.20	.....	11,677.20	262,975.00
136	[2]Saltonstall Fund	60,568.75	2,686.20	.....	2,014.65	61,240.30
137	Samuel E. Sawyer	4,914.40	217.56	.....	217.56	4,914.40
139	Andrew Hastings Spring	52,550.00	2,331.00	.....	2,331.00	52,550.00
140	Seth K. Sweetser	26,311.62	1,167.72	.....	1,167.72	26,311.62
141	William J. Walker	24,763.59	1,101.12	.....	1,101.12	24,763.59
114	Horace Herbert Watson	33,869.25	1,509.60	207.44	1,509.60	34,076.69
145	Albion K. P. Welch	5,250.00	230.88	.....	230.88	5,250.00
147	[3]George Wigglesworth	25,067.90	1,110.00	.....	999.00	25,178.90
		$25,734,913.80	$1,143,285.36	$85,392.50	$1,162,327.98	$25,801,263.68
	Unrestricted Funds					
151	Edmund D. Barbour	$384,021.08	$16,738.80	.....	$17,058.27	$383,701.61
152	Howard A. Carson	.....	26.64	$1,000.00	26.64	1,000.00
153	Henrietta G. Fitz	10,000.00	444.00	.....	444.00	10,000.00
155	Esther A. Hilton	1,626.67	71.04	.....	71.04	1,626.67
157	Industrial Fund	108,017.37	4,972.80	9,000.00	35,159.81	86,830.36
159	Hiram F. Mills	10,675.00	475.08	.....	475.08	10,675.00

[1] See alphabetical listing and description of Funds on pages 170–179.
[2] One-fourth of net income added to Fund.
[3] Ten per cent of gross income added to Fund.

Schedule M (*Continued*)

	Unrestricted Funds (Continued)	*Funds, June 30, 1932*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds, June 30, 1933*
162	Moses W. Oliver	$11,770.49	$523.92	.....	$523.92	$11,770.49
163	Preston Player	.....	444.00	$20,000.00	444.00	20,000.00
165	Robert E. Rogers	7,980.77	355.20	.....	355.20	7,980.77
168	Ellen V. Smith	25,000.00	1,110.00	.....	1,110.00	25,000.00
171	Horace W. Wadleigh	2,243.14	97.68	.....	97.68	2,243.14
173	Webster, Frank G.	25,000.00	1,110.00	.....	1,110.00	25,000.00
		$586,334.52	$26,369.16	$30,000.00	$56,875.64	$585,828.04

SCHEDULE M

[2]ENDOWMENT FUNDS FOR DESIGNATED PURPOSES

	Special Deposit Funds					
205	Endowment Reserve	$581,167.81	$21,809.57	$48,036.34	$159,091.94	$491,921.78
207	Albert Fund	2,724.44	53.28	4,010.00	2,575.92	4,211.80
209	[1]Anonymous (1924)	1,589.55	71.04	.....	.....	1,660.59
210	1923 Endowment	286.78	.....	56.53	.....	343.31
211	[1]1923 Endowment Reserve	8,771.74	390.72	573.80	479.28	9,256.98
212	[1]1924 Endowment	1,541.98	75.48	551.12	.....	2,168.58
213	[1]1924 Endowment Reserve	6,529.66	288.60	1,411.73	.....	8,229.99
214	[1]1925 Endowment	1,492.12	66.60	.....	.....	1,558.72
215	[1]1925 Endowment Reserve	3,551.12	159.84	474.37	.....	4,185.33
216	1926 Endowment	258.56	.....	.....	.....	258.56
217	1926 Endowment Reserve	428.23	.....	289.21	615.47	101.97
218	1927 Endowment	5,041.15	235.32	954.27	.....	6,230.74
220	[1]1928 Endowment	6,870.08	310.80	1,428.56	.....	8,609.44
221	1929 Endowment	3,225.14	155.40	1,044.76	.....	4,425.30
222	[1]1930 Endowment	475.27	.....	.....	.....	475.27
223	1930 Endowment Reserve	26.63	.....	.....	.....	26.63
225	M.I.T.Teachers' Insurance	3,933.40	.....	27,819.72	24,001.90	7,751.22
226	[1]M.I.T.Teachers' Insurance (Special)	56,082.85	2,486.40	1,556.81	1,863.50	58,262.56
227	[1]M.I.T.Alumni Association Permanent Funds	46,998.77	2,086.80	450.00	.....	49,535.57
230	[1]Class of '98 Loan	6,846.06	279.72	.....	500.00	†6,625.78
231	Professors' Fund	21,327.30	1,163.28	14,526.38	200.00	36,816.96
233	[1]Richards Portrait	504.05	22.20	50.00	10.00	566.25
235	Rockefeller Found.Research	*7,503.00	.....	41,250.00	40,350.00	*6,603.00
236	W. P. Ryan Special	.....	.....	3,000.00	.....	3,000.00
237	Sedgwick Memorial Lecture Fund	6,124.77	279.72	546.59	49.96	6,901.12
239	[1]Elihu Thomson	5,943.80	261.96	.....	.....	6,205.76
243	[1]Undergraduate Dues, Reserve	19,756.50	866.80	1,000.00	.....	21,623.30
		$783,994.76	$31,063.53	$149,030.19	$229,737.97	$734,350.51

[1] Income added to Fund.
[2] See alphabetical listing and description of Funds on pages 170–179.
* Overdraft.
† Exclusive of student notes receivable. (See Schedule P, page 164.)

[2]Schedule M (*Continued*)

No.		*Funds, June 30, 1932*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds, June 30, 1933*
	FUNDS FOR SALARIES					
251	Samuel C. Cobb For General Salaries	$38,351.31	$1,700.52	.....	$1,700.52	$38,351.31
253	Sarah H. Forbes For General Salaries	500.00	22.20	.....	22.20	500.00
255	George A. Gardner For General Salaries	21,000.00	932.40	.....	932.40	21,000.00
259	James Hayward Professorship of Engineering	20,250.00	896.88	.....	896.88	20,250.00
261	William P. Mason Professorship of Geology . .	20,250.00	896.88	.....	896.88	20,250.00
263	Henry B. Rogers For General Salaries	26,250.00	1,163.28	.....	1,163.28	26,250.00
265	Nathaniel Thayer Professorship of Physics . .	26,250.00	1,163.28	.....	1,163.28	26,250.00
266	Elihu Thomson Professorship, Elec. Eng. .	.....	.....	$1,479.60	.....	1,479.60
		$152,851.31	$6,775.44	$1,479.60	$6,775.44	$154,330.91
	FUNDS FOR LIBRARY, READING ROOMS AND GYMNASIUM					
271	Walter S. Barker	$11,067.56	$475.08	.....	$473.61	$11,069.03
273	Ednah Dow Cheney	16,042.80	710.40	$10.30	76.78	16,686.72
274	Frank Harvey Cilley	81,800.51	3,631.92	.....	3,293.75	82,138.68
277	Charles Lewis Flint	5,567.27	244.20	.....	217.28	5,594.19
280	William Hall Kerr	3,156.82	137.64	.....	13.46	3,281.00
283	George A. Osborn	8,866.27	381.84	.....	223.54	9,024.57
286	Arthur Rotch Arch	6,435.60	284.16	.....	.....	6,719.76
288	Technology Matrons' Teas . .	9,162.82	390.72	.....	409.20	9,144.34
289	John Hume Tod	2,910.73	128.76	.....	96.64	2,942.85
291	Theodore N. Vail.	41,513.88	1,776.00	.....	1,869.48	41,420.40
		$186,524.26	$8,160.72	$10.30	$6,673.74	$188,021.54
	FUNDS FOR DEPARTMENTS					
301	William Parsons Atkinson . . .	$13,732.20	$608.28	.....	$608.28	$13,732.20
303	Frank Walter Boles Memorial .	26,661.69	1,181.04	.....	245.99	27,596.74
305	William E. Chamberlain . . .	7,659.77	337.44	.....	337.44	7,659.77
307	Chemical Engineering Practice	270,822.97	12,023.52	.....	12,023.52	270,822.97
309	Crosby Honorary Fund	1,571.26	71.04	.....	.....	1,642.30
311	Susan E. Dorr	100,705.67	4,471.08	.....	4,471.08	100,705.67
312	George Eastman	420,400.00	18,665.76	.....	18,665.76	420,400.00
317	George Henry May	5,250.00	230.88	.....	230.88	5,250.00
319	Susan Minns.	40.000.00	.....	.....	.....	40,000.00
320	Forris Jewett Moore	34,637.65	1,376.40	$ .81	5,653.67	30,361.19
322	William E. Nickerson	38,361.17	1,509.60	.....	5,371.60	34,499.17
324	Edward D. Peters	5,692.94	253.08	.....	80.00	5,866.02
325	Pratt Naval Architectural . . .	412,399.95	18,315.00	.....	18,315.00	412,399.95
327	Arthur Rotch	26,250.00	1,163.28	.....	1,163.28	26,250.00
329	W. T. Sedgwick	89,538.44	3,973.80	.....	.....	93,512.24
331	[1]Edmund K. Turner	256,686.67	11,397.48	.....	9,067.49	259,016.66
333	William Lyman Underwood . .	9,989.00	274.00	2,128.00	.....	12,391.00
		$1,760,359.38	$75,851.68	$2,128.81	$76,233.99	$1,762,105.88

[1] One-fourth of net income added to Fund.
[2]See alphabetical listing and description of Funds on pages 170–179.

[1]Schedule M (*Continued*)

No.		Funds, June 30, 1932	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1933
	FUNDS FOR RESEARCH					
341	John E. Aldred	$27,098.20	.....	$1,504.90	$28,603.10	.....
343	Samuel Cabot	54,384.27	$2,308.80	.....	1,994.76	$54,698.31
344	Crane Automotive Research	6,630.45	248.64	.....	1,000.00	5,879.09
347	Daniel Guggenheim	1,763.65	75.48	.....	.....	1,839.13
349	Ellen H. Richards	20,723.98	923.52	120.00	.....	21,767.50
351	Charlotte B. Richardson	44,614.59	1,980.24	.....	.....	46,594.83
354	Technology Plan Research	1,623.63	71.04	.....	.....	1,694.67
356	Textile Research Fund	36,950.44	1,420.80	.....	7,578.86	30,792.38
358	Edward Whitney	59,783.11	2,664.00	.....	3,071.01	59,376.10
		$253,572.32	$9,692.52	$1,624.90	$42,247.73	$222,642.01
	FUNDS FOR FELLOWSHIPS					
361	Arkwright Club	$1,935.05	$84.36	.....	.....	$2,019.41
363	William Sumner Bolles	28,503.09	1,265.40	.....	$1,400.00	28,368.49
364	Malcolm Cotton Brown	13,740.34	125.00	.....	1,000.00	12,865.34
366	Collamore	15,044.71	666.00	.....	700.00	15,010.71
368	Dalton Graduate Chemical	7,363.00	328.56	.....	.....	7,691.56
369	DuPont	.....	.....	$1,500.00	1,473.50	26.50
372	Daniel Guggenheim	1,244.10	.....	.....	1,164.10	80.00
374	Rebecca R. Joslin	2,504.12	111.00	.....	100.00	*2,515.12
376	Wilfred Lewis	5,241.80	222.00	.....	225.00	5,238.80
378	Moore	30,507.26	1,354.20	.....	1,500.00	30,361.46
380	Willard B. Perkins	7,552.44	333.00	.....	.....	7,885.44
382	Proctor	.....	.....	2,500.00	1,500.00	1,000.00
384	Proprietors Locks and Canals	3,828.10	146.52	.....	500.00	3,474.62
386	Henry Bromfield Rogers	26,893.05	1,194.36	.....	1,300.00	26,787.41
388	Richard Lee Russell	3,189.07	165.00	.....	165.00	3,189.07
390	Henry Saltonstall	11,372.39	506.16	.....	500.00	11,378.55
392	James Savage	12,863.36	572.76	.....	600.00	12,836.12
393	Sloan	.....	.....	1,000.00	1,000.00	.....
395	Susan H. Swett	12,215.45	485.00	.....	500.00	12,200.45
396	Gerard Swope	138.75	.....	.....	.....	138.75
397	Frank Hall Thorp	10,116.25	448.44	.....	.....	10,564.69
398	Louis Francisco Verges	11,091.76	492.84	.....	500.00	11,084.60
		$205,344.09	$8,500.60	$5,000.00	$14,127.60	$204,717.09
	FUNDS FOR SCHOLARSHIPS					
401	Elisha Atkins	$5,535.77	$244.20	.....	$250.00	$5,529.97
403	Billings Student	53,704.96	2,384.28	.....	2,660.00	53,429.24
404	Jonathan Bourne	11,255.88	497.28	.....	550.00	11,203.16
405	Albert G. Boyden	531,869.45	24,153.60	$28,390.00	20,517.14	563,895.91
406	Harriet L. Brown	7,808.92	346.32	.....	350.00	7,805.24
408	Nino Tesher Catlin	1,114.80	48.84	.....	60.00	1,103.64
411	Lucius Clapp	5,367.21	239.76	.....	250.00	5,356.97
413	Class of 1896	6,238.47	275.28	.....	300.00	6,213.75
415	Lucretia Crocker	84,430.80	3,747.36	.....	7,100.00	81,078.16
417	Isaac W. Danforth	5,653.77	248.64	.....	250.00	5,652.41

[1] See alphabetical listing and description of Funds on pages 170-179.
* Exclusive of student notes receivable. (See Schedule P, page 164.)

[1]Schedule M (*Continued*)

No.		*Funds, June 30, 1932*	*Investment Income*	*Other Income*	*Expended or Transferred*	*Funds, June 30, 1933*
420	Ann White Dickinson	$44,336.91	$1,966.92	.....	$2,200.00	$44,103.83
421	Thomas M. Drown	52,090.95	2,313.24	.....	2,310.00	52,094.19
424	Farnsworth	5,802.12	257.52	.....	250.00	5,809.64
426	Charles Lewis Flint	5,800.14	257.52	.....	250.00	5,807.66
427	Sarah S. Forbes	3,779.67	168.72	.....	170.00	3,778.39
429	Fuel and Gas Scholarship	350.00	.....	.....	.....	350.00
431	George Hollingsworth	5,412.97	239.76	.....	250.00	5,402.73
433	T. Sterry Hunt	3,420.66	150.96	.....	150.00	3,421.62
434	William F. Huntington	5,647.78	248.64	.....	250.00	5,646.42
436	Joy Scholarships	17,339.49	768.12	.....	850.00	17,257.61
438	William Litchfield	5,717.60	253.08	.....	250.00	5,720.68
439	Elisha T. Loring	5,727.39	253.08	.....	250.00	5,730.47
441	Lowell Inst. Scholarship	2,702.57	119.88	.....	125.00	2,697.45
443	George Henry May	7,812.98	350.76	$100.00	400.00	*7,863.74
445	James H. Mirrlees	2,695.72	119.88	.....	125.00	2,690.60
447	Nichols Scholarship	5,657.51	248.64	.....	250.00	5,656.15
448	Charles C. Nichols	5,717.89	253.08	.....	250.00	5,720.97
450	John Felt Osgood	5,621.36	248.64	.....	250.00	5,620.00
451	George L. Parmelee	19,727.33	874.68	.....	950.00	19,652.01
453	Richard Perkins	56,471.87	2,508.60	.....	2,735.00	56,245.47
455	John P. Schenkl	22,544.51	1,176.60	23,821.12	1,150.00	46,392.23
456	Thomas Sherwin	5,695.55	253.08	.....	250.00	5,698.63
458	Horace T. Smith	33,330.71	1,478.52	.....	1,450.00	33,359.23
459	Sons and Daughters New England Colony	627.90	26.64	.....	25.00	629.54
460	Samuel E. Tinkham	2,516.33	111.00	.....	100.00	2,527.33
462	F. B. Tough	35.30	.....	.....	.....	*35.30
463	Susan Upham	1,249.90	53.28	.....	60.00	1,243.18
465	Vermont Scholarship	8,421.97	372.96	.....	400.00	8,394.93
467	Ann White Vose	65,233.91	2,894.88	.....	3,195.00	64,933.79
469	Arthur M. Waitt	10,912.48	483.96	.....	540.00	10,856.44
471	Louis Weissbein	4,546.63	199.80	.....	220.00	4,526.43
473	Frances Erving Weston	6,557.68	266.60	.....	200.00	6,624.28
474	Samuel Martin Weston	5,422.54	200.00	.....	200.00	5,422.54
476	Amasa J. Whiting	4,914.25	217.56	.....	230.00	4,901.81
		$1,146,822.60	$51,522.16	$52,311.12	$52,572.14	$1,198,083.74
	FUNDS FOR PRIZES					
481	Robert A. Boit	$5,416.11	$239.76	.....	$200.00	$5,455.87
483	Class of 1904	553.25	22.20	.....	15.00	560.45
485	Roger Defriez Hunneman	1,078.30	48.84	.....	50.00	1,077.14
487	James Means	3,167.02	142.08	.....	.....	3,309.10
489	Arthur Rotch	6,850.88	301.92	.....	200.00	6,952.80
491	Arthur Rotch, Special	9,148.86	404.04	.....	.....	9,552.90
493	Samuel W. Stratton	.....	17.76	$1,780.00	1,00.00	1,697.76
		$26,214.42	$1,176.60	$1,780.00	$565.00	$28,606.02

[1] See alphabetical listing and description of Funds on pages 170-179..
* Exclusive of student notes receivable. (See Schedule P, page 164.)

[2]Schedule M (*Continued*)

No.		Funds, June 30, 1932	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1933
	FUNDS FOR RELIEF					
501	Edward Austin	$461,489.58	$20,490.60	$61.00	$23,000.00	$459,041.18
503	Thomas Wendell Bailey	2,702.50	119.88	.....	125.00	2,697.38
504	[1]Charles Tidd Baker	28,873.67	1,283.16	.....	761.87	29,394.96
506	Levi Boles	11,417.17	506.16	.....	550.00	11,373.33
508	Bursar's Fund	8,400.00	333.00	5,277.40	5,653.73	*8,356.67
510	Mabel Blake Case	28,149.05	1,247.64	.....	1,350.00	28,046.69
511	Chandler	3,731.17	164.28	.....	.....	3,895.45
512	Fred L. and Florence L. Coburn	5,083.70	226.44	.....	220.00	5,090.14
514	Coffin Memorial	41,918.50	2,150.00	.....	2,110.00	41,958.50
516	Dean's Fund	3,658.53	168.72	527.40	637.50	*3,717.15
518	Carl P. Dennett	327.68	.....	5.17	.....	*332.85
520	Dormitory Fund	4,025.66	177.60	.....	160.00	4,043.26
521	Frances and William Emerson	100,727.10	4,440.00	.....	5,000.00	*100,167.10
523	Norman H. George	98,440.39	4,368.96	.....	4,840.00	97,969.35
525	John A. Grimmons	3,989.13	213.12	3,260.91	760.00	*6,703.16
527	James H. Haste	148,864.13	7,015.20	27,400.00	6,700.00	176,579.33
529	David L. Jewell	25,682.80	1,141.08	.....	1,100.00	25,723.88
531	William B. Rogers	18,950.58	932.40	6,425.50	3,541.00	*22,767.48
532	Summer Surveying Camp	685.08	.....	363.05	680.00	*368.13
534	Teachers' Fund	136,586.58	6,065.04	.....	2,600.00	140,051.62
536	Samson R. Urbino	1,131.80	48.84	.....	60.00	1,120.64
537	Jonathan Whitney	604,342.53	29,378.11	72.72	26,971.75	606,821.61
539	Morrill Wyman	75,299.99	3,343.32	70.00	3,650.00	75,063.31
		$1,814,477.32	$83,813.55	$43,463.15	$90,470.85	$1,851,283.17

RECAPITULATION OF FUNDS

FOR GENERAL PURPOSES					
Restricted	$25,734,913.80	$1,143,285.36	$85,392.50	$1,162,327.98	$25,801,263.68
Unrestricted	586,334.52	26,369.16	30,000.00	56,875.64	585,828.04
FOR DESIGNATED PURPOSES					
Special Deposit Funds	783,994.76	31,063.53	149,030.19	229,737.97	734,350.51
Salaries	152,851.31	6,775.44	1,479.60	6,775.44	154,330.91
Libraries, etc.	186,524.26	8,160.72	10.30	6,673.74	188,021.54
Departments	1,760,359.38	75,851.68	2,128.81	76,233.99	1,762,105.88
Research	253,572.32	9,692.52	1,624.90	42,247.73	222,642.01
Fellowships	205,344.09	8,500.60	5,000.00	14,127.60	204,717.09
Scholarships	1,146,822.60	51,522.16	52,311.12	52,572.14	1,198,083.74
Prizes	26,214.42	1,176.60	1,780.00	565.00	28,606.02
Relief	1,814,477.32	83,813.55	43,463.15	90,470.85	1,851,283.17
Total (Schedule D)	$32,651,408.78	$1,446,211.32 (Schedule B)	$372,220.57	$1,738,608.08	$32,731,232.59 (Schedule D)

[1] One-half of the income added to the principal.
[2] See alphabetical listing and description of Funds on pages 170-179.
* Exclusive of student notes receivable. (See Schedule P, page 164.)

SCHEDULE P

LOAN FUNDS

Fund	*Notes Receivable June 30, 1932*	*Loans Made 1932–1933*	*Loans Paid 1932–1933*	*Notes Receivable June 30, 1933*	*Interest Paid 1932–1933*
Technology Loan Fund	$227,357.00	$203,780.00	$12,544.99	$418,592.01	$5,358.40
Bursar's Fund	13,121.67	5,403.73	4,839.91	13,685.49	118.49
Rogers Fund	18,115.67	3,541.00	6,122.57	15,534.10	302.93
Dean's Fund	2,762.02	637.50	500.94	2,898.58	26.46
C. E. Summer Camp Fund	975.00	680.00	350.00	1,305.00	13.05
Grimmons Sch. Loan Fund	1,750.00	760.00	55.00	2,455.00	66.68
Dennett Fund	980.00	.....	.....	980.00	5.17
Dean's Special Fund	.....	95.00	.....	95.00	.....
R. R. Joslin Fund	.....	100.00	.....	100.00	.....
G. H. May Sch. Fund	2,240.00	400.00	100.00	2,540.00	.....
F. B. Tough Fund	500.00	.....	.....	500.00	.....
Hygiene Special Fund	2,655.15	.....	160.63	2,494.52	1.25
Class of 1898 Fund	.....	500.00	.....	500.00	.....
Emerson Fund	775.00	.....	.....	775.00	.....
Total	$271,231.51	$215,897.23	$24,674.04	$462,454.70	$5,892.43
				(Schedule D)	

SCHEDULE R

MINOR FUNDS

Name	Balance June 30, 1932	Income	Other Increases	Salaries and Expenses	Balance June 30, 1933
Additional Group Ins. Fund	$9.29	$5,195.90	.....	$5,192.52	$12.67
Aeronautical Eng., Airplane Mat.					
Design	1,784.28	800.00	.....	2,005.48	578.80
No. 640	2,834.40	47.10	.....	674.67	2,206.83
Coasting Expts.	59.36	.....	[2]750.00	701.50	107.86
Wind Tunnels	1,501.93	1,050.00	[2]200.00	1,617.39	1,134.54
N. A. C. A. Acct.	*1,000.00	1,000.00	.....	.....	.....
Wing Flutter Acct.	.....	.....	[2]400.00	284.36	115.64
No. 793	164.09	.....	[2]200.00	364.09	.....
No. 837	31.25	.....	.....	31.25	.....
No. 868	336.20	.....	.....	109.62	226.58
No. 881	948.16	3,000.00	.....	6,894.22	*2,946.06
No. 902	594.11	.....	.....	.....	594.11
No. 915	196.92	.....	[2]414.22	402.05	209.09
No. 927	.....	.....	[1]2,000.00	.....	2,000.00
No. 935	.....	.....	[1]342.58	342.58	.....
No. 945	.....	.....	[2]1,000.00	169.79	830.21
Aldred Lecture Fund	*310.18	1,996.22	.....	1,686.04	.....
Architecture:					
Town Planning	.....	941.66	.....	941.66	.....
Special Scholarship	*350.00	350.00	.....	.....	.....
Travel. Scholarships	1,000.00	.....	[2]1,500.00	2,499.10	.90
Biology — Food and Fisheries	5,496.18	463.66	[1,2]1,812.95	4,753.98	3,018.81
Colgate Research	.....	6,000.00	.....	2,318.66	3,681.34
Biocinema Research	2,583.52	87.05	.....	.....	2,670.57
Coffee Research	606.73	.....	.....	34.90	571.83
Frigidaire Research	1,140.68	1,500.00	.....	1,050.32	1,590.36
Health Education	583.27	29.46	[1] 400.00	791.38	221.35
General Sea Foods	5,557.11	5,000.00	.....	7,191.78	3,365.33
Account L	307.14	.....	[2]9.68	316.82	.....
Gelatin Research	1,662.29	290.00	.....	1,767.46	184.83
Rockefeller Research	4,731.18	59.10	[2]6,050.00	5,175.72	5,664.56
Merck Research	32.28	.....	.....	41.66	*9.38
Blue Print Service	.....	4,616.60	.....	4,481.72	134.88
Boat House Equipment	840.07	2,343.65	.....	2,119.95	1,063.77
Building Key Account	.....	2,913.75	.....	241.00	2,672.75
Bus. and Eng. Administration:					
XV Fund	229.09	.....	.....	143.20	85.89
No. 736	219.31	.....	[2]125.00	270.00	74.31
Graduate Fellowship Fund	604.50	5,899.35	.....	6,135.75	368.10
No. 785	177.25	110.00	[2]160.00	352.18	95.07
No. 791	139.14	.....	[2]154.33	.....	293.47

* Overdraft.
[1] Appropriation from Current Funds.
[2] By Transfer.

Schedule R (*Continued*)

Name	*Balance June 30, 1932*	*Income*	*Other Increases*	*Salaries and Expenses*	*Balance June 30, 1933*
Bus. and Eng. Administration (*Cont.*):					
No. 847	$342.27	.....	.....	$327.92	$14.35
No. 857	296.49	.....	.....	296.49	.....
No. 866	259.64	.....	.....	259.64	.....
J. R. Macomber Fund	.....	$500.00	.....	220.60	279.40
No. 972	.....	.....	[1]$2,000.00	.....	2,000.00
Chemical Eng. Practice, Special	.....	611.54	[2]700.00	.....	1,311.54
Chemistry:					
Rockefeller Research	*1,906.54	.....	[2]18,700.00	12,478.78	4,314.68
Res. Lab. App. Chemistry	*1,994.76	2,420.43	[2]11,834.79	12,260.46	.....
Res. Lab. Phys. Chem. Royalties	1,007.56	.....	.....	402.33	605.23
Steam Table Research	*1,062.52	3,478.76	.....	2,416.24	.....
Civil Engineering — No. 616	47.61	.....	.....	47.61	.....
Soil Mech., No. 632	59.27	.....	[1]400.00	341.39	117.88
Spec. Fund	150.00	.....	.....	75.00	75.00
No. 734	113.07	.....	.....	79.85	33.22
No. 635	41.91	.....	.....	41.91	.....
Nat. Res. Council Grant	.....	200.00	.....	91.00	109.00
No. 889	184.01	.....	.....	184.01	.....
No. 890	82.49	.....	.....	82.49	.....
No. 913	8,498.75	.....	.....	4,628.22	3,870.53
Dean's Special Fund	.....	520.00	.....	359.73	†160.27
Dining Service Reserve	16,315.86	.....	.....	9,637.78	6,678.08
Div. of Indus. Co-operation	.....	18,023.11	[2]25,319.78	43,342.89	.....
Div. of Mun. and Ind. Research	.....	1,505.00	.....	1,505.00	.....
Dormitory Tax	78.93	1,517.50	.....	1,475.00	121.43
Curtain and Rug Account	.....	220.50	.....	220.50	.....
Laundry Account	.....	1,411.86	.....	1,411.86	.....
Book Shelf	314.50	.....	.....	314.50	.....
Electrical Engineering					
No. 710	46.97	3.95	.....	45.98	4.94
Rumford Grant	.....	250.00	.....	184.92	65.08
VI-A Fund	650.19	.....	.....	294.32	355.87
No. 918	498.40	17.77	.....	516.17	.....
Network Analyzer	1,655.79	107.00	.....	189.58	1,573.21
Integraph	9.58	.....	.....	9.58	.....
Boston Police Dept. Survey	787.86	.....	.....	751.08	36.78
Round Hill	3,182.73	20,593.14	[1]14,450.00	26,568.05	11,657.82
Nat. Elec. Light Assoc.	725.96	5,025.00	.....	4,641.84	1,109.12
Machine Transients	114.99	.....	.....	.....	114.99
Account 4133	.....	5,000.00	.....	1,050.00	3,950.00
Nat. Research Council Grant	.....	500.00	.....	105.00	395.00
Aberdeen Proving Ground	463.00	.....	[2]29.00	492.00	.....
Differential Analyzer	.....	.....	[2]2,700.00	.....	2,700.00

* Overdraft.
[1] Appropriation from Current Funds.
[2] By Transfer.
†Exclusive of student notes receivable. (See Schedule P, page 164.)

Schedule R (*Continued*)

Name	*Balance June 30, 1932*	*Income*	*Other Increases*	*Salaries and Expenses*	*Balance June 30, 1933*
Emergency Employment Fund	$542.79	$4,726.68	.....	$5,218.07	$51.40
Employees Health and Acc. Ins.	.....	5,323.00	.....	5,323.00	.....
Engineering Research	.....	.....	[1]$5,000.00	.....	5,000.00
Freeman Translation Fund	1,000.00	.....	.....	655.38	344.62
Fuel and Gas, Contractors' Account	7,265.62	2,525.00	.....	6,335.40	3,455.22
Geology, Rockefeller Research	617.35	310.00	[2]4,850.00	3,714.46	2,062.89
Geology — No. 913	.....	.....	[2]3,500.00	630.21	2,869.79
Graphic Arts Acct.	.....	14.97	.....	.....	14.97
Historic Memorials	844.96	.....	.....	345.00	499.96
Historic Tablets No. 723	239.00	.....	.....	.....	239.00
Hydraulic Fund	*10,831.29	.....	[1, 2]29,849.78	19,018.49	.....
Hygiene Department Special	2,717.72	161.88	.....	25.00	†2,854.60
Journal of Mathematics and Physics	1,592.23	1,257.87	[1]2,500.00	2,382.00	2,968.10
Letter Shop	833.52	19,021.24	.....	19,752.94	101.82
Library, Special No. 1	275.16	171.78	.....	446.94	.....
No. 774	280.59	21.83	.....	302.42	.....
Mechanical Engineering — No. 482	779.00	.....	.....	.....	779.00
Shop Account	265.32	.....	.....	184.92	80.40
No. 781	115.75	.....	.....	45.00	70.75
No. 873	349.89	.....	.....	337.66	12.23
No. 917	128.37	.....	.....	104.09	24.28
Mining Engineering:					
Ore Dressing	162.55	.....	[2]204.38	263.68	103.25
Welding Research	187.44	450.00	.....	1,021.80	*384.36
Special Travel Fund	500.00	.....	.....	.....	500.00
Photographic Service	36.28	12,299.98	.....	12,188.80	147.46
Photostat Service	2,348.23	4,597.02	.....	6,704.90	240.35
Photostat — Reserve	.....	.....	[2]2,000.00	.....	2,000.00
Physics Department, Special	688.75	.....	.....	217.60	471.15
R. L. Ind. Phys.	.....	.....	.....	.....	.....
Roentgen Ray	1,883.42	.....	.....	.....	1,883.42
Hale Spectroscopic Fund	1,486.20	.....	.....	.....	1,486.20
Carnegie Spectroscopy Fund	*504.00	1,365.00	.....	861.00	.....
Rockefeller Research Fund	9,621.43	.....	[2]10,750.00	15,836.11	4,535.32
Nat. Res. Council	55.33	.....	.....	55.33	.....
Rumford Grant, A. A. of A. & S.	278.62	.....	.....	.....	278.62
Nat. Res. Council Grant	.....	400.00	.....	400.00	.....
Rumford Grant, H.	.....	500.00	.....	288.01	211.99
Rumford Grant, S.	.....	500.00	.....	27.82	472.18
Rumford Grant, O.	215.98	.....	.....	210.00	5.98
Salary Account	2,000.00	2,000.00	.....	2,000.00	2,000.00
No. 908	1,458.18	.....	[2]373.36	1,831.54	.....
No. 914	257.76	53.30	.....	311.06	.....
No. 916	1,342.84	150.00	.....	1,298.16	194.68

* Overdraft.
[1] Appropriation from Current Funds.
[2] By Transfer.
† Exclusive of student notes receivable. (See Schedule P, page 164.)

Schedule R (*Continued*)

Name	*Balance June 30, 1932*	*Income*	*Other Increases*	*Salaries and Expenses*	*Balance June 30, 1933*
Poughkeepsie Race Account	$521.26	.....	.....	.....	$521.26
President's Fund	69.00	.....	.....	$69.00	.....
Publicity, No. 952	.....	.....	[1]$3,059.29	3,059.29	.....
R. O. T. C. Uniform Accounts	766.35	$455.13	.....	571.90	649.58
Safe Harbor Hydraulic Account	*1,387.89	7,828.91	.....	6,586.46	*145.44
Salaries Reserve Fund	.....	82,697.44	.....	13,623.92	69,073.52
Special Publication Acct., No. 954	.....	3,500.00	[1]125.00	3,550.00	75.00
Special, No. 962	.....	.....	[2]2,169.38	2,169.38	.....
Special, No. 968	.....	.....	[1]4,000.00	1,680.65	2,319.35
Special — Dormitories	.....	.....	[2]2,200.00	.....	2,200.00
Special — Repairs	.....	.....	[1]5,000.00	.....	5,000.00
Special — Rogers Bldg.	.....	.....	[1]4,500.00	.....	4,500.00
Special — Salary Account No. 1	.....	5,000.00	.....	3,854.03	1,145.97
Special — Salary Account No. 2	.....	215.00	.....	190.00	25.00
Suspense Accounts	*916.45	10,704.76	.....	8,009.81	1,778.50
Tea Dance	.....	.....	[2]235.00	235.00	.....
Tech Loan Fund — Interest	348.28	5,358.40	.....	4,701.08	1,005.60
Tech Loan Fund — Principal	1,760.00	12,544.99	.....	9,383.00	4,921.99
Technology Press	177.11	.....	.....	53.30	123.81
Textile Research Progress	1,000.00	1,578.86	.....	2,578.86	.....
Textile School	.....	450.71	.....	450.71	.....
Thomson Dinner	.....	1,559.94	.....	1,559.94	.....
Walker Memorial Library	819.77	.....	[2]3,108.25	3,663.77	264.25
Buildings and Grounds Accounts	.....	.....	[1]6,500.00	33.36	6,466.64
Totals	$95,865.98	$293,342.75	$181,576.77	$362,812.77	$207,972.73
		(Schedule B)		(Schedule C)	(Schedule D)

*Overdraft.
[1] Appropriation from Current Funds
[2] By Transfer.

SCHEDULE S

CURRENT DEFICIT

Deficit, June 30, 1932	$29,699.55
Net Increase (Schedule A)	5,727.40
Deficit, June 30, 1933 (Schedule D)	$35,426.95

DETAIL OF PROFIT AND LOSS ACCOUNT

LOSSES AND CHARGES:	
Students' Accounts (previous years), charged off	$1,052.53
Miscellaneous Charges	810.23
Total Losses	$1,862.76
GAINS AND CREDITS:	
Premium Refund Account Employees' Insurance	$352.80
Miscellaneous Credits	555.28
Total Gains	$908.08
Profit and Loss. Net Loss (Schedule A)	$954.68

*THE ENDOWMENT FUNDS OF THE INSTITUTE

207 ALBERT FUND, 1930, $7,500. Gift from anonymous donor to pay three years rental of M. I. T. Student House at 159 Bay State Road, Boston.

341 JOHN E. ALDRED FUND, 1926, $101,850. Gift of John E. Aldred. For establishment of Division of Municipal and Industrial Research, and Hydraulic Research.

209 ANONYMOUS, 1924, $1,052.50. Gift of member of Class of 1924 to accumulate until twenty-fifth reunion of Class in 1949.

361 ARKWRIGHT CLUB FELLOWSHIP, 1926-27, $2,000. Gift. For graduate student in Industrial Chemistry or other textile activity.

101 GEORGE ROBERT ARMSTRONG FUND, 1902, $5,000. Bequest of George W. Armstrong in honor of son. Income available for general purposes of the Institute.

401 ELISHA ATKINS SCHOLARSHIP FUND, 1894, $5,000. Bequest of Mary E. Atkins.

301 WILLIAM PARSONS ATKINSON FUND, 1918, $13,000. Bequest of Charles F. Atkinson as a memorial to father — for English Department of the Institute.

501 EDWARD AUSTIN FUND, 1899, $400,000. Bequest. Interest paid to needy, meritorious students and teachers to assist in payment of studies.

503 THOMAS WENDELL BAILEY FUND, 1914, $2,200. Bequest. Income used for rendering assistance to needy students in Department of Architecture.

504 CHARLES TIDD BAKER FUND, 1922, $20,000. Bequest. One-half of net income for assistance of poor and worthy students and one-half to principal.

151 EDMUND DANA BARBOUR FUND, 1926, $847,000. Bequest. Principal and income for general purposes of Institute.

271 WALTER S. BARKER FUND, 1927, $10,000. Bequest. Income only available for purposes of the Library.

403 BILLINGS STUDENT FUND, 1900, $50,000. Bequest of Robert C. Billings. Students receiving benefit are expected to abstain from use of alcohol or tobacco in any form.

102 GEORGE BLACKBURN MEMORIAL FUND, 1931, $830,000. Bequest of Harriette A. Nevins. Income for general purposes.

481 ROBERT A. BOIT FUND, 1921, $5,000. Bequest. Income to stimulate students' interest in best use of English Language through annual prizes or scholarships.

303 FRANK WALTER BOLES MEMORIAL FUND, 1915, $25,200. Under agreement between Harriet A. Henshaw and M. I. T. Income paid to committee of Department of Architecture, to purchase fine arts material and to supplement and strengthen instruction in architectural design.

506 LEVI BOLES FUND, 1915, $10,000. Bequest of Frank W. Boles in memory of father. Income for assistance of needy and deserving students.

363 WILLIAM SUMNER BOLLES FUND, 1924, $9,400. Bequest of William P. Bolles in memory of son, to maintain either fellowship, traveling scholarship or resident scholarship. Recipient to have character, ability or promise.

404 JONATHAN BOURNE FUND, 1915, $10,000. Bequest of Hannah B. Abbe. Income to aid deserving students.

*Alphabetically listed — see pages 153-163 for corresponding reference numbers.

405 ALBERT G. BOYDEN FUND, 1931, $530,000. Bequest. Estate of Elizabeth R. Stevens. Income for scholarships. Preference to students from Fall River and Swansea, Mass.

406 HARRIET L. BROWN FUND, 1922, $6,000. Bequest. Income to needy and deserving young women students, as would otherwise be unable to attend. In case two or more applicants of equal merit, preference given to native of either Massachusetts or New Hampshire.

364 MALCOLM COTTON BROWN FUND, 1919, $11,000. Under agreement between Caroline Cotton Brown, Charles A. Brown and M. I. T., to establish memorial to son, Lieutenant Brown, R. A. F., killed in service 1918, for advanced study and research in Physics. Income to Senior in high standing for graduate study — not a condition but other things being equal, the fellowship to be awarded to member of Phi Gamma Delta.

508 BURSAR'S FUND, 1907, $6,000. Bequest of Lyman S. Rhoads. Income and repayments used for loans to students in discretion of Bursar, subject to approval of President and Treasurer.

343 SAMUEL CABOT FUND, 1912, $50,000. Gift of Helen N. Cabot in honor of husband. Income for purchase of apparatus and supplies required in conduct of research in Industrial Chemistry.

152 HOWARD A. CARSON FUND, 1933, $1,000. Bequest. For general purposes, unrestricted.

510 MABEL BLAKE CASE FUND, 1920, $25,000. Bequest of Caroline S. Freeman. Income to aid deserving students (preferably women) who are in need of assistance.

408 NINO TESHER CATLIN FUND, 1926, $1,000. Gift of Maria T. Catlin in memory of son. Income for needy and deserving students — not a condition but if possible award to be made to member of Lambda Phi Fraternity.

305 WILLIAM E. CHAMBERLAIN FUND, 1917–19, $6,000. Bequest. Income used for Department of Architecture.

511 CHANDLER FUND, 1927, $2,700. Gift from Architectural Society. A loan fund to be administered by Head of Architectural Department.

307 CHEMICAL ENGINEERING PRACTICE FUND, 1915–16, $300,000. Gift of George Eastman for Chemical Engineering Stations provided Institute will carry forward this plan of education for a reasonable period.

273 EDNAH DOW CHENEY FUND, 1905–06, $13,900. Bequest. Income for maintenance and care of Margaret Cheney Room for women students.

103 CHARLES CHOATE FUND, 1906, $25,000. Bequest. Income for general purposes.

274 FRANK HARVEY CILLEY FUND, 1913, $57,700. Bequest. Income and such part of principal as necessary for purchase of suitable books, photographs, statuary, etc., for library and gymnasium of Walker Memorial.

411 LUCIUS CLAPP FUND, 1905, $4,900. Bequest. Income to worthy students who may not be able to complete their studies without help.

413 CLASS OF '96 FUND, 1923, $2,272. Gift. Award subject to approval of Class Secretaries. Preference to descendants of members of Class Scholarships to be considered a loan to be repaid when and if able.

483 CLASS OF 1904 FUND, 1925, $392. Contributions received by Professor Gardner for Architectural Department prizes.

210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223.

CLASS ENDOWMENT AND ENDOWMENT RESERVE FUNDS

Note: These funds are being accumulated for the several classes whose members took out life insurance toward a gift to the Institute on their Twenty-Fifth Reunions.

The Class Endowments are of funds permanently held toward the final sum.

The Class Endowment Reserves may be applied in accordance with the terms of the several plans toward keeping alive policies that might lapse on account of non-payment or as otherwise designated.

230 CLASS OF 1898 LOAN FUND, $5,535. By subscription of certain members of class from 1927–1931. Income only for scholarship loans, as authorized by committee of class.

251 SAMUEL C. COBB FUND, 1916, $30,000. Bequest. Income for salaries of President and professors.

512 FRED L. AND FLORENCE L. COBURN FUND, 1932, $5,000. Bequest. Income to aid needy and worthy students, preference being given to those residing in Somerville, Mass.

514 COFFIN MEMORIAL FUND, 1929, $35,000. Gift of the Estate of Charles A. Coffin. For loans or other aid to students as determined by Executive Committee.

366 COLLAMORE FUND, 1916, $10,000. Bequest of Helen Collamore. Income primarily to aid women students in post-graduate courses, secondarily, for purchase of instruments for Chemical Laboratory.

344 CRANE AUTOMOTIVE FUND, 1928, $5,000. Gift of Henry M. Crane. Reserved for purchase of further equipment for Aeronautical Laboratory when necessary.

415 LUCRETIA CROCKER FUND, 1916, $50,000. Bequest of Matilda H. Crocker. Income for establishment of scholarships for women in memory of sister.

309 CROSBY HONORARY FUND, 1916, $1,633. Contributions in honor of William Otis Crosby (Professor Emeritus). Income for upbuilding of the Geological Department, especially its collections.

368 DALTON GRADUATE CHEMICAL FUND, 1896, $5,000. Gift of Charles H. Dalton. Income for scholarships for American male graduates of M. I. T., for advanced chemical study and research — preference given to chemical research especially applicable to textile industries.

417 ISAAC W. DANFORTH FUND, 1903, $5,000. Bequest of James H. Danforth. Income for scholarship purposes as a memorial to brother.

516 DEAN'S FUND, 1924, $3,350. Contributions — to be loaned by Dean to needy students.

518 CARL P. DENNETT FUND, 1926, $500. Gift. To be loaned to students, preferably Freshmen, at discretion of President.

420 ANN WHITE DICKINSON FUND, 1898, $40,000. Bequest. Income used to establish free scholarships. Such persons enjoying benefit shall be worthy young men of American origin.

520 DORMITORY FUND, 1903, $2,700. Contributions. Income for scholarship purposes.

311 SUSAN E. DORR FUND, 1914, $95,000. Bequest. Income for use and benefit of Rogers Physical Laboratory.

104 EBEN S. DRAPER FUND, 1915, $100,000. Bequest. Income used for general purposes of the Institute.

421 THOMAS MESSINGER DROWN FUND, 1928, $50,000. Bequest of Mary Frances Drown. Income to establish scholarships for deserving undergraduate students.

105 COLEMAN DU PONT FUND, 1931, $117,017.11. Bequest. Income for support and maintenance of the Institute.

369 DU PONT FUND, 1922. Annual gift of Chemical Department of E. I. du Pont de Nemours & Company to be granted to graduate student whose major subject is chemistry or chemical engineering. Company to be advised of name of appointee and a report of progress made semi-annually.

107 EASTMAN CONTRACT FUND, 1924, $9,500,000. Gift of George Eastman. Income for general purposes of the Institute.

108 GEORGE EASTMAN BUILDING FUND, 1916–17, $2,500,000. Gift of George Eastman on condition that $1,500,000 be raised by alumni and others. Balance to be used eventually for new educational buildings.

312 GEORGE EASTMAN FUND, 1918, $400,000. Gift of George Eastman. Income for Chemistry and Physics. Principal available for addition to EASTMAN BUILDING FUND after latter is exhausted.

109 CHARLES W. EATON FUND, 1929, $243,000. Bequest. Income for advancement of general purposes of Institute.

112 EDUCATIONAL ENDOWMENT FUND, 1920–21, $8,000,000. $4,000,000 gift from George Eastman and $4,000,000 from alumni and others. Income for current educational expenses.

113 MARTHA ANN EDWARDS FUND, 1890, $30,000. Gift. Income for general purposes.

521 FRANCES AND WILLIAM EMERSON FUND, 1930, $100,000. Gift. Income for aid of regular and special students in Department of Architecture.

114 WILLIAM ENDICOTT FUND, 1916, $25,000. Bequest. Income for general purposes.

205 ENDOWMENT RESERVE FUND, 1924, $600,000. Created by application annually of a small percentage of income of the General Investments to insure the annual income of the funds sharing. Increased otherwise by gains account of sales or maturities of investments and decreased by premium amortization of bonds and losses and charges from sales or maturities.

424 FARNSWORTH FUND, 1889, $5,000. Bequest of Mary E. Atkins. Income for scholarships

153 HENRIETTA G. FITZ FUND, 1930, $10,000. Bequest. Income for general purposes.

426 CHARLES LEWIS FLINT FUND, 1889, $5,000. Bequest. Income for support of worthy student, preference given graduate of English High School, Boston.

277 CHARLES LEWIS FLINT FUND, 1889, $5,000. Bequest. Income for purchase of books and scientific publications for library.

253 SARAH H. FORBES FUND, 1901, $500. Gift of Malcolm Forbes as memorial to mother. Income for salaries.

427 SARAH S. FORBES FUND, 1913, $3,400. Gift of Sarah S. Forbes, William B. Rogers and Henry S. Russell. Income for maintenance and education of scholar in M. I. T.

117 FRANCIS APPLETON FOSTER FUND, 1922, $1,000,000. Bequest. Income for purposes of Institute.

118 ALEXIS H. FRENCH FUND, 1930, $5,000. Bequest. Income for general purposes of Institute.

119 JONATHAN FRENCH FUND, 1915–16, $25,000. Bequest of Caroline L. W. French. Income for purposes of the Institute.

121 HENRY CLAY FRICK FUND, 1925–32, $1,830,000. Bequest. Institute received ten shares of a total of one hundred shares of his residuary estate. Income for general purposes.

429 FUEL AND GAS SCHOLARSHIP FUND, 1925–26, $700. Gift Boston Consolidated Gas Company and Massachusetts Gas Companies for scholarship in Gas Engineering.

255 GEORGE A. GARDNER FUND, 1898, $20,000. Gift. Income for salaries of instructors.

122 GENERAL ENDOWMENT FUND, 1921, $1,527,000. Contributions by alumni and others to meet George Eastman's condition relative to gift of $2,500,000, his building fund (No. 108).

523 NORMAN H. GEORGE FUND, 1919, $70,000. Bequest. Income for assistance of worthy and needy students.

525 JOHN A. GRIMMONS FUND, 1930–32, $6,648.68. Bequest of Lillian C. Moore of Malden. Principal held by Atlantic National Bank, Boston. Income for loans to undergraduates in Electrical Engineering not to exceed $600 to any one student in any one year with interest at 5 per cent and to be repaid within ten years. Loans to be awarded to male, white, native-born citizens of United States and to be protected by life insurance.

347 DANIEL GUGGENHEIM FUND, 1928. Gift for Meteorology Department. Balance remaining from $34,000 of which $10,000 was available for equipment, $12,000 for salaries, $6,000 for three fellowships and $6,000 for research for three years.

527 JAMES H. HASTE FUND, 1930, $141,000. Bequest. Income for aid of deserving students of insufficient means.

259 JAMES HAYWARD FUND, 1866, $18,000. Bequest. Income for salaries.

155 ESTHER A. HILTON FUND, 1930, $1,600. Bequest. Income used for general purposes.

431 GEORGE HOLLINGSWORTH FUND, 1916, $5,000. Bequest of Rose Hollingsworth. Income used for scholarship.

485 ROGER DEFRIEZ HUNNEMAN PRIZE FUND, 1927, $1,060. Gift of W. C. Hunneman in memory of Roger Defriez Hunneman, '23. Income paid as annual award to most meritorious student in Chemical Engineering who has shown most outstanding originality in his work as determined by that Department.

433 T. STERRY HUNT FUND, 1894, $3,000. Bequest. Income to a student in Chemistry.

434 WILLIAM F. HUNTINGTON FUND, 1892, $5,000. Gift of Susan E. Covell. Income to deserving students. Preference to be given to students in Civil Engineering.

157 INDUSTRIAL FUND, 1924–31. This fund succeeded "Tech Plan" Contracts, payments under which went to the Educational Endowment Fund. Payments on contracts which were renewed or new contracts are now turned over to this Fund.

123 JAMES FUND, 1898–99, $163,000. Bequest of Julia B. H. James. Income for development of M. I. T.

529 DAVID L. JEWELL FUND, 1928, $25,000. Bequest. Income for tuition of five young men who are worthy of assistance and who, were it not for such assistance, might be unable to pursue their studies at M. I. T.

374 REBECCA R. JOSLIN FUND, 1924, $1,540. Gift. Income awarded as a loan to advanced student in Chemical Engineering on recommendation of that Department — restricted to native and resident of Massachusetts. Beneficiary to abstain from using tobacco in any form.

436 JOY SCHOLARSHIPS, 1886, $7,500. Gift of Nabby Joy. Income for scholarships for one or more women studying natural science at M. I. T.

280 WILLIAM HALL KERR FUND, 1896, $2,000. Gift of Alice M. Kerr. Income for the annual purchase of books and drawings in machine design.

276 WILFRED LEWIS FUND, 1930, $5,000. Gift of Emily Sargent Lewis. Income for maintenance of graduate student in Mechanical Engineering.

438 WILLIAM LITCHFIELD FUND, 1910, $5,000. Bequest. Income for scholarship on competitive examination.

439 ELISHA T. LORING FUND, 1890, $5,000. Bequest. Income for assistance of needy and deserving pupils.

441 LOWELL INSTITUTE FUND, 1923, $2,300. Gift from alumni of Lowell Institute to establish scholarship for its graduates.

125 KATHARINE B. LOWELL FUND, 1895, $5,000. Gift of Augustus Lowell in honor of Mrs. Lowell. Income for purchase of books and apparatus for Department of Physics.

261 WILLIAM P. MASON FUND, 1868, $18,800. Bequest. Income to support a professorship in the Institute.

127 M. I. T. ALUMNI FUND, 1907. Total subscriptions of alumni to 1924, $632,500. $632,000 appropriated for New Equipment, Walker Memorial 1916 Reunion and Dormitories. Present small balance unappropriated.

227 M. I. T. ALUMNI ASSOCIATION PERMANENT FUND, 1929–32, $32,389.07. Deposited with M. I. T. for investment purposes only.

225 M. I. T. TEACHERS' INSURANCE FUND, 1926. Balance of 2 per cent salary deductions under M. I. T. Pension and Insurance Plan in excess of Group Insurance Premiums paid.

226 M. I. T. TEACHERS' INSURANCE FUND SPECIAL, 1928–32, $50,647.45. Refund of premiums paid on Group Insurance under M. I. T. Pension and Insurance Plan held at interest and accumulated. $50,000 appropriated for special pension purposes.

317 GEORGE HENRY MAY FUND, 1914, $4,250. Gift. Income for benefit of Chemical Department.

443 GEORGE HENRY MAY FUND, 1914, $5,000. Gift. Income to assist graduates of Newton High School recommended as eligible by superintendent and head masters of Newton High Schools. Beneficiary to issue a note payable without interest.

126 THOMAS MCCAMMON FUND, 1930, $15,000. Bequest in honor of father, James Elder McCammon. Income available for general purposes.

487 JAMES MEANS FUND, 1925, $2,700. Gift of Dr. James H. Means as a memorial to father. Income for annual prize for essay on an aeronautical subject.

159 HIRAM F. MILLS FUND, 1922, $5,000. Bequest. For general purposes.

319 SUSAN MINNS FUND, 1930. Gift of Miss Susan Minns — tract of land on Memorial Drive for use in any way deemed best for benefit of plan regarding construction and maintenance of an hydraulic laboratory.

445 JAMES H. MIRRLEES FUND, 1886, $2,500. Gift of James Buchanan Mirrlees. Income to such student in third or fourth year Mechanical Engineering most deserving pecuniary assistance.

320 FORRIS JEWETT MOORE FUND, 1927–31, $32,000. Gift of Mrs. F. Jewett Moore as a memorial to husband. Income or principal expended subject to approval of Executive Committee by a committee of three members of the Department of Chemistry — to make the study of Chemistry more interesting and surroundings of such study more attractive.

378 MOORE FUND, 1914–28–29, $24,200. Gift of Mrs. F. Jewett Moore. Income to help some Institute graduate to continue studies in Europe, especially organic chemistry. Preference to student who has distinguished himself in this subject while an undergraduate.

130 KATE M. MORSE FUND, 1925, $25,000. Bequest. Income for general purposes of M. I. T.

447 NICHOLS FUND, 1895, $5,000. Bequest of Betsy F. W. Nichols. Income for scholarship to student in Chemistry.

448 CHARLES C. NICHOLS FUND, 1904, $5,000. Bequest. Income for scholarship.

322 WILLIAM E. NICKERSON FUND, 1928, $50,000. Gift. Principal and income used to finance chair in Humanics.

162 MOSES W. OLIVER FUND, 1921, $11,000. Bequest. Principal or income for general purposes.

283 GEORGE A. OSBORNE FUND, 1928, $10,000. Bequest. Income for benefit of mathematical library.

450 JOHN FELT OSGOOD FUND, 1909, $5,000. Bequest of Elizabeth P. Osgood in memory of husband. Income for scholarship in Electricity.

451 GEORGE L. PARMELEE FUND, 1921, $17,000. Bequest. Income for tuition of either special or regular worthy students.

131 RICHARD PERKINS FUND, 1887, $50,000. Bequest. Income for general purposes.

453 RICHARD PERKINS FUND, 1887, $50,000. Bequest. Income for scholarships.

380 WILLARD B. PERKINS FUND, 1898, $6,000. Bequest. Income to be expended every fourth year for travelling scholarship in architecture.

324 EDWARD D. PETERS FUND, 1924, $5,000. Bequest of Elizabeth W. Peters. Income for the Department of Mineralogy.

163 PRESTON PLAYER FUND, 1933, $20,000. Bequest. For general purposes, unrestricted.

325 PRATT NAVAL ARCHITECTURAL FUND, 1916, $1,071,000. Bequest of Charles H. Pratt to endow the Department of Naval Architecture and Marine Engineering to be called forever Pratt School of Naval Architecture and Marine Engineering — to erect a building — remainder held in trust. Income to support said school.

382 PROCTOR FUND, 1929–30. Gift of $1,000 per annum from Redfield Proctor for fellowship in Physics.

231 PROFESSORS' FUND, 1931, $21,304.10. Contributions of one half of outside income earned by members of staff during academic year. To be disbursed on recommendation of committee appointed by contributors.

384 PROPRIETORS LOCKS AND CANALS FUND, 1927, $4,000. Gift to finance post-graduate scholarship in Textile Research, mechanical or chemical, to American-born graduate of Lowell Textile School, nominated by the Trustees of that School and approved by Executive Committee of Locks and Canals.

132 J. W. & B. L. RANDALL FUND, 1897, $83,000. Bequest of Belinda L. Randall as a permanent fund or in erecting a building with those names.

233 RICHARDS PORTRAIT FUND, 1929. Balance of subscriptions from friends of Prof. R. H. Richards for portrait completed — available for Mining Department.

349 ELLEN H. RICHARDS FUND, 1912, $15,000. Income for promotion of research in Sanitary Chemistry, for fellowships to advanced students, for employment of research assistants and in such other ways as will best promote investigation in that field.

351 CHARLOTTE B. RICHARDSON FUND, 1891, $30,000. Bequest. Income to support of Industrial Chemical School.

263 HENRY B. ROGERS FUND, 1873, $25,000. Gift. Income for salaries of one or more professors or instructors.

386 HENRY BROMFIELD ROGERS FUND, 1921, $20,000. Bequest of Anna Perkins Rogers. Income to establish fellowship or scholarship for women graduates of M. I. T. or other colleges whose graduate work is carried on at M. I. T.

165 ROBERT E. ROGERS FUND, 1886, $7,600. Bequest in memory of brother, William B. Rogers. For general purposes.

531 WILLIAM BARTON ROGERS FUND. Present, $20,000. Established by subscriptions of members of Alumni Association through Prof. R. H. Richards for loans to students.

135 WILLIAM BARTON ROGERS MEMORIAL FUND, 1883–4–5, $250,000. Contributions from 91 persons. Income for support of Institute.

286 ARTHUR ROTCH ARCHITECTURAL FUND, 1895, $5,000. Bequest. Income for Library or collection of Department of Architecture.

327 ARTHUR ROTCH FUND, 1895, $25,000. Bequest. Income for general purposes of Department of Architecture.

489 ARTHUR ROTCH FUND, 1895, $5,000. Bequest. Income for annual prize to student in regular course in Architecture graduating highest in class.

491 ARTHUR ROTCH SPECIAL FUND, 1895, $5,000. Bequest. Income for annual prize to student who shall be ranked highest at end of two years special course in Architecture.

388 RICHARD LEE RUSSEL FUND, 1904, $2,000. Gift of Theodore E. Russel. Income to assist worthy student of high standing in Department of Civil Engineering either undergraduate or post-graduate.

236 WILLIAM PATRICK RYAN SPECIAL FUND, 1933. Appropriation. Educational fund for three children of late Prof. W. P. Ryan.

136 SALTONSTALL FUND, 1901, $40,000. Bequest of Henry Saltonstall. One-fourth income each year added to principal and remaining three-fourths expended for benefit of Institute.

390 HENRY SALTONSTALL FUND, 1901, $10,000. Bequest. Income to aid one or more needy students.

392 JAMES SAVAGE FUND, 1873, $10,000. Bequest. Income for scholarships in institution "where my son-in-law, William B. Rogers, is President."

137 SAMUEL E. SAWYER FUND, 1895, $4,000. Bequest. Income to be used in such manner as will best promote interests of M. I. T.

455 JOHN P. SCHENKL FUND, 1922, $20,000. Bequest of Johanna Pauline Schenkl in memory of father. Income for scholarships in Department of Mechanical Engineering.

237 SEDGWICK MEMORIAL LECTURE FUND, 1930, $3,900. Bequest of Mary Katrine Sedgwick in memory of husband. All copyrights and interest in copyrights and benefits from contracts with publishers for Department of Biology and Public Health.

329 W. T. SEDGWICK FUND, 1928, $69,500. Received from Trustees of the Estate of W. T. Sedgwick under Agreement and Declaration of Trust following decease of Mary Katrine Sedgwick, for Department of Biology and Public Health.

456 THOMAS SHERWIN FUND, 1871, $5,000. Gift of Committee on Sherwin Memorial Fund for free scholarship to graduate of English High School.

393 SLOAN FUND, 1933, $1,000. Gift of A. P. Sloan, Jr. for Fellowship in Automotive Engineering.

168 ELLEN VOSE SMITH FUND, 1930, $25,000. Bequest. For general purposes.

458 HORACE T. SMITH FUND, 1930, $32,988.76. Bequest. Income for scholarships. Preference to graduates of East Bridgewater (Mass.) and Bridgeport (Conn.) High Schools.

459 SONS AND DAUGHTERS OF NEW ENGLAND PURITAN COLONY SCHOLARSHIP FUND, 1931, $600. Gift. Income for scholarship aid to a boy of New England ancestry.

139 ANDREW HASTINGS SPRING FUND, 1921, $50,000. Bequest of Charlotte A. Spring in memory of nephew as a permanent fund. Income for general purposes.

493 SAMUEL W. STRATTON PRIZE FUND, 1933, $1,680. Contributed by friends of the late Dr. S. W. Stratton for competition prizes in the presentation of scientific papers.

532 SUMMER SURVEYING CAMP LOAN FUND, 1927, $500. Gift of Lammot du Pont as a revolving loan fund to help students in Civil Engineering attend summer surveying camp.

140 SETH K. SWEETSER FUND, 1915, $25,000. Bequest as a permanent fund. Income for general purposes.

395 SUSAN H. SWETT FUND, 1888, $10,000. Bequest. Income to support a graduate scholarship.

396 GERARD SWOPE FUND, 1926, $2,500. Annual gift for fellowships in Electrical Engineering.

534 TEACHERS' FUND, 1899–1900. Gifts of $50,000 each from Augustus Lowell and A. Lawrence Lowell to establish fund for use in case of retirement, disability or death of members of instructing staff.

288 TECHNOLOGY MATRONS TEAS FUND, 1916–22–31, $8,500. Gifts of Mrs. F. Jewett Moore. Income for social activities of Technology Matrons.

354 TECHNOLOGY PLAN RESEARCH FUND. Funds received by Division of Industrial Coöperation and Research from Industrial Companies under contract covering a five-year period paid in annual installments.

356 TEXTILE RESEARCH FUND, 1930, $42,000. Gift of Textile Alliance, Inc., for scientific and economic research for benefit of development of textile industry, its allied branches, including production of raw materials.

265 NATHANIEL THAYER FUND, 1868, $25,000. Gift. Income for professorship of Physics.

239 ELIHU THOMSON FUND, 1929, $5,000. Gift.

266 ELIHU THOMSON PROFESSORSHIP, 1933, $1,479.60. Contributed toward fund for Professorship in Electrical Engineering.

397 FRANK HALL THORP FUND, 1932, $10,000. Anonymous gift. Income for fellowship in Industrial Chemistry.

460 SAMUEL E. TINKHAM FUND, 1924, $2,400. Gift of Boston Society of Civil Engineers. Income to assist worthy student in Civil Engineering.

289 JOHN HUME TOD FUND, 1913, $2,500. Gift of Mrs. F. Jewett Moore. Income for purchase of books of a humanistic character for General Library.

462 F. B. TOUGH FUND, 1924, $465. Gift to extend financial assistance to worthy students in mining or oil production.

331 EDMUND K. TURNER FUND, 1915, $178,000. Bequest. Income for a certain annuity during the life of sister — three-quarters of balance of income for Department of Civil Engineering and one-quarter to be added annually to principal.

243 UNDERGRADUATE DUES RESERVE FUND, 1924. Transferred from Undergraduate Dues Reserve and Contingent to secure investment income.

333 WILLIAM LYMAN UNDERWOOD FUND, 1932, $9,872. Bequest. For benefit of Biological Department or otherwise for general purposes.

463 SUSAN UPHAM FUND, 1892, $1,000. Gift. Income to assist students deserving financial aid.

536 SAMSON R. URBINO FUND, 1927, $1,000. Bequest. Income for students who need assistance, Germans preferred.

291 THEODORE N. VAIL FUND, 1925, $24,000. Bequest. Income for benefit of Vail Library.

398 LUIS FRANCISCO VERGES FUND, 1924, $10,000. Gift from Caroline A. Verges. Income for graduate students doing research work in sugar industry or if no such candidate, undergraduate student in Civil Engineering.

465 VERMONT SCHOLARSHIP FUND, 1924, $8,000. Gift of Redfield Proctor, '02, in memory of Vermonters who, having received their education at the Institute, served as engineers in the armies of the Allies in the World War. Income to student preferably from Vermont. Mr. Proctor reserves right to designate recipient as long as he lives.

467 ANN WHITE VOSE FUND, 1896, $60,000. Bequest. Income for free scholarships for young men of American origin.

171 HORACE W. WADLEIGH FUND, 1920, $2,100. Bequest. For general purposes.

469 ARTHUR M. WAITT FUND, 1925, $9,700. Bequest. Income for deserving students in second, third and fourth year classes in Mechanical Engineering.

141 WILLIAM J. WALKER FUND, 1915–17, $23,000. Bequest. Income for general purposes.

144 HORACE HERBERT WATSON FUND, 1930, $31,000. Bequest of Elizabeth Watson Cutter as a permanent fund. Income for general purposes.

173 FRANK G. WEBSTER FUND, 1931, $25,000. Bequest. For general purposes.

471 LOUIS WEISBEIN FUND, 1915, $4,000. Bequest. Income for scholarship for student in Architectural Department, preference to be given to a Jewish boy.

145 ALBION B. K. WELCH FUND, 1871, $5,000. Bequest as a permanent fund. Income for general purposes.

473 FRANCES ERVING WESTON FUND, 1912, $200. Bequest. Received annually to aid a native-born American Protestant girl of Massachusetts. (Principal $5,000 turned over to M. I. T., 1931.)

474 SAMUEL MARTIN WESTON FUND, 1912. Bequest of Frances E. Weston in memory of husband. Two hundred dollars received annually to aid a native-born American Protestant boy; preference to be given one from Roxbury. (Principal $5,000 turned over to M. I. T. in 1931.)

476 AMASA J. WHITING FUND, 1927, $4,500. Bequest of Mary W. C. Whiting. Income as scholarship to deserving students; preference to students from the Town of Hingham, Massachusetts.

358 EDWARD WHITNEY FUND, 1910, $25,000. Bequest as a memorial to him and his wife, Caroline. Principal and interest for conduct of research or teaching in geophysics — to include investigations in seismology conducted with a view to the protection of human life and property.

537 JONATHAN WHITNEY FUND, 1912, $525,000. Bequest of Mrs. Francis B. Green. Income to assist poor and deserving young men and women in obtaining an education at M. I. T.

147 GEORGE WIGGLESWORTH FUND, 1931, $25,000. Bequest. Ten (10) per cent of gross annual income to be added to principal, balance of income for general purposes of the Institute.

539 MORRILL WYMAN FUND, 1915–16, $66,000. Bequest. Income to aid deserving and promising students upon understanding that if in after life the person receiving aid shall find it possible, he shall reimburse said fund — not a legal obligation.

AUDITORS' CERTIFICATE

We have examined the books and accounts of the Treasurer and the Bursar of the Massachusetts Institute of Technology for the year ended June 30, 1933, and we report upon our verification of the accompanying financial statements of the Treasurer, as follows:

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

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

WE HEREBY CERTIFY that the accompanying Balance Sheet and Statements of Income and Expenditures correctly set forth, respectively, the financial condition of the Institute at June 30, 1933, and the financial results for the year ended at that date, and that the financial statements are in accordance with the books of the Institute.

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

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

The investment accounts of the Wyeth and Hewett Funds and of the Massachusetts Institute of Technology Pension Association were checked with certified lists of securities obtained from the Old Colony Trust Company of Boston, Massachusetts.

Respectfully submitted,

PATTERSON, TEELE & DENNIS,
Accountants and Auditors.

1 Federal Street, Boston, August 15, 1933.

REPORT OF THE AUDITING COMMITTEE

We report that the firm of Patterson, Teele & Dennis, Accountants and Auditors, have examined the books and accounts of the Treasurer and the Bursar of the Massachusetts Institute of Technology for the fiscal year ended June 30, 1933, and their certificate dated August 15, 1933 is a part of our report.

This report covers all of the books and accounts of the Treasurer and the Bursar and also all accounts of which the Massachusetts Institute of Technology acts as Trustee. It also covers the accounts of the Massachusetts Institute of Technology Pension Fund.

Respectfully submitted,

FRANKLIN W. HOBBS,
Chairman Auditing Committee.

September 9, 1933.

PERIODICAL PUBLICATIONS, BOOKS AND REVIEWS BY MEMBERS OF THE STAFF

DEPARTMENT OF AERONAUTICAL ENGINEERING

1. DRAPER, CHARLES S. and TAYLOR, E. S. *A New High Speed Engine Indicator.* (Mech. Eng. *55*, p. 169, March 1933.)

2. OBER, SHATSWELL. *Estimation of Variation of Thrust Horsepower with Air Speed.* (Nat. Adv. Com. for Aero. Technical Note 446, February 1933.)

3. PEKERIS, C. L. *The Development and Present Status of the Theory of the Heat Balance in the Atmosphere.* (M. I. T. Meteorological Progressional Notes, No. 5, November 1932.)

4. ROSSBY, CARL-GUSTAF. *A Generalization of the Theory of the Mixing Length with Applications to Atmospheric and Oceanic Turbulence.* (M. I. T. Meteorological Papers, *1*, pp. 1–36, September 1932.)

5. TAYLOR, C. FAYETTE. *"The Internal Combustion Engine," by D. R. Pye.* (Review) (Mech. Eng. *55*, p. 67, January 1933) and (S. A. E. Jour. *32*, p. 30, January 1933.)

6. TAYLOR, C. FAYETTE. *Aircraft Engine Developments.* (Trans. A. S. M. E.-Aero. Eng. *5*, p. 1, January-March 1933.)

7. TAYLOR, C. FAYETTE. *Bending Moments in the Master Rod of a Radial Aircraft Engine.* (S. A. E. Jour. *31*, p. 488, December 1932.)

8. TAYLOR, C. FAYETTE. *New Data on the Bending Moments in the Master Connecting Rod.* (S. A. E. Jour. *32*, p. 26, June 1933.)

9. TAYLOR, C. FAYETTE. *Progress in Aircraft Power Plant Fundamentals.* (Proc. Inst. Aero. Sci. — Founders Meeting Issue, p. 31, January 1933.)

10. TAYLOR, EDWARD S. *The Importance of Ignition Lag in Knocking.* (Nat. Adv. Com. Aero. Technical Note 452, March 1933) and (Air Eng. *5*, June 1933.)

11. WILLETT, HURD C. *American Air Mass Properties.* (Papers in Phys. Oceanog. and Meteor. *2*, June 1933.)

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH

12. BLAKE, CHARLES H. *Cordylophora in Massachusetts.* (Science, *76*, pp. 345–346, October 1932.)

13. BLAKE, CHARLES H. *Arion Circumscriptus in Massachusetts.* (Nautilus, *46*, p. 107, January 1933.)

14. BLAKE, CHARLES H. *Distribution of gastropods in the Muddy River, September 1932.* (Nautilus, *46*, pp. 100–101, January 1933.)

15. BLAKE, CHARLES H. *Foraminifera; Kinorhyucha; Arthropoda.* (Biol. Surv. Mount Desert Region, part 5: pp. 69–78, 3 fig.; p. 131; pp. 214–282, 4 fig. May 1933.)

16. BLAKE, CHARLES H. *Nomenclatorial Notes on Gastrotricha.* (Science, *77*, p. 606, June 1933.)

17. BUNKER, JOHN W. M., HARRIS, ROBERT S. and EUSTIS, RICHARD S. *The Antirachitic Potency of the Milk of Human Mothers Fed Previously on "Vitamin D Milk."* (N. E. Jour. of Med. *208*, p. 313, 1933.)

18. GEER, LAURENCE P., MURRAY, WILLIAM T. and SMITH, ERNEST. *Bacterial Content of Frosted Hamburg Steak.* (Am. J. Pub. Health, *23*, p. 673, July 1933.)

19. HARRIS, ROBERT S. *A Reliable Method for the Production of Nutritional Anemia in White Rats.* (Science, *76*, pp. 495–496, 1932.)

20. HARRIS, ROBERT S. and BUNKER, JOHN W. M. *Bacterial Detoxification.* (Proc. Am. Acad. Sci., *67*, p. 147, 1932.)

21. HARRIS, ROBERT S., BUNKER, JOHN W. M. and MILAS, NICHOLAS A. *The Germicidal Activity of Vapors from Irridiated Oils.* (Jour. Bact., *23*, p. 429, 1932.)

22. HARRIS, ROBERT S., BUNKER, JOHN W. M. and MILAS, NICHOLAS A. *Chemical Nature of Germicidal Vapors Emanating from Irradiated Oils.* (Ind. Eng. Chem., *24*, p. 1181, 1932.)

23. HORWOOD, MURRAY P. *The Sanitation of Water Supplies.* (Charles C. Thomas, Springfield, Ill., November 1932.)

24. HORWOOD, MURRAY P. *Indices of the Sanitary Quality of Swimming Pool Waters.* (J. Am. Water Works Assn., *25*, pp. 124–135, January 1933.)

25. TURNER, CLAIR E. *Cleanliness and Health.* (D. C. Heath & Co., August 1932.

26. TURNER, CLAIR E. *Health — Where Can It Be Taught?* (Amer. J. Pub. Health, *22*, p. 9, September 1932.)

27. TURNER, CLAIR E. *The Health Section of the World Federation of Educational Associations.* (Hawaii Ed. Rev. *21*, pp. 13–14, September 1932.)

28. TURNER, CLAIR E. *Health Education by Teachers.* (School Physicians' Bull. *2*, pp. 19–21, December 1932.)

29. TURNER, CLAIR E. and PARSONS, RUTH I. *Health Education in the City of Boston.* (N. E. Jour. of Med., 208, pp. 19–27, 81–88, 134–140, January 1933.)

30. TURNER, CLAIR E. *Limited Budgets and the Physical Welfare of the Child.* (J. Health and Phys. Education, *4*, p. 32, March 1933.)

31. TURNER, CLAIR E. *Seasonal Fluctuation in Growth with Special Reference to the Clothing Factor.* (Res. Quar. Amer. Phys. Ed. Assn. *4*, pp. 177–197, March 1933.)

32. TURNER, CLAIR E. *Test Room Studies in Employee Effectiveness.* (Amer. J. Pub. Health, *23*, pp. 577–584, June 1933.)

33. TURNER, CLAIR E. *Training and Personnel.* (Amer. Pub. Health Assn. Yearbook, *18*, pp. 120–125, June 1933.)

DEPARTMENT OF BUSINESS AND ENGINEERING ADMINISTRATION

34. RAYMOND, FAIRFIELD E. *Industrial Research Methods.* (Mass. Inst. Technology, October 1932.)

35. RAYMOND, FAIRFIELD E. and RICE, CALVIN W. *The Management Activities of the American Society of Mechanical Engineers.* (Bull. Int. Manage. Inst., *7*, pp. 66–69, May 1933.)

36. RAYMOND, FAIRFIELD E. *The Fundamentals of Industrial Equipment Policies.* (Mech. Eng., *55*, pp. 411–420, July 1933.)

37. SCHELL, ERWIN H. *Shall I Hire My Son?* (Tech. Rev., *35*, pp. 175–176, February 1933.)

DEPARTMENT OF CHEMICAL ENGINEERING

38. ADAMS, FREDERICK W. *Absorption of Sulfur Dioxide in Water.* (Ind. Eng. Chem., *25*, p. 424, April 1933.)

39. ADAMS, FREDERICK W. and BELLOWS, JOHN. *The Value of a Paper Stiffness Test.* (Paper Trade Jour., *96*, p. 37, March 1933.)

40. HOTTEL, HOYT C. *Effect of Reradiation on Heat Transmission.* (Mech. Eng., *55*, 1933.)

41. LEWIS, WARREN K. and CAREY, J. S. *Studies in Distillation.* (Ind. Eng. Chem., *24*, p. 882, August 1932.)

42. MCADAMS, WILLIAM H. *Heat Transmission* (McGraw-Hill Book Co., Inc., January 1933.)

43. MANGELSDORF, THEODORE A. and BROUGHTON, F. P. *Effect of Atmosphere on Desulfurization of Coal during Carbonization of Coal.* (Ind. Eng. Chem., *24*, p. 1136, October 1932.)

44. MAREK, LEROY F. *Methods and Apparatus for Oxidation of Hydrocarbons.* (Ind. Eng. Chem., *24*, p. 1103, October 1932.)

45. MAREK, LEROY F. and FLEGE, R. K. *Catalytic Vapor Phase Hydration of n-Butane under High Pressures.* (Ind. Eng. Chem., *24*, p. 1428, December 1932.)

46. MAREK, LEROY F. and WHITE, A. *Corrosion of Mild Steel and Alloys by Hydrogen Sulfide at 500° C. and Atmospheric Pressure.* (Ind. Eng. Chem., *24*, p. 889, August 1932.)

47. ROETHELI, BRUNO E. and FORREST, H. O. *Materials Used in Chemical Engineering Operations.* (Ind. Eng. Chem., *24*, p. 1018, September 1932.)

48. ROETHELI, BRUNO E., FRANZ, C. J. and MCCUISICK, B. L. *How Cadmium Resists Aqueous Solutions.* (Met. Ind., *30*, p. 361, September 1932.)

49. ROBINSON, CLARK S. *Explorations in the Ossipees.* (Apalachia, p. 478, June 1933.)

50. ROBINSON, CLARK S. *Rules for the Development of Real Estate.* (Planning Board, Reading, Mass. December 1932.)

51. SHERWOOD, THOMAS K. and COMINGS, E. W. *The Drying of Solids-V.* (Ind. Eng. Chem., *25*, p. 311, March 1933.)

52. SHERWOOD, THOMAS K. and COMINGS, E. W. *The Drying of Solids.* (Heat. Piping, and Air Cond., *5*, p. 187, April 1933.)

53. SHERWOOD, THOMAS K. and PETRIE, J. M. *Heat Transmission to Liquids Flowing in Pipes.* (Ind. Eng. Chem., *24*, p. 736, July 1932.)

DEPARTMENT OF CHEMISTRY

54. ASHDOWN, AVERY A. *Culmination of the Development of Chemical Research at Technology.* (The Tech. Eng. News, *13*, p. 130, December 1932.)

55. BLANCHARD, ARTHUR A. and WINDSOR, MANLY M. *Nickel Carbonyl.* A Study of the Mechanism of its Formation from Nickel Sulphide and Carbon Monoxide. (J. Am. Chem. Soc., *55*, p. 1877, May 1933.)

56. DAVIS, TENNEY L. *The Faraday Celebrations, 1931.* (J. Chem. Education, *9*, pp. 1202–1218, July 1932.)

57. DAVIS, TENNEY L. *Lyman Churchill Newell.* (Ind. Eng. Chem., *24*, pp. 1082–1083, September 1932.)

58. DAVIS, TENNEY L. *Chemical Flower Gardens.* (Tech. Rev., *35*, pp. 181–182, February 1933.)

59. DAVIS, TENNEY L. *Another Priestley Document.* (J. Chem. Education, *10*, p. 159, March 1933.)

60. DAVIS, TENNEY L. *Joseph Priestley — The Firebrand Philosopher.* (The Tech. Eng. News, *14*, pp. 23–24, 37, March 1933.)

61. DAVIS, TENNEY L. *Chemistry at M. I. T. A History of the Department from 1865 to 1933.* (Tech. Rev., *35*, pp. 250–252, 264, 266, 268, 270–272, April 1933.)

62. DAVIS, TENNEY L. *The Scientific Work of Harvard's New President.* (Boston Transcript, May 13, 1933.)

63. DAVIS, TENNEY L. *Further Evidence of Priestley's Sympathy for the American Revolution.* (J. Chem. Education, *10*, pp. 348–349, June 1933.)

64. DAVIS, TENNEY L. and ELDERFIELD, ROBERT C. *Alkyl-Nitroguanidines. Dearrangement and Preparation by Nitration.* (J. Am. Chem. Soc., *55*, pp. 731–740, February 1933.)

65. DAVIS, TENNEY L. and WU, LU-CH'IANG. *The Ts'an T'ung Ch'i of Wei Po-yang, with an Introduction and Notes.* Translated from the Chinese. (Isis, *18*, pp. 210–289, October 1932.)

66. DIETRICHSON, GERHARD, ORLEMAN, C. W. and RUBIN, CHARLES. *The Density of Ammonia at Reduced Pressures and Its Relation to the Atomic Weight of Nitrogen, the Gas Constant, R, and the Limiting Molal Volume, V_0.* (J. Am. Chem. Soc., *55*, p. 14, January 1933.)

67. DIETRICHSON, GERHARD, BIRCHER, LOUIS J. and O'BRIEN, JOHN J. *The Normal Density of Ammonia.* (J. Am. Chem. Soc., *55*, p. 1, January 1933.)

68. GILL, AUGUSTUS H. *Pine Nut Oil.* (Oil and Soap, *10*, p. 7, 1933.)

69. GILL, AUGUSTUS H. *The Diagnosis of Explosions.* (Amer. J. Criminal Law and Criminology, *23*, pp. 894–897, 1933.)

70. GILLESPIE, LOUIS J. and COE, J. R., JR. *The Heat of Expansion of a Gas of Varying Mass.* (J. Chem. Phys., *1*, pp. 103–113, January 1933.)

71. HARRIS, LOUIS, BENEDICT, W. S. and KING, G. W. *Form and Vibrational Frequencies of the NO_2 Molecule.* (Nature, *131*, p. 621, April 1933.)

72. HARRIS, LOUIS. *Purification and Ultraviolet Transmission of Ethyl Alcohol.* (J. Am. Chem. Soc., *55*, p. 1940, May 1933.)

73. HUNTRESS, ERNEST H. and CLIFF, I. S. *The Preparation of Certain Disubstituted Fluorenomes by the Action of Heat upon the Corresponding Substituted Diphenic Acids or their Derivatives.* (J. Am. Chem. Soc., *55*, pp. 2559–2567, June 1933.)

74. HUNTRESS, ERNEST H. and HERSHBERG, E. B. *An Automatic Pressure-Regulating Unit for Vacuum Distillation.* (Ind. Eng. Chem., Anal. Ed., *5*, pp. 144–146, March 1933.)

75. KEYES, FREDERICK G. and KIRKWOOD, J. G. *The Dependence of the Dielectric Constants of Gases on Temperature and Density.* (J. Chem. Phys., *1*, pp. 155–159, 1933.)

76. KEYES, FREDERICK G. and SMITH, L. B. *Report of Progress on Steam Research at M. I. T. I.* (Mech. Eng., *55*, pp. 113–114, 1933.)

77. KEYES, FREDERICK G. and SMITH, L. B. *Report of Progress on Steam Research at M. I. T. II.* (Mech. Eng., *55*, pp. 114–116, 1933.)

78. KIRKWOOD, JOHN G. *The Dependence of the Dielectric Constants of Gases on Temperature and Density.* (J. Chem. Phys., *1*, p. 155, 1933.)

79. KIRKWOOD, JOHN G. *Erweiterung der Summensätze für Alkalien mit Anwendung auf den Starkeffekt.* (Physikalische Zeitschrift, *33*, p. 521, July 1932.)

80. MILAS, NICHOLAS A. and MCALEVY, AMBROSE. *Studies in Organic Peroxides. I. Peroxides in the Camphoric Acid Series.* (J. Am. Chem. Soc., *55*, p. 349, January 1933.)

81. MILAS, NICHOLAS A. and CLIFF, IVAN S. *Studies in Organic Peroxides. II. The Use of Camphoric Acid Eracid for the Estimation of Unsaturation.* (J. Am. Chem. Soc., *55*, p. 352, January 1933.)

82. MILLARD, EARL B. *What Research Can Do for the Textile Industry.* (Textile Research, *3*, pp. 85–92, December 1932.)

83. MILLARD, EARL B. *Scientific Research — Its Value to the Small Manufacturer.* (The Tech. Eng. News, *14*, p. 70, May 1933.)

84. MORTON, AVERY A. and PEAKES, L. V., JR. *The Reaction of a Free Radical, Triphenyl-methyl, with Ethers, Esters, and Acetone.* (J. Am. Chem. Soc., *55*, p. 2449, June 1933.)

85. MORTON, AVERY A. and PEAKES, L. V., JR. *Sterically Hindered Tertiary Carbinols. 2, 4, 6-Tribromotriphenylcarbinol.* (J. Am. Chem. Soc., *55*, p. 2110, May 1933.)

86. MORTON, AVERY A. and PEAKES, L. V., JR. *A Microtest for Triaryl Carbinols.* (Ind. Eng. Chem. Anal. Ed., *5*, p. 185, May 1933.)

87. NORRIS, JAMES F. *The Significance of Pyrolysis Temperatures.* (J. Chem. Education, *9*, p. 1890, November 1932.)

88. NORRIS, JAMES F. *Experimental Organic Chemistry.* (McGraw-Hill Book Co., Inc., 1933.)

89. SCATCHARD, GEORGE, JONES, PAUL T. and PRENTISS, SPENCER S. *The Freezing*

Points of Aqueous Solutions. I. A Freezing Point Apparatus. (J. Am. Chem. Soc., *54*, pp. 2676–2690, July 1932.

90. SCATCHARD, GEORGE, PRENTISS, SPENCER S. and JONES, PAUL T. *The Freezing Point of Aqueous Solutions. II. Potassium, Sodium and Lithium Nitrates* (J. Am. Chem. Soc., *54*, pp. 2690–2695, July 1932.)

91. SCATCHARD, GEORGE and PRENTISS, SPENCER S. *The Freezing Points of Aqueous Solutions. III. Ammonium Chloride, Bromide, Iodide, Nitrate and Sulfate.* (J. Am. Chem. Soc., *54*, pp. 2696–2705, July 1932.)

92. SCHUMB, WALTER C. and GAMBLE, EDMUND L. *Fluorochlorides of Silicon.* (J. Am. Chem. Soc., *54*, p. 3943, October 1932.)

93. SCHUMB, WALTER C., SEVERYNS, JOSEPH H. and WILKINSON, EDWIN R. *The Use of Lithium in the Analysis of Gases, Especially for the Determination of Nitrogen in Inert Gases.* (Ind. Eng. Chem., Anal. Ed., *4*, p. 371, October 1932.)

94. SCHUMB, WALTER C. and SUNDSTROM, RICHARD F. *Ammines of the Lower Chlorines of Titanium.* (J. Am. Chem. Soc., *55*, p. 596, February 1933.)

95. SCHUMB, WALTER C. and SIMPSON, STEPHEN G. *Determination of Zirconium in Steels — Selenious Acid Method.* (Ind. Eng. Chem., Anal. Ed., *5*, p. 40, January 1933.)

96. SCHUMB, WALTER C. and SIMPSON, STEPHEN G. *The Determination of Zirconium in Steels. Selenious Acid-Phosphate Method.* (Ind. Eng. Chem., Anal. Ed., *5*, p. 211, May 1933.)

97. SEWARD, RALPH P. *A Distribution Method for the Determination of the Dissociation Pressures of Salt Ammoniates.* (J. Am. Chem. Soc., *54*, p. 4598, December 1932.)

98. UNDERWOOD, HENRY W., JR. *Quantitative Organic Analysis.* 40 pp. (Privately printed, June 1933.)

99. UNDERWOOD, HENRY W., JR. *Syllabus of Organic Chemistry.* 160 pp. (Privately printed, June 1933.)

100. WINDSOR, MANLY M. *Laboratory Directions for Entrance Chemistry.* (Privately printed, June 1933.)

101. YOUNG, RALPH C. *Some Reactions of Complex Chlorides of Trivalent and Pentavalent Tungsten.* (J. Am. Chem. Soc., *54*, p. 4515, December 1932.)

DEPARTMENT OF CIVIL AND SANITARY ENGINEERING

102. BABCOCK, JOHN B. *Clemens Herschel.* (J. Boston Soc. C. E., *20*, p. 62, April 1933.)

103. BARROWS, HAROLD K. *Reservoir Storage above Spillway Level.* (Civ. Eng. — Am. Soc. C. E., *3*, p. 233, April 1933.)

104. BARROWS, HAROLD K. *Discussion of "Forests and Stream Flow," by W. G. Hoyt and H. C. Troxwell.* (Trans. Am. Soc. C. E., *58*, p. 1828, December 1932).

105. BARROWS, HAROLD K. *Discussion of "Report of the Committee on Floods."* (J. Boston Soc. C. E., *19*, p. 533, December 1932.)

106. BARROWS, HAROLD K. *Discussion of "McIndoes Falls Power Development," by Harry E. Popp.* (J. Boston Soc. C. E., *19*, p. 436, September 1932.)

107. BARROWS, HAROLD K. *Discussion of "Fifteen Mile Falls Lower Development," by Clarence R. Bliss.* (J. Boston Soc. C. E., *19*, p. 410, September 1932.)

108. BARROWS, HAROLD K. *James Lundie.* (Dictionary of Am. Biog., *11*, p. 505, 1933.)

109. BARROWS, HAROLD K. *Charles Herschel Koyl.* (Dictionary of Am. Biog., *10*, p. 498, 1932.)

110. BARROWS, HAROLD K. *Edgar Boyd Kay.* (Dictionary of Am. Biog., *10*, p. 265, 1932.)

111. BARROWS, HAROLD K. *Vocational Guidance in Engineering Lines.* (The Am. Assn. of Engineers, Chap. 37, "Hydraulic Engineering," pp. 308–313, 1933.)

112. BARROWS, HAROLD K. *Precipitation and Altitude and Run-off Relations for Connecticut River.* (Trans. Am. Geophysical Union, 14th Annual Meeting, Sect. of Hydrology, pp. 396–406, June 1933.)

113. BREED, CHARLES B. *A General Discussion of the Cost of Highway Transportation and an Analysis of Road Cost on Two Moderate Traffic State Highways in Massachusetts.* (Proc. 12th Annual Meeting, Highway Research Board, Pt. I, *12*, pp. 28–51, December 1932.)

114. SPOFFORD, CHARLES M. *Chapter entitled "Engineers and Engineering in Boston"* (pp. 435–448), *in Fifty Years of Boston — A Memorial Volume.* (Sub-committee on Memorial History of the Boston Tercentenary Committee, 1932.)

115. SPOFFORD, CHARLES M. and WILBUR, JOHN B. *Discussion of a paper entitled "Suspension Bridges Under the Action of Lateral Forces," by Leon S. Moisseiff and Frederick Lienhard.* (Proc. Am. Soc. C. E., *58*, pp. 1280–1287, September 1932.)

116. TUCKER, ROSS F. *Slum Clearance — A Plan for the Housing of Poor People.*

117. VOSS, WALTER C. *Bond in Masonry Construction.* (J. Boston Soc. C. E., *20*, p. 19, February-March 1933.)

DEPARTMENT OF ECONOMICS

118. DEWEY, DAVIS R. in coöperation with other members of the Emergency Board. *Report of Emergency Board Appointed March 10, 1932, under Section 10 of the Railway Labor Act.* (Annual Rep. U. S. Board of Mediation, pp. 36–42, November 1932.)

119. DEWEY, DAVIS R. *George Gunton.* (Dictionary of Am. Biog., *8*, pp. 55–56, 1932.)

120. THRESHER, B. ALDEN. *On the Calculation of a Coefficient of Contingency Between the Occupations of the Paternal Grandfathers and Fathers of American Business Leaders.* (Pp. 281–287, Appendix to "American Business Leaders," by F. W. Taussig and C. S. Joslyn.)

DEPARTMENT OF ELECTRICAL ENGINEERING

121. BALSBAUGH, JAYSON C. *Further Studies and Tests on the Problems Involved in High-Precision Power Factor Measurements of Small Oil Samples.* (Committee on Electrical Insulation Reports, Nat. Res. Council, 1932.)

122. BALSBAUGH, JAYSON C. *Losses in Reference to Air Condensers and Their Relation to Measurement of Dielectric Loss.* (Underground Systems Committee Reports, N. E. L. A. 1932.)

123. BALSBAUGH, JAYSON C. and MOON, P. H. *A Bridge for Precision Power-Factor Measurements of Small Oil Samples.* (Trans. A. I. E. E., *52*, p. 528, June 1933.)

124. BARROW, W. L. *A New Electrical Method of Frequency Analysis and Its Application to Frequency Modulation.* (Proc. Inst. of Radio Eng., *20*, pp. 1626–1639, October 1932.)

125. BENNETT, RALPH D. *The Riddle of Cosmic Rays.* (Tech. Rev., *34*, p. 365, July 1932.)

126. BENNETT, RALPH D. *Diurnal Variation of Cosmic Rays.* (Phys. Rev., *41*, p. 119, July 15, 1932.)

127. BENNETT, RALPH D. and VAN DYKE, H. B. *A Simple Vacuum-Tube Potentiometer for the Measurement of Glass Electrode Potentials.* (J. of Lab. and Clinical Medicine, *17*, p. 1268, September 1932.)

128. BENNETT, RALPH D., STEARNS, J. C. and OVERBECK, W. P. *Solar Component of Cosmic Rays.* (Phys. Rev., *42*, p. 317, October 1932.)

129. BENNETT, RALPH D., DUNHAM, J. L., BRAMHALL, E. H. and ALLEN, P. K. *Intensity of Cosmic Ray Ionization in Western North America.* (Phys. Rev., *42*, p. 446, November 1, 1932.)

130. BENNETT, RALPH D. *Laboratories in Engineering Education.* (The Tech. Eng. News, *13*, December 1932.)

131. BENNETT, RALPH D. and STEARNS, J. C. *Angular Distribution of Cosmic Ray Particles.* (Phys. Rev., *43*, p. 1038, June 15, 1933.)

132. BENNETT, RALPH D., STEARNS, J. C. and OVERBECK, W. P. *A Portable Double Geiger Counter.* (Rev. of Sci. Inst., *4*, p. 387, July 1933.)

133. BOWLES, EDWARD L. *New Standard Handbook for Electrical Engineers.* Sections 26 and 27 and part of Section 2. (McGraw-Hill Book Co., February 1933.)

134. BRUNE, O. *Note on Bartlett's Bisection Theorem for 4-Terminal Electrical Networks.* (Phil. Mag., *14*, p. 806, November 1932.)

135. CHINN, HOWARD A. *A Radio Range Beacon Free from Night Effects.* (Inst. Radio Engrs., *21*, p. 802, June 1933.)

136. DAHL, OTTO GUSTAV C. *Elektrisk Fremdrift av Fartöier* (Electric Propulsion of Ships.) (Norsk Tidskrift for Sjöresen, November 1932.)

137. DWIGHT, HERBERT B. and FARMER, E.B. *Double Conductors for Transmission Lines.* (Trans. A. I. E. E., *51*, p. 803, September 1932.)

138. DWIGHT, HERBERT B. *Adjusted Synchronous Reactance and Its Relation to Stability.* (Gen. Elec. Rev., *35*, p. 609, December 1932.)

139. DWIGHT, HERBERT B. *Revision of part of Section 2 of Standard Handbook for Electrical Engineers, on Electric and Magnetic Circuits.* (Above Handbook, Sixth Edition, p. 59, January 1933.)

140. EDGERTON, HAROLD E. and GERMESHAUSEN, KENNETH J. *Stroboscopic Photography.* (Electronics, *5*, p. 220, July 1932.)

141. EDGERTON, HAROLD E. *The Mercury Arc as an Actinic Stroboscopic Light Source.* (Rev. Sci. Inst., *3*, p. 535, October 1932.)

142. EDGERTON, HAROLD E. and GERMESHAUSEN, KENNETH J. *Synchronous Motor Pulling-into-Step Phenomena.* (A. I. E. E. Winter Convention Reprint, January 25, 1933.)

143. FRAZIER, RICHARD H. *Educating for Responsibility.* (Tech. Rev., *35*, p. 52, November 1932.)

144. FRAZIER, RICHARD H. *The Development of Rigorous Thinking.* (The Tech. Eng. News, *13*, p. 105, November 1932.)

145. FRAZIER, RICHARD H. *A Precise Determination of the Thermal Diffusivity of Zinc.* (Phys. Rev., *43*, p. 135, January 15, 1933.)

146. FRAZIER, RICHARD H. *Purity of Zinc for Which Thermal Diffusivity Recently was Reported.* (Letter to the Editor.) (Phys.-Rev., *43*, p. 762, May 1, 1933.)

147. GERMESHAUSEN, KENNETH J. *The Mercury Arc as an Actinic Stroboscopic Light Source.* (Rev. Sci. Inst., *3*, p. 535, October 1932.)

148. GRAY, TRUMAN S. *A Laboratory for Practical Electronics.* (The Tech. Eng. News, *13*, p. 144, January 1933.)

149. GUILLEMIN, E. A. *A Recent Contribution to the Design of Electric Filter Networks.* (J. Math. and Phys., *11*, 1932.)

150. GUILLEMIN, E. A. *Early Developments in Electromagnetic Theory.* (Isis, *52*, July 1932.)

151. HALL, WILLIAM M. *A Miniature Condenser Transmitter for Sound Field Measurements.* (Acoustical Soc. of Amer., *4*, July 1932.)

152. HOUGHTON, H. G. *The Size and Size Distribution of Fog Particles.* (Physics, *2*, June 1932.)

153. HUDSON, RALPH G. *Electronics.* (John Wiley and Sons, 135 pp., 1932.)

154. JACKSON, DUGALD C. *Machinery and Unemployment.* (Chapter II, Stabilization of Employment, pp. 33–51, 1933.)

155. JACKSON, DUGALD C. *A History of the National Research Council, 1919–1933. III. Division of Engineering and Industrial Research.* (Science, *77*, pp. 500–503, May 26, 1933.)

156. JACKSON, DUGALD C. *Comments by D. C. Jackson on the Committee Report entitled "The Relation of Consumption, Production, Distribution," a Progress Report of American Engineering Council as published in Electrical Engineering for June 1932.* (Electrical Engineering, *51*, pp. 743–744, October 1932.)

157. LAWRENCE, RALPH R. *Batteries.* Section 24 of Sixth Edition of Standard Handbooks for Electrical Engineers. (McGraw-Hill Book Co., Inc., January 1933.)

158. LYON, WALDO V. *Reactive Power and Power Factor.* (Elec. Eng., *52*, p. 342, May 1933.)

159. STRATTON, J. A. and CHINN, H. A. *The Radiation Characteristics of a Vertical Half-Wave Antenna.* (Inst. Radio Engrs., *20*, p. 1892, December 1932.)

160. TIMBIE, WILLIAM H. *Electrical Measuring Instruments.* (National Encyclopedia, March 1933.)

DEPARTMENT OF ENGLISH

161. BRIDENBAUGH, CARL. *The Partisan Leader: Nathaniel Beverly Tucker.* (Knopf 1933.)

162. BRIDENBAUGH, CARL. *Colonial Newport as a Summer Resort.* (R. I. Hist. Soc. Collections, *26*, pp. 1–23, January 1933.)

163. BRIDENBAUGH, CARL. *The High Cost of Living in Boston, 1728.* (N. E. Quarterly, *5*, pp. 800–811, October 1932.)

164. FASSETT, FREDERICK G., JR. *A History of Newspapers in the District of Maine, 1785–1820.* (Univ. of Maine Press, November 1932.)

165. PEARSON, HENRY G. *Son of New England: James J. Storrow.* (Thomas Todd, October 1932.)

DEPARTMENT OF GEOLOGY

166. BUERGER, MARTIN J. *The Cleavage Surfaces of Galena.* (Am. Mineralogist, *17*, pp. 391–395, August 1932.)

167. LINDGREN, WALDEMAR. *Annotated Bibliography of Economic Geology.* (Auspices of Nat. Res. Council, W. Lindgren, Chairman, *4* (2), 200 pp., July 1932.)

168. LINDGREN, WALDEMAR. *Annotated Bibliography of Economic Geology.* (Auspices of Nat. Res. Council, W. Lindgren, Chairman, *5* (1), 228 pp., January 1933.)

169. LINDGREN, WALDEMAR. *Memorial of Richard Alexander Fullerton Penrose, Jr.* (Proc. Amer. Philosophical Soc., *72*, pp. 101–104, 1933.)

170. MORRIS, F. K. and LARSEN, E. S. *Origin of the Schists and Gneisses of the Wachusett-Coldbrook Tunnel, Mass.* (Bull. Geol. Soc. Amer., *44*, 1933.)

171. NEWHOUSE, W. H. *Composition of Vein Solutions as Shown by Liquid Inclusions in Minerals.* (Econ. Geol., *27*, pp. 419–436, August 1932.)

172. SLICHTER, LOUIS B. and GABRIEL, GABRILOVICH V. (Part I). *Studies in Reflected Seismic Waves, Parts I and II.* (Gerlands Beiträge zur Geophysik, *38*, pp. 228–256, 1933.)

173. SLICHTER, LOUIS B. *The Theory of the Interpretation of Seismic Travel-Time Curves in Horizontal Structures.* (Physics, *3*, pp. 273–295, December 1932.)

HUMANICS

174. MAGOUN, F. ALEXANDER. *Training for Leadership.* (Proc. Fourteenth Annual Ind. Conf., May 1933.)

175. MAGOUN, F. ALEXANDER. *Problems in Human Engineering.* (Macmillan, September 1932.)

DEPARTMENT OF MATHEMATICS

176. DOUGLAS, JESSE. *One-Sided Minimal Surfaces with a Given Boundary.* (Trans. Am. Math. Soc., *34*, pp. 731–756, October 1932.)

177. DOUGLAS, JESSE and FRANKLIN, PHILIP. *A Step-Polygon of a Denumerable Infinity of Sides which Bounds no Finite Area.* (Proc. Nat. Acad. Sci., *19*, pp. 188–191, January 1933.)

178. DOUGLAS, JESSE. *Crescent-Shaped Minimal Surfaces.* (Proc. Nat. Acad. Sci., *19*, pp. 192–199, January 1933.)

179. DOUGLAS, JESSE. *A Jordan Space Curve which Bounds No Finite Simply Connected Area.* (Proc. Nat. Acad. Sci., *19*, pp. 269–271, February 1933.)

180. DOUGLAS, JESSE. *An Analytic Closed Space Curve which Bounds No Orientable Surface of Finite Area.* (Proc. Nat. Acad. Sci., *19*, pp. 448–451, April 1933.)

181. DOUGLAS, JESSE. *The Problem of Plateau.* (Bull. Am. Math. Soc., *39*, pp. 227–251, April 1933.)

182. FRANKLIN, PHILIP. *The Geometric Interpretation of Some Formulas of Analytic Geometry.* (Am. Math. Monthly, *40*, pp. 143–147, March 1933.)

183. FRANKLIN, PHILIP. *Differential Equations for Electrical Engineers.* (John Wiley & Sons, Inc., May 1933.)

184. PHILLIPS, HENRY B. *Vector Analysis.* (John Wiley & Sons, Inc., February 1933.)

185. PHILLIPS, HENRY B. *Faraday's Law as a Basis of Electromagnetic Theory.* (J. Math. and Phys., *12*, pp. 259–273, May 1933.)

DEPARTMENT OF MECHANICAL ENGINEERING

186. BULLOCK, HEMENWAY R. *Structural Changes at Stress Relieving Temperatures.* (J. Am. Welding Soc., *12*, p. 22, June 1933.)

187. HAYWARD, H. W., HOLMES, A. F. and ADAMS, R. G. *Structural Mechanics.* (McGraw-Hill Book Co., Inc., December 1932.)

188. JAMES, WALTER H. *Kinematic Notes and Problems.* (M. I. T., July 1932.)

189. MAESER, MIETH. *The Application of Photo-Elastic Analysis to Stress Problems.* (The Tech. Eng. News, *14*, p. 50, April 1933.)

190. SCHWARZ, EDWARD R. *Abstract and Bibliography Sections.* (Textile Research, *2*, Nos. 9, 10 (1932) and *3*, Nos. 1–8, 1933.)

191. SCHWARZ, EDWARD R. *Introduction to the Micro-Analysis of Yarn.* (J. Textile Inst., British, *24*, pp. T105–T118, March 1933.)

192. SCHWARZ, EDWARD R. *Introduction to the Study of Yarn Structure with a Twist Tester.* (Textile Research, *3*, pp. 145–156, January 1933.)

193. SCHWARZ, EDWARD R. *Optical Measurement of Yarn Waviness.* (Textile Research, *3*, pp. 14–26, November 1932.)

194. SCHWARZ, EDWARD R. *Textile Research — A Survey of Progress.* (Technology Press, 264 pp., 1932.)

DEPARTMENT OF MINING AND METALLURGY

195. HAYWARD, CARLE R. *The Metallurgy of Copper in 1931.* (The Mineral Industry, *40*, p. 152, October 1932.)

196. HAYWARD, CARLE R. and JACKMAN, ROYAL B. *Forms of Copper in Reverberatory Slags.* (Pub. Am. Inst. Min. and Met. Engrs. Contribution No. 6 Non-Ferrous Met., February 1933.)

197. HUTCHINSON, W. SPENCER and BREITENSTEIN, AUGUST J. *Competitive Relation of Coal and Petroleum in the United States.* (Pub. Am. Inst. Min. and Met. Engrs. Contribution No. 18, February 1933.)

198. LOCKE, CHARLES E. *Ore Dressing Progress.* (Min. and Met., *14*, pp. 32–34, January 1933.)

199. LOCKE, CHARLES E. *Mining and Ore Dressing.* (The Am. Year Book, Record of the year 1932, pp. 434–437, 1933.)

200. LOCKE, CHARLES E. and RICHARDS, R. H. *Progress in Ore Dressing and Coal Preparation in 1931.* (The Mineral Industry During 1931, *40*, pp. 613–675, 1932.)

201. NORTON, JOHN T. *On the X-Ray Determination of Stresses in Welds.* (J. Am. Welding Soc., *11*, p. 5, September 1932.)

DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING

202. HOVGAARD, WILLIAM. *Ritz's Electrodynamic Theory.* (J. Math. and Phys. *11*, pp. 218–242, 1932.)

203. HOVGAARD, WILLIAM. "*After the Akron.*" (The Forum, *89*, June 1933.)

DEPARTMENT OF PHYSICS

204. ALBERTSON, WALTER E. *Note on the Term System of Ir I.* (Phys. Rev., *42*, p. 443, November 1932.)

205. BOYCE, JOSEPH C., MENZEL, DONALD H. and PAYNE, CECILIA H. *Forbidden Lines in Astrophysical Sources.* (Proc. Nat. Acad. Sci., *19*, p. 581, June 1933.)

206. BRAMHALL, ERVIN H. *Cosmic Rays.* (Stanford Illus. Rev., November 1932.)

207. BRAMHALL, ERVIN H. and VAN DE GRAAFF, R. J. *1,500,000 Volt Portable Electrostatic Generator of Rugged Design.* (Phys. Rev., *43*, p. 382, March 1933.)

208. COPELAND, PAUL L. *The Variation of Secondary Emission with Heat Treatment.* (J. Franklin Inst., *215*, pp. 435–443, April 1933.)

209. HARDY, ARTHUR C. and PERRIN, F. H. *The Principles of Optics.* (McGraw-Hill Book Co., Inc., October 1932.)

210. HARRISON, GEORGE R. *A Mechanical Aid to the Analysis of Complex Spectra.* (Rev. Sci. Inst., *3*, p. 753, December 1932.)

211. HARRISON, GEORGE R. *A Dichromatic Projection Microphotometer.* (Rev. Sci. Inst., *3*, p. 572, October 1932.)

212. MACADAM, DAVID L. *Focus of a Concave Grating Spectrograph.* (J. Optical Soc. of Am., *23*, p. 178, May 1933.)

213. MACADAM, DAVID L. *Study of the Probable Error of Slide Rules.* (Rev. Sci. Inst., *3*, p. 620, October 1932.)

214. MORSE, PHILIP M. *Quantum Mechanics of Collision Processes.* (Rev. of Mod. Phys., *4*, p. 577, July 1932.)

215. MORSE, PHILIP M. and VINTI, J. P. *Variable Scale Atomic Wave Functions.* (Phys. Rev., *43*, p. 337, March 1933.)

216. MORSE, PHILIP M. and ROSEN, N. *Vibration of Polyatomic Molecules.* (Phys. Rev., *42*, p. 210, October 1932.)

217. NOTTINGHAM, WAYNE B. *Photoelectric and Thermionic Emission from Composite Surfaces.* (Phys. Rev., *41*, pp. 793–812, September 1932.)

218. O'BRYAN, HENRY M. *Absorption and Dispersion of Celluloid Between 300A and 1000A.* (J. Optical Soc. Am., *22*, p. 739, December 1932.)

219. PATTON, TEMPLE C. *Nomographic Chart for Determining Heating Unit Design.* (Chem. and Metal. Eng., *40*, p. 150, March 1933.)

220. SLATER, JOHN C. *Note on Molecular Structure.* (Phys. Rev. *41*, pp. 255–257, July 1932.)

221. SLATER, JOHN C. *Analytic Atomic Wave Functions.* (Phys. Rev., *42*, pp. 33–43, October 1932.)

222. SLATER, JOHN C. *The Electron Theory of Metallic Conduction.* (Science, *77*, pp. 595–597, June 1933.)

223. THOMPSON, MAURICE DEKAY. *The Adhesion of Metal Electrodeposits.* (Metal Cleaning and Finishing, *4*, p. 385, 1932.)

224. THOMPSON, MAURICE DEKAY. *Recent Developments in Electroplating.* (Metal Cleaning and Finishing, *5*, p. 9, 1933.)

225. THOMPSON, MAURICE DEKAY. *The Electrochemical Oxidation of Molybdenum in Potassium Hydroxide Solutions.* (Trans. Electrochemical Soc., *62*, September 1932.)

226. THOMPSON, MAURICE DEKAY and JELEN, F. C. *Chromium Plating on Zinc.* (Trans. Electrochemical Soc., *63*, 1933.)

227. THOMPSON, MAURICE DEKAY. *Note on the Seat of the Electromotive Force in Voltaic Cells.* (Trans. Electrochemical Soc., *63*, preprint 12, 1933.)

228. THOMPSON, MAURICE DEKAY. *Recent Foreign Original Research in Electroplating.* (Quar. Rev. Am. Electroplaters Soc., *19*, p. 15, 1932.)

229. THOMPSON, MAURICE DEKAY. *Conductivity of Solutions of Water in Sulfur Dioxide.* (Trans. Electrochemical Soc., *63*, preprint 10, 1933.)

230. VALLARTA, MANUEL S. and LEMAITRE, G. *On Compton's Latitude Effect of Cosmic Rediation.* (Phys. Rev., *43*, p. 87, January 1933.)

231. VAN ATTA, L. C. *A New Design for a High Voltage Discharge Tube.* (Phys. Rev., *43*, p. 156, February 1933.)

232. VAN DE GRAAFF, ROBERT J., COMPTON, K. T. and VAN ATTA, L. C. *The Electrostatic Production of High Voltage for Nuclear Investigations.* (Phys. Rev., *43*, p. 149, February 1933.

233. WARREN, BERTRAM E. *Book Review "Applied X-Rays," by G. L. Clark.* (J. Am. Chem. Soc., *55*, p. 1300, April 1933.)

234. WARREN, BERTRAM E. *Book Review "Methoden der Kristallstrukturbestimming mit Röntgenstrahlung," by E. Schiebold.* (J. Am. Chem. Soc., *55*, p. 1301, April 1933.)

235. WILKES, GORDON B. *Thermal Conductivity of Magnesite Brick.* (J. Amer. Ceramic Soc., *16*, p. 125, March 1933.)

DIVISION OF INDUSTRIAL COOPERATION

236. FELLOWS, JOHN A. *Domes for Circular Kilns.* (J. Amer. Ceramic Soc., *15*, p. 508, September 1932.)

237. NORTON, FREDERICK H. *The Exeter Pottery.* (Antiques, July 1932.)

238. NORTON, FREDERICK H. *Classification of Industrial Furnaces.* (Fuels and Furnances, *10*, July-August 1932.)

239. NORTON, FREDERICK H. *Selection of Refractories.* (Fuels and Furnaces, *10*, September-October 1932.)

240. NORTON, FREDERICK H. *Heat Flow in Refractories.* (Fuels and Furnaces, *10*, November-December 1932.)

241. NORTON, FREDERICK H. *Refractory Insulators.* (Fuels and Furnaces, *11*, January-February 1933.)

242. NORTON, FREDERICK H. *Some Notes on the Nature of Clay II.* (J. Amer. Ceramic Soc., February 1933.)

243. NORTON, FREDERICK H. *Furnaces Roofs.* (Fuels and Furnaces, *11*, March-April 1933.)

244. NORTON, FREDERICK H. *Color in the Ceramic Industry.* (Ceramic Age, May 1933.)

245. NORTON, FREDERICK H. *The Construction of Furnace Walls, Hearths, Doors and Other Parts.* (Fuels and Furnaces, *11*, May-June 1933.)

246. NORTON, FREDERICK H. and DUPLIN, V. J., JR. *A Muffle Kiln of High Efficiency.* (J. Amer. Ceramic Soc., March 1933.)

ADMINISTRATION

247. FORD, HORACE S. *Report of Thirteenth Annual Meeting, Association of University and College Business Officers of Eastern States, Richmond, Va., December 1932.* (110 pp. Also nine previous annual reports, February 1933.)

248. TRYON, JAMES L. *Review of Theodore Marburg's Development of the League of Nations Idea.* (Am. Jour. Int. Law, *27*, p. 377, April 1933.)

THE INSTITUTE LIBRARY

249. MAYNARD, KATHARINE. *Oliver Heaviside as Seen in His Books and Letters.* (Tech. Rev., *35*, pp. 214, 234. March 1933. Also condensed under the title: "That Eminent Man: Oliver Heaviside" in General Electric Review, *36*, pp. 186–187, April 1933.)

THESES PRESENTED FOR DOCTORS' DEGREES

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Doctor of Philosophy

250. HUTCHINSON, EDWARD PRINCE. *The Incidence of Tuberculous Infection Among School Children in Massachusetts: a Study Based on Statistical Analysis of Data of the Ten-Year Program.* (June 1933.)

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251. BRAGG, LESLIE BARTLETT. *The Effect of Temperature and Pressure on the Rate of Cracking of Hydrocarbons.* (June 1933.)

252. CAMPS-CAMPINS, FRANCISCO MIGUEL. *Studies in the Ash of Cane Sugar Products.* (June 1933.)

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255. HITCHCOCK, LAUREN BLAKELY. *Absorption of Carbon Dioxide by Solutions of Caustic Alkalies.* (June 1933.)

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258. SIMS, HUGH DAVIS. *Relative Volatility of Binary Mixtures at Low Pressures.* (June 1933.)

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Doctor of Philosophy

259. FASCE, EGI VICTOR. *The Relative Reactivities of the Carbon-Chlorine Bond in Benzoyl Chloride and Certain of Its Derivatives.* (December 1932.)

260. BENEDICT, WILLIAM SIDNEY. *The Absorption Spectra of Nitrogen Dioxide and Nitrogen Tetroxide.* (June 1933.)

261. GOLDMAN, LOUIS. *The Synthesis of Ammonia in the Electrodeless Discharge.* (June 1933.)

262. TUCKER, HELEN FARNHAM. *The Effect of Substituents on the Thermal Stability of Certain Derivatives of Malonic Acid.* (June 1933.)

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263. PANDYA, ANANT HIRALAL. *A Theoretical and Experimental Investigation of the Bearing Capacity of Footings on Sand.* (June 1933.)

264. WILBUR, JOHN BENSON. *The Development of a Workable Method of Determining Stresses in Tall Building Frames due to Lateral Forces.* (June 1933.)

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265. CALDWELL, SAMUEL HAWKS. *The Extension and Application of Differential Analyzer Technique in the Solution of Ordinary Differential Equations.* (June 1933.)

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267. BROWN, LEVI STANLEY. *The Age of the Gulf Border Salt Deposits.* (June 1933.)

268. CARMAN, KATHARINE WOODLEY. *Shallow Water Foraminifera of Bermuda.* (June 1933.)

269. FLAHERTY, GERARD FRANCIS. *Geology of Chignecto Area, New Brunswick.* (June 1933.)

Doctor of Science

270. GOLD, KENNETH MONROE. *The Capillary Theory of Ore Deposition.* (December 1932.)

DEPARTMENT OF MATHEMATICS

Doctor of Philosophy

271. ESTES, JAMES GRAHAM. *The Lift and Moment of an Arbitrary Aerofoil-Joukovsky Potential.* (June 1933.)

272. HIBBARD, DONALD LAWRENCE. *Mathematical Risk.* (June 1933.)

273. WADSWORTH, GEORGE PROCTOR. *The Geometry of Linear Homogeneous Partial Differential Equations of the First Order.* (June 1933.)

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274. YEH, YUN CHIAO. *The Distribution of Stresses in Welded Structures.* (June 1933.)

DEPARTMENT OF MINING AND METALLURGY

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METALLURGY

275. DRINNAN, ROBERT GIFFEN, JR. *The Properties and Possible Uses of Metal made from Sponge Iron.* (June 1933.)

276. HICKS, LAURENCE CLARK. *An X-ray Study of the Diffusion of Chromium into Iron.* (June 1933.)

277. MARZKE, OSCAR THEODORE. *The Precipitation of Alpha from Beta Brass.* (December 1932.)

278. ZAVARINE, IGOR NICHOLAS. *The Magnetic Transformation A2 in Carbon Steels.* (June 1933.)

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279. FITZGERALD, NORMAN DUNHAM. *The Normal and Basic Prices of Petroleum.* (June 1933.)

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* Not on Institute Staff 1932–33.

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