

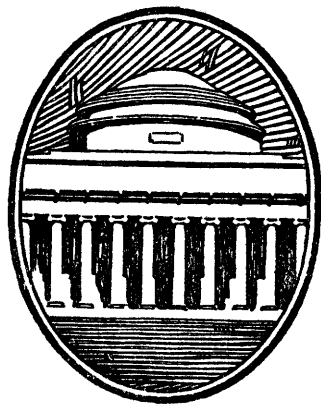
111417
1933-34

BULLETIN, MASSACHUSETTS
INSTITUTE OF TECHNOLOGY

PRESIDENT'S REPORT
ISSUE

VOLUME 70

NUMBER 1



OCTOBER, 1934

Published by
Massachusetts Institute of Technology
Cambridge, Massachusetts

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

Entered July 13, 1933, at the Post Office, Boston, Massachusetts, as second-class
matter, under Act of Congress of August 24, 1912.

MASSACHUSETTS
INSTITUTE OF TECHNOLOGY

President's Report Issue

1933-1934

Covering period from meeting of Corporation October, 1933
to meeting of Corporation October, 1934



STATE LIBRARY
OF
MASSACHUSETTS

THE TECHNOLOGY PRESS
CAMBRIDGE, MASSACHUSETTS
1934

STATE LIBRARY OF MASSACHUSETTS

JUL 28 1937

YRABELL STATE
TO
STTBURHDA22AM

377 M412

M412

1929-31

TABLE OF CONTENTS

THE CORPORATION	PAGE
Members of the Corporation	5
Committees of the Corporation	6
REPORT OF THE PRESIDENT	
Personnel	10
Finances	12
Students	13
Facilities	15
Educational Program	17
Research	18
Industrial Coöperation and Public Service	22
Alumni Association	24
A Look Ahead	25
REPORTS OF OTHER ADMINISTRATIVE OFFICERS	
Dean of Students	31
Dean of the Graduate School	34
Registrar	38
Chairman of Committee on Summer Session	56
Librarian	56
Medical Director	59
Director of the Division of Industrial Coöperation	61
Secretary of Society of Arts	63
Director of Admissions	64
Director of News Service	65
REPORTS OF THE HEADS OF DEPARTMENTS AND COURSES	
SCHOOL OF ENGINEERING	
Aeronautical Engineering	68
Building Engineering and Construction	70
Business and Engineering Administration	71
Chemical Engineering	74
Civil and Sanitary Engineering	75
Electrical Engineering	79
Electrochemical Engineering	85
Mechanical Engineering	88
Meteorology	90
Mining and Metallurgy	92
Naval Architecture and Marine Engineering	95
SCHOOL OF SCIENCE	
Biology and Public Health	96
Chemistry	98

	PAGE
General Science and General Engineering	100
Geology	101
Mathematics	103
Physics	104
SCHOOL OF ARCHITECTURE	
Architecture	106
City Planning	107
Architectural Engineering	108
Division of Drawing	109
DIVISION OF HUMANITIES	
Economics and Social Science	110
English and History	111
Military Science and Tactics	112
Modern Languages	113
REPORT OF THE TREASURER	115
PUBLICATIONS OF STAFF 188	
Index of Authors	204
THESES PRESENTED FOR DOCTORS' DEGREES 201	
Index of Authors	206

MEMBERS OF THE CORPORATION

1934-1935

President

KARL TAYLOR COMPTON

Vice-President

VANNEVAR BUSH

Secretary*

WALTER HUMPHREYS

Treasurer

HOBACE SAYFORD FORD

Life Members

FRANCIS HENRY WILLIAMS
ABBOTT LAWRENCE LOWELL
ELIHU THOMSON
CHARLES AUGUSTUS STONE
FRANCIS RUSSELL HART
WILLIAM CAMERON FORBES
ALBERT FARWELL BEMIS
EDWIN SIBLEY WEBSTER
PIERRE SAMUEL DUPONT
FRANK ARTHUR VANDERLIP
CHARLES HAYDEN
CHARLES THOMAS MAIN
HARRY JOHAN CARLSON
GERARD SWOPE
ARTHUR DEHON LITTLE
FRANKLIN WARREN HOBBS
WILLIAM HOWARD BOVEY

WILLIAM ROBERT KALES
JOSEPH WRIGHT POWELL
HENRY ADAMS MORSS
FRANCIS WRIGHT FAXAN
JOHN EDWARD ALDRED
FRANK WILLIAM LOVEJOY
WALTER HUMPHREYS
VICTOR MACOMBER CUTTER
ALBERT HENRY WIGGIN
JOHN RUSSELL MACOMBER
ALFRED LEE LOOMIS
JOHN JEREMIAH PELLEY
HARLOW SHAPLEY
ALFRED PITCHARD SLOAN, JR.
CHARLES NEAVE
FRANKLIN ATWOOD PARK
LAMMOT DUPONT

FRANK BALDWIN JEWETT

Term Members

Term expires June, 1935

GODFREY LOWELL CABOT
WILLIAM DAVID COOLIDGE
REDFIELD PROCTOR

Term expires June, 1937

BRADLEY DEWEY
MARTIN HERBERT EISENHART
DONALD GOODRICH ROBBINS

Term expires June, 1936

FRANCIS JOHN CHESTERMAN
THOMAS CHARLES DESMOND
HENRY ELWYNE WORCESTER

Term expires June, 1938

LOUIS SHATTUCK CATES
HAROLD BOURS RICHMOND
ALLAN WINTER ROWE

Term expires June, 1939

JAMES MADISON BARKER
WILLIS FLEMING HARRINGTON
WILLIAM RUSSELL HEDGE

Representatives of the Commonwealth

HIS EXCELLENCY, JOSEPH BUELL ELY, *Governor*

HON. ARTHUR PRENTICE RUGG, *Chief Justice of the Supreme Court*

DR. PAYSON SMITH, *Commissioner of Education*

*Address correspondence to Massachusetts Institute of Technology.

COMMITTEES OF THE CORPORATION FOR 1934-1935

Executive Committee

KARL T. COMPTON } *Ex officio*
HORACE S. FORD }

EDWIN S. WEBSTER	FRANCIS R. HART	REDFIELD PROCTOR
GERARD SWOPE	ELIHU THOMSON	

Committee on Finance

FRANCIS R. HART	JOHN R. MACOMBER	ALFRED L. LOOMIS
CHARLES HAYDEN	EDWIN S. WEBSTER	THE TREASURER, <i>ex officio</i>

Auditing Committee

GODFREY L. CABOT	HAROLD B. RICHMOND	WILLIAM R. HEDGE
------------------	--------------------	------------------

Committee on Membership

CHARLES A. STONE	FRANCIS W. FABYAN	GERARD SWOPE
JOHN E. ALDRED	ARTHUR D. LITTLE	

VISITING COMMITTEES

Department of Civil and Sanitary Engineering

WILLIAM R. KALES	CHARLES T. MAIN	HARRISON P. EDDY
JOHN J. PELLE	ARTHUR W. DEAN	FRANK E. WINSOR
A. FARWELL BEMIS	HERBERT T. GERRISH	

Department of Mechanical Engineering

FRANKLIN A. PARK	ALFRED P. SLOAN, JR.	JOHN E. OTTERSON
JOHN E. ALDRED	FREDERICK G. COBURN	HENRY M. CRANE
CHARLES T. MAIN	DAVID S. REYNOLDS	

Department of Mining and Metallurgy

CHARLES HAYDEN	LOUIS S. CATES	QUINCY A. SHAW, JR.
THOMAS C. DESMOND	EDWIN D. MARTIN	GALEN H. CLEVINGER
BRADLEY DEWEY	GEORGE A. PACKARD	

Department of Geology

LOUIS S. CATES	GODFREY L. CABOT	BRIG. GEN. EDWARD M.
CHARLES A. STONE	FREDERICK G. CLAPP	MARKHAM
HARLOW SHAPLEY	ROBERT LIVERMORE	WALTER C. MENDENHALL

Department of Architecture

HARRY J. CARLSON	FRANKLIN A. PARK	GEOFFREY PLATT
THOMAS C. DESMOND	EDGAR I. WILLIAMS	SIDNEY WAUGH
A. LAWRENCE LOWELL	RALPH T. WALKER	

Department of Physics

WILLIAM D. COOLIDGE	DONALD G. ROBBINS	HENRY A. BARTON
ALFRED L. LOOMIS	CHARLES G. ABBOT	F. K. RICHTMYER
FRANK A. VANDERLIP	BAILEY TOWNSHEND	

Department of Electrical Engineering

ALFRED L. LOOMIS	FRANK B. JEWETT	HENRY A. WISE WOOD
W. CAMERON FORBES	THOMAS SPOONER	J. ALLEN JOHNSON
CHARLES NEAVE	DON L. GALUSHA	

Department of Hygiene

ALLAN WINTER ROWE	LAMMOT DU PONT	HAVEN EMERSON, M.D.
HARRY J. CARLSON	MARSHALL B. DALTON	JOEL GOLDTHWAIT, M.D.
HENRY E. WORCESTER	DONALD F. CARPENTER	

Department of Economics and Social Science

VICTOR M. CUTTER	WILLIAM R. HEDGE	WILSON M. COMPTON
FRANKLIN W. HOBBS	RUDOLPH F. HAFFENREFFER	CARL SNYDER
HAROLD B. RICHMOND	LEWIS W. DOUGLAS	

Department of Business and Engineering Administration

JOHN R. MACOMBER	JAMES M. BARKER	PHILIP R. ALLEN
FRANCIS W. FABYAN	HAROLD V. COES	CARL P. DENNETT
ALBERT H. WIGGIN	GEORGE W. TREAT	

Department of English and History

FRANCIS J. CHESTERMAN	DONALD G. ROBBINS	GEN. WILLIAM D. CONNOR
PAYSON SMITH	EDWARD P. BROOKS	ROBERT I. REES
A. FARWELL BEMIS	J. RHYNE KILLIAN, JR.	

Department of Modern Languages

W. CAMERON FORBES	JAMES M. BARKER	DONALD W. KITCHIN
A. LAWRENCE LOWELL	INGERSOLL BOWDITCH	FREDERICK W. C. LIEDER
		A. F. WHITTEM

Department of Mathematics

M. HERBERT EISENHART	WILLIS F. HARRINGTON	LUTHER P. EISENHART
FRANCIS J. CHESTERMAN	GEORGE A. CAMPBELL	ROLAND G. D. RICHARDSON
HENRY E. WORCESTER	RALPH D. BOOTH	

Department of Chemistry

ARTHUR D. LITTLE	WILLIS F. HARRINGTON	CLAUDE C. VAN NUYS
FRANK W. LOVEJOY	GEORGE T. COTLE	WALTER S. LANDIS
M. HERBERT EISENHART	SALMON W. WILDER	

Department of Chemical Engineering

BRADLEY DEWEY	HENRY E. WORCESTER	CHARLES M. A. STINE
ARTHUR D. LITTLE	SAMUEL CABOT	MILTON C. WHITAKER
FRANK W. LOVEJOY	GEORGE H. TABER, JR.	

Department of Biology and Public Health

ALLAN WINTER ROWE	HENRY E. WORCESTER	HENRY VAUGHAN
DR. FRANCIS H. WILLIAMS	HARRISON P. EDDY	FRED C. BLANCK
FRANCIS W. FABYAN	LEWIS W. WATERS	

Department of Naval Architecture and Marine Engineering

JOSEPH W. POWELL	WILLIAM S. NEWELL	JOHN E. BURKHARDT
HENRY A. MORSS	CAPT. CLAYTON M.	H. HARRIS ROBSON
CHARLES A. STONE	SIMMERS	

Department of Military Science and Tactics

BRADLEY DEWEY	COL. CLIFTON C. CARTER	COL. OLIVER L.
WALTER HUMPHREYS	CAPT. PAUL W. GEORGE	SPAULDING, JR.
HAROLD B. RICHMOND	BRIG. GEN. ALSTON	
	HAMILTON	

Aeronautical Engineering

GODFREY L. CABOT	COMDR. R. D.	HARRY F. GUGGENHEIM
WILLIAM H. BOVEY	WEYERBACHER	GEORGE W. LEWIS
HENRY A. MORSS	DONALD W. DOUGLAS	

Division of Industrial Coöperation

CHARLES NEAVE	FRANK B. JEWETT	ISAAC HARTER
WILLIAM D. COOLIDGE	GEORGE P. DIKE	WILLIAM B. GIVEN, JR.
ALFRED P. SLOAN, JR.	CHARLES R. BOGGS	

Textiles

FRANKLIN W. HOBBS	ALBERT R. PIERCE	H. NELSON SLATER
WALTER HUMPHREYS	RUSSELL B. LOWE	E. DEAN WALEN
FRANCIS W. FABYAN		

Committee on Nautical Museum

FRANCIS R. HART	HENRY A. MORSS	JOSEPH W. POWELL
-----------------	----------------	------------------

Library

HARLOW SHAPLEY	WALTER HUMPHREYS	DONALD G. ROBBINS
----------------	------------------	-------------------

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, analyzing its present situation, describing its accomplishments, and mentioning some of its problems. My report carries a distinct note of satisfaction and optimism, tempered, however, by a realization of the grave responsibilities which rest on the entire constituency of the Institute, but especially on its Corporation and administrative officers, in order that it may perform its functions in the unsettled future with the greatest possible effectiveness.

Due to the able and devoted work of the Treasurer and the Finance Committee, to the splendid coöperation of the staff, to the Loan Fund, and the curtailment or consolidation of certain activities, the Institute has been able satisfactorily to meet the financial difficulties arising from reduced income on investments and diminishing enrolment during the period of the depression. The Treasurer's Report will show, in fact, a modest surplus remaining from the year's operations.

While the recent years have not been years of expansion in a material sense, out of adversity there have come an internal improvement and a coöperative, loyal effort within the Institution, which have resulted in a clarification of educational objectives and an improvement in educational procedures. In my contacts with staff and alumni I have felt the stimulus of their enthusiasm. In my contacts with the public I have discovered an increasing recognition of and respect for our products: well trained men and important professional accomplishments. More important than my own impressions are the records of research, of public service, and the output of trained men during the year.

In the following paragraphs I shall dwell briefly upon some of the more significant aspects of the year's work, which will be described more in detail in the appended reports of other administrative officers of the Institute.

PERSONNEL

The Corporation suffered a great loss in the death, on December 27, 1933, of Mr. Everett Morss, who had been a member of the Corporation since 1908, of the Executive Committee since 1910, and Treasurer since 1921.

The term of service of Alexander Macomber, Calvin W. Rice and Maurice R. Scharff expired in June 1934.

There have been elected to life membership on the Corporation, Messrs. Lamot du Pont and F. B. Jewett, and to term membership, Messrs. J. M. Barker, W. F. Harrington, W. R. Hedge, and Donald G. Robbins, the latter to fill the unexpired term of Mr. J. C. Hunsaker.

Mr. Horace S. Ford, for twenty years Bursar of the Institute, was elected Treasurer to succeed Mr. Everett Morss.

Under the recent amendment of Section X of the By-Laws, Messrs. Redfield Proctor and H. E. Worcester have served on the Executive Committee as substitutes for Messrs. Gerard Swope and Elihu Thomson, Mr. Swope having been prevented from regular attendance by his duties as Chairman of the Business Advisory and Planning Council, and Professor Thomson having been absent on account of illness.

The Faculty has lost through death, Dr. W. H. Walker, non-resident Professor of Chemical Engineering; Robert H. Smith, Emeritus Professor of Mechanical Engineering; J. W. Phelan, Professor of Inorganic Chemistry and H. W. Underwood, Jr., Assistant Professor of Chemistry. The following have been retired on account of age, each with the title of Professor Emeritus: A. H. Gill, Professor of Technical Chemical Analysis; A. L. Merrill, Professor of Mechanism and Secretary of the Faculty; C. F. Park, Professor of Mechanism, and F. S. Woods, Professor of Mathematics and Head of the Department of Mathematics.

The Faculty has also lost through resignation, M. W. Dole, Assistant Professor of Mechanism; J. L. Entwistle, Assistant Professor of Electric Transportation; V. Guillemin, Jr., Assistant Professor of Physics; E. C. Harwood, Assistant Professor of Military Science and Tactics; L. F. Marek, Assistant Professor of Chemical Engineering; Johnson O'Connor, Assistant Professor of Industrial Research in the Department

of Business and Engineering Administration; J. P. Walsted, Assistant Professor of Physical Metallurgy.

Distinguished visitors on the Staff during the year were: J. Franck, Visiting Lecturer in Physics; Otto Szasz, Visiting Professor in Mathematics; Sir Raymond Unwin, Visiting Lecturer in City Planning.

This year the Faculty is strengthened by the addition of the following: Warren J. Mead, Professor of Geology and Head of the Department; W. G. Whitman, Professor of Chemical Engineering and Head of the Department; E. S. Burdell, Associate Professor of Sociology; A. V. de Forest, Associate Professor of Mechanical Engineering; J. H. Keenan, Associate Professor of Mechanical Engineering; Francis Bitter, Associate Professor of the Physics of Metals; R. W. Carlson, Assistant Professor of Civil Engineering; William C. D. Bridges, Assistant Professor of Military Science and Tactics; Robley D. Evans, Assistant Professor of Physics.

Under an arrangement recently authorized by the Executive Committee, the Institute welcomes for the present academic year J. F. Byrne of Ohio State University as Visiting Assistant Professor of Electrical Engineering in exchange with our Assistant Professor H. L. Hazen, and J. P. Fife, Visiting Assistant Professor of English in exchange with our Assistant Professor William C. Greene, Jr.

The following promotions have been made within the Faculty. From the grade of Associate Professor to that of Professor: A. C. Hardy, G. Rutledge, W. C. Schumb; from the grade of Assistant Professor to that of Associate Professor: J. Douglas, R. D. Douglass, R. F. Elder, R. D. Fay, W. P. Fiske, P. M. Morse, A. A. Morton, E. R. Schwarz, T. K. Sherwood, B. E. Warren.

The following Instructors have been promoted to the Faculty with the rank of Assistant Professor: W. P. Allis, A. A. Ashdown, H. L. Beckwith, C. H. Blake, J. C. Boyce, C. Bridenbaugh, S. H. Caldwell, G. Dietrichson, F. G. Fassett, Jr., C. H. R. Mabie, J. D. Mitsch, S. G. Simpson, J. B. Wilbur, J. C. G. Wulff, R. C. Young.

FINANCES

The detailed report of the financial operations and conditions of the Institute will be presented by the Treasurer. There it will be seen that the total operating income for the year 1933-34 was \$3,314,296.67 as compared with \$3,288,536.07 in 1932-33, and \$3,702,184.89 in 1931-32. For 1933-34 there was an unexpended balance of \$5,548.31 as compared with a deficit of \$5,727.40 in 1932-33, and a deficit of \$15,575.22 in 1931-32. The present estimates indicate a budget income of about \$2,600,000 for the current year 1934-35, it being impossible as yet to estimate the additional operating income from special funds, gifts and contracts.

The Salary Reserve Plan which operated so successfully in 1932-33 was again put in operation for the year 1933-34. It provided for the contributions to the Reserve Fund by every person on the payroll of the Institute, at the rate of 10 per cent of salary in excess of \$500, with the understanding that this reserve would not be drawn upon unless the Institute should incur a deficit in excess of \$20,000. By October it became evident that the reserve accumulated to date would be ample to cover any probable deficit during the year, so that contributions from the staff to the Reserve Fund were discontinued after that date, and on October 21 all contributions for the year were returned in full to the contributors. The Salary Reserve Plan has again been put in force for the year 1934-35, although there is a reasonable hope that with continued economy it may again be possible to finish the year with little or no deficit.

However loyal the staff may be in coöperating with the administration to maintain the financial stability of the Institution, it is recognized that the morale of its members should not be subjected to too long a moratorium on promotions in salary and rank. This is especially true in the case of the younger men whose family responsibilities increase from year to year. In spite of financial stringency, the Executive Committee therefore authorized a limited number of modest promotions in rank and increases in salary beginning July 1, 1934. It is to be hoped that the way may be clear to extend this policy next year.

With faith that the most difficult period of the financial

emergency has been passed and with realization that the future of the Institute depends above all on the outstanding quality of its staff, the Executive Committee has authorized the appointment of several professors of distinction and wide reputation in their fields to strengthen the staff in key positions, even though it would have been possible to carry the teaching load for another year without their appointment. This I consider to be the most important step taken during the year. In order that the financial burden of these new salaries should not fall upon the present staff through the Salary Reserve Fund, these salaries are being carried in a supplementary budget which will be provided, if necessary, by drawing on capital funds rather than at the expense of the Salary Reserve Fund.

STUDENTS

Students may be considered the raw material in our educational process, and it is therefore of prime importance that we give consideration to the supply, quality and welfare of the student group. The following table shows significant trends in enrolment.

Enrolment at M. I. T.

	Total Undergraduate	Freshmen	Total Graduate	New Graduate	Total Enrolment
1930-31. . . .	2,670	734	539	280	3,209
1931-32. . . .	2,610	628	578	294	3,188
1932-33. . . .	2,308	562	523	232	2,831
1933-34. . . .	2,106	485	500	226	2,606
1934-35* . . .	2,012	549	499	267	2,511

* Figures as of October 6, 1934.

It is seen that the continual decline in enrolment has been due primarily to the steady decrease in the number of students entering in the freshman year. The total enrolment for the current year is somewhat smaller than last year, due to the graduation last June of the large pre-depression class which entered in 1930 and its replacement by a smaller entering class. The point of real significance is the fact that freshman enrolment shows a marked increase over last year, which we hope means that the low point of depression effects on enrolment has been passed. The enrolment in

the Graduate School has remained more nearly constant, and here again there is an encouraging increase this year as compared with last year.

Various causes may be ascribed to this upward turn. It may reflect a certain degree of returning confidence and increased earnings on the part of the general public. We believe that it is due in significant part to the special efforts which have been made to bring desirable students to the Institute through the various types of educational publicity which were discussed in my report of a year ago. These include the visits to schools and colleges by members of the staff and particularly by our Director of Admissions; the attractive bulletin, "Educational Opportunities at the Massachusetts Institute of Technology," of which more than twenty thousand copies were mailed; a similar bulletin on Architectural Education which also was distributed widely to interested recipients; the participation of the Institute in the exhibitions at the Hall of Science in Chicago, and the excellent press publicity handled by our Director of News Service. Important also have been the effective coöperation of alumni clubs and of the one hundred and two Honorary Secretaries now representing the administration of the Institute in important cities in the United States and foreign countries.

Financial aid to deserving needy students has always been recognized as essential to the best discharge of our educational responsibilities. During the past year, as an emergency measure, a limited number of special scholarships were awarded to supplement those ordinarily provided through specially designated endowments or contributions. The distribution of student aid through scholarships, fellowships, and loans, together with student earnings through the Technology Christian Association's employment service, are listed in the following table. It is significant that the number of these awards exceeds half of the total enrolment of the Institution.

Student Aid at M. I. T. (1933-1934)

Undergraduate Scholarships	358	\$62,559
Graduate Scholarships and Fellowships	231	83,250
Loans	712	202,905
Student Employment Service	235	31,323
Totals	1,536	\$380,037

The convenient and adequate health service centered in the Homberg Infirmary, continues its remarkably effective contribution to student welfare. During the year there were 23,674 calls for medical examination or treatment. There were 2,756 physical examinations given. There were only five contagious cases during the entire year. This remarkable freedom from epidemics is without doubt due largely to the ease and freedom with which the medical staff may be consulted.

It is difficult to estimate or to compare the quality of the student body from year to year. Personal opinions and statistics on scholastic records both indicate definite improvement in our students. This may be ascribed to increased alumni assistance in the selection of students, to improved criteria and standards for admission, to improvement in our educational processes, and to the increased seriousness with which students view their academic work in the present period of economic difficulty and competition for positions after graduation.

As to placement of our students on graduation, it is encouraging to note that approximately twice as large a proportion of our graduating class was definitely placed by the date of graduation last June as had been the case in either of the two preceding years. The latest figures, as of October 4, show that 26 per cent of last June's bachelors are still unemployed, 12 per cent of last year's masters, and less than 8 per cent of last year's doctors.

FACILITIES

Changes in the educational plant of the Institute during the past year have been confined principally to reallocations of space to meet changing requirements and to consolidate closely related activities. Prominent among these changes is the combination of the branch libraries in Geology and Mining and Metallurgy to form the Lindgren Library. This, like the Eastman Library, is another step toward the combination of the numerous library deposits throughout the Institute into a small number of branch libraries conveniently located, well equipped and under efficient supervision coördinated with the Main Library.

At the M. I. T. Experimental Station, on the estate of Colonel E. H. R. Green at Round Hill, South Dartmouth, and

kindly placed by Colonel Green at the disposal of the Institute, the large airship dock has been converted into a well equipped high voltage laboratory, housing the Van de Graaff ten million volt generator and accessory equipment.

In order to provide better living accommodations for graduate students and at the same time to combat the decrease in occupancy of the dormitories which resulted from decreasing enrolment, the experiment was tried during 1933-34 of converting the dormitory units, Crafts, Nichols and Holman, into a Graduate House with attractively furnished rooms, a lounge, library and basement buttry. This house accommodated 78 graduate students and was conducted under the supervision of a resident master, Professor Avery Ashdown, with the assistance of a House Committee of the students. This experiment proved so successful that it was decided to convert the remainder of that dormitory, with the additional units, Runkle, Atkinson and Ware, into a complete Graduate House. This has been done during the past summer, so that there are now excellent accommodations for 206 graduate students in the combined units. The Institute is therefore one of the few institutions in this country which has made special provision for housing its graduate students under such conditions as will exert a stimulating, broadening influence through the close social contacts of these men of somewhat mature interest gathered from all parts of the world.

An interesting result of the success of the Graduate House was the creation of a desire on the part of the undergraduates for somewhat more complete furnishing of their dormitory accommodations, together with willingness to pay the slightly increased rental necessary to provide them. This was done, and the result has been to make dormitory life decidedly more desirable, in student opinion. For the first time since 1930-31 the dormitories are filled and there is a waiting list.

The outstanding addition to the plant during the year has been the Edmund Dana Barbour Field House, which was erected during the summer to supersede the inadequate and unattractive wooden shed which had previously been the athletic center of the Institute. The move for this field house was initiated by a petition from the Student-Faculty Curriculum Committee, which pointed out not only the inadequacy of the

old accommodations but also the fallacy of maintaining such an unsightly rendezvous for visiting school and college teams at a time when the Institute was exerting special efforts to attract desirable students.

The Executive Committee realized the force of these arguments and appropriated \$55,000 from the Edmund Dana Barbour Fund, for the erection of the Field House, whose planning, architectural and engineering work have all been done by members of the Institute staff in Architecture, Building Construction, Mechanical and Electrical Engineering, under the supervision of a committee headed by the Treasurer, Horace S. Ford, with two members of the Corporation, Dr. A. W. Rowe and Mr. H. E. Worcester. This Field House nearly doubles the facilities for students participating in track, basketball, wrestling, squash, and other sports, and is a distinct success architecturally and in the perfection of its appointments.

EDUCATIONAL PROGRAM

While we consider all of our activities as direct or indirect aspects of our basic educational program, the most obvious aspect of this program is found in the curriculum. During the year the study and revision of the courses of study have continued into the upper years. It has also led to a few modifications in the first year program, suggested by the experience of the past four years of operation under the simplified first year curriculum which was put into effect following a study inaugurated by the late President Stratton.

The most important change in the curriculum has been the introduction of a five-year course designed to educate scientists and engineers for greater public service, and which is alternative to the regular four-year course in all departments except Architecture, whose course already extends through five years, and the course in Business and Engineering Administration which already includes social, economic and business subjects. This new five-year course leads on its completion to two degrees, one the bachelor of science in the professional subject of the undergraduate course pursued, and the other a master of science in economics and engineering or economics and natural science as the case may be. The purpose of this course is to

give the student a better introduction to fundamental economic and social aspects of the environment in which he will carry on his profession. The course is planned to include essentially the same four years of professional study as before, with the addition of a year of study in the field of social science, all these studies being advantageously distributed throughout the five years and culminating in a thesis which, preferably, will deal with some economic aspect of the field of professional study.

The social science courses offer opportunities of selection among such subjects as economic theory, industrial relations, business management, labor organization, government control of industry, investment analysis and finance, public utilities, statistical methods, international law and American foreign policy, and sociology. This five-year course has started auspiciously with an adequate number of students of high standing, and it is expected to develop into an important part of our educational program.

RESEARCH

Activity in research is an important measure of the contributions of the Institute to public welfare, of its healthy spirit of intellectual activity and of the professional standing of its staff. Last spring a meeting of the Alumni Council was devoted to "Research at M. I. T.," at which time a report was made on 408 research projects actively under way by students and staff. This astonishing array ranged all the way from scientific investigation of the most theoretical type to practical engineering problems of design; from projects whose successful conclusion would have immense effect on our national life to others which gave desired information regarding some particular material.

During the year there were 286 publications from the Institute, almost all of a scientific or technical nature, and 41 doctor's theses were presented.

It is obviously difficult to pick out certain research projects as more important than others, but I will venture to mention the following topics as illustrative of the work which is being done in this field.

As a result of several years of highly scientific work on

the physical and chemical nature of fog, carried on with the financial assistance of Colonel E. H. R. Green and with use of facilities on his Round Hill estate, there has been developed a method for dissipating fog on a rather large scale. The first practical test of this method last summer was successful, probably beyond the expectations of anyone except Mr. Houghton, whose calculations had convinced him of its practicality. As a result of this test, negotiations are under way with certain departments of the government for a coöperative further development aimed at a practical means of landing airplanes in a fog.

For several years Dean Bush and Professor Caldwell have been developing a mechanical device for solving differential equations, which has been used successfully on a great variety of problems which are too difficult or tedious to be solved in any other way. The constant use of this machine by members of our staff has made possible important contributions to knowledge in such diverse fields as radio transmission, cosmic rays, acoustics, electric power distribution, and atomic structure. With our coöperation, duplicates of the machine are now being built at two other institutions in this country, one in England and one in Norway. Further important improvements in the machine are planned.

World interest has been centered on the powerful electrostatic high voltage generator designed by Professor Van de Graaff and erected in the high voltage laboratory on the estate of Colonel E. H. R. Green at Round Hill. The public demonstration of this generator last fall brought together a group of science writers for the press, said to be the largest ever assembled. Auxiliary apparatus for use with this machine in experiments on nuclear structure, will be ready by the first of the year. Closely related to this work are investigations of improved methods of transmitting electric power over great distances and of producing x-rays for therapeutic treatment of internal cancer, which are being carried forward as rapidly as permitted by the very limited funds available.

The new methods of high speed photography and of stroboscopic examination of rotating or vibrating objects, invented by Professor Edgerton, have found an enormous range of interest and application. Developed primarily for the

study of machinery and in increasing practical use for that purpose, the methods have also been applied to studies of animals and insects and to transient phenomena of a great variety.

Although the spectroscope has been called "the master key of science" its use is restricted because of the time and effort required in measuring and analyzing spectra. Professor Harrison has devised and built apparatus which will perform automatically a large part of this work so rapidly as to reduce the time required in this work from days or weeks to minutes. This will greatly increase the opportunities to use the spectroscope in its more difficult fields of application.

The safety of water tanks in earthquakes is of great importance, particularly in reducing fire hazard. For this reason Mr. Ruge, in consultation with Dean Bush, has devised a "shaking table" of unique design upon which models of water tanks or any other structures may be studied with respect to their reaction to vibrations or shocks of various types. This is leading to new designs which will greatly increase the safety of these structures in earthquakes.

The Institute, through Professor Keyes and his associates, has been one of three main organizations coöperating in an international effort to extend accurate knowledge of the thermodynamic properties of steam. It is this work which has among other things made possible the great increase in efficiency of steam power generation during the last decade. This program is nearing completion and an important feature of it was the International Conference which met this fall at the Institute for the purpose of surveying the results of the work and coming to an international agreement regarding the standards and data for scientific and engineering work.

In no small degree as a result of the meteorological studies at the Institute, the United States Weather Bureau is taking steps to adopt the new air mass or "synoptic" method of weather forecasting. In this field the Institute has made a continuous development and study through systematic daily charting and forecasting of weather conditions and through the daily study of meteorological conditions in the upper atmosphere, carried on through airplane flights which have been financed in part by the Rockefeller Foundation. A research

which has been made possible by these flights is a microbiological study of the contents of air at various altitudes, by Professor Proctor, and a study of the effect of winds in carrying the larvae of the gipsy moth.

An investigation in which our late colleague, Mr. Everett Morss, was much interested has been the measurement, by Dr. Urry, of the age of minerals through a study of their helium content. This work is part of an international study under the auspices of the National Research Council. It is now being extended at the Institute by the introduction of other methods based upon radioactive transformations in the rocks.

A coöperative study with the Bureau of Standards, carried on by Messrs. F. G. Kear and H. A. Chinn, has shown the cause of the occasional dangerous errors in radio range beacons and resulted in a method for largely overcoming these errors.

It has been recognized that lithium fluoride, of all substances, should be transparent to light farthest in the ultra-violet and should transmit visible light with a minimum amount of chromatic aberration, but attempts to produce the substance in adequate size and perfection for use in optical instruments have not hitherto been successful. After several years of very careful work, however, Professor Stockbarger has developed a successful method of producing this material in large size and very perfect quality, and there is every reason to expect that it will find wide application in practical optical work as well as in research.

The Division of Industrial Coöperation has carried on an increasing number of investigations for industrial concerns. The policy has been increasingly in the direction of discouraging or refusing work of a type which can properly be done in commercial laboratories, and in devoting attention to problems of an unusual or obscure nature where the unique facilities of the Institute and the coöperative efforts of its staff may be utilized. This trend in the work of the Division is decidedly encouraging, and some very important industrial problems have been successfully handled during the year.

During the year the Institute has been happy to welcome as guests in its research laboratories, twelve National Research Fellows in Chemistry and Physics, working under auspices of

the National Research Council and supported by funds from the Rockefeller Foundation.

INDUSTRIAL COÖPERATION AND PUBLIC SERVICE

The Institute as an organization and members of its staff as individuals are frequently requested to perform voluntary services for the government in fields where their professional qualifications and disinterested position place them in a peculiar position of helpfulness. Our policy has been to render this service freely and gladly as a public duty. The following illustrations will show the scope of this public service.

At the request of the Governor of the Commonwealth, the Institute assumed the direction of a state-wide survey of traffic accidents, financed by C. W. A. and F. E. R. A. funds. This work was put in charge of Professor Eddy in consultation with Dean Bush, Professor Eddy being relieved of other duties. This project employed a maximum of 1,200 men, including 450 engineers, and an average of nearly 700 over a period of ten months, with a total payment of about \$400,000 in wages, and constitutes the most complete survey ever made of traffic accidents and safety.

The Mayor of the City of Boston has recently asked our assistance in a survey of the manifold engineering services of the City, looking toward their possible reorganization in the interest of efficiency. For this purpose a coöperating committee, consisting of Professors Eddy, Norton and Breed, have been appointed with the understanding that they will call in for consultation other members of the staff as occasion may arise.

The Institute, in coöperation with Harvard University, acted as host to the American Association for the Advancement of Science at its great annual convention during the last Christmas holidays. The arrangements were in the hands of a local committee headed by Dean Prescott, with Professors Bunker and Townsend from the Institute's staff, who devoted many weeks to the planning and management of this, which proved to be one of the most successful conventions in the history of American Science.

A second Summer Conference in Spectroscopy was held last July with such success as to indicate that this will be an

annual event of international interest. It was planned by Professor Harrison to make the resources of the new spectroscopy laboratory and its staff of as great value as possible. Particular attention was devoted to the use of the spectroscope in biological and medical fields, in the belief that it may prove to be as successful a tool in these sciences as it has been in physics, chemistry and astronomy. Among the many valuable results of this conference may be mentioned the financial support of the Rockefeller Foundation of a coöperative research program between our spectroscopy laboratory and the Harvard Medical School.

Professor Hunsaker is in the midst of several months of intensive service as a member of the Federal Aviation Commission, appointed by the President of the United States at the direction of the Congress, and charged with the duty of recommending a national policy with respect to aviation.

Professor Dewey has rendered important public service as a member of the Railway Emergency Board appointed by the United States Board of Mediation.

In line with his interests in teaching and research in the field of Public Health Education, Professor C. E. Turner has served as Chairman of the Committee on Health Education in Secondary Schools of the Massachusetts State Department of Education, and has also served together with Dean Prescott on the Governing Council of the American Public Health Association.

Among Professor Lindgren's activities may be mentioned particularly his chairmanship of the Committee on Projects of the Geological Society of America, and his chairmanship of the Committee on Annotated Bibliography of Economic Geology operating under the auspices of the National Research Council.

Professor C. B. Breed has been active in making a highway survey and report under the auspices of the Federal Highway Commission and the National Research Council. This report deals with all aspects of highways from the engineering features of their construction to a study of their economics with reference to taxation, competition with other carriers, and the like.

Your President has been called upon in various capacities for work which constitutes part of the Institute's contribution to public service. Chief among these have been service as

Chairman of the Science Advisory Board, appointed by the President of the United States for two years; member of the Commission on the Army Air Corps, appointed by the Secretary of War under chairmanship of Mr. Newton D. Baker; member of the Business Advisory and Planning Council, appointed by Secretary Roper for the Department of Commerce; member of the Visiting Committee of the United States Bureau of Standards; continuation as Vice Chairman of the Massachusetts Commission on the Stabilization of Employment, appointed by Governor Ely; Chairman of the Committee on Engineering Schools of the Engineers Council for Professional Development, and Chairman of the American Institute of Physics.

It is realized that this list represents only a limited portion of the various individual or group activities of the Institute in the performance of public service along the lines of their professional competency.

An entirely different aspect of public service which falls also in the fields of industrial coöperation and of alumni and student interest, is the work of the Placement Bureau, now in charge of Mr. John M. Nalle. As a result of the high quality of service of this bureau and as an indication of an improvement in conditions for employment of technical men, it is gratifying to report that placements of alumni through this bureau during the past year more than doubled those of preceding years, and are maintaining this high rate.

ALUMNI ASSOCIATION

Important among the activities of the Alumni Association during the year have been the inauguration of the new plan for securing nominations of alumni officers, the study of various proposals for modifying the nature and schedule of alumni reunions, and the undertaking by the alumni council, at the request of the Corporation, of the nomination of alumni members of visiting committees to departments. A past President of the Alumni Association, our colleague, Mr. Redfield Proctor, will make a more extended report to the Corporation on the activities of the Alumni Association.

A LOOK AHEAD

In view of the continuing economic uncertainty it is futile to plan in detail far ahead. Nevertheless, it is possible to state clearly our ideals and objectives, to evaluate our present status in respect to their attainment and to point out those features of our program which most urgently need attention if we are to go forward. An educational institution is like any other live organization, it must continually adapt itself to new conditions and go forward or its effectiveness will be quickly lost. The developments in science and engineering are so rapid, and the opportunities for public service in many directions are so great, that we must not only go forward with them, but in fact should go ahead of them in the rôle of the leader.

Our objective is to make an effective contribution to our national welfare in the particular field of technology. We do this by giving professional training to our students, by instilling in them high ideals of professional conduct and citizenship, by contributing to the advancement of knowledge and the art of its useful applications through research, and by direct public services to government and society in the fields of our particular competency. Our ideal is to perform these services in the best possible way; to maintain leadership in the realm of research; and to render other public service in a distinctive manner.

You will recall my earlier statement that my report to you at this time is made in a considerable spirit of satisfaction and optimism. Nevertheless, there are several matters which challenge attention and in which I shall need your help in the immediate future if our ideals of fine performance are to be maintained. These matters relate to aspects of our work which must be strengthened if we are not to slip into a second rate position, and to opportunities which must be seized if they are not to be lost.

Our operating income has dropped by about \$400,000 from the peak in 1931-32. About three-fifths of this drop is ascribed to decreased enrolment and the remainder to decreased income from investments and gifts. Had it not been for the relief accorded by the release of the Eastman contract the situation would be worse by another \$300,000. With this in view consider the following facts:

In spite of the distinct improvement in our facilities devoted to the extra-curricular welfare of our students, notably in the dormitories and the field house, we still have one great lack, namely, adequate equipment for physical training. Our new field house gives excellent accommodations for lockers and showers. Beyond that our facilities for physical training consist of a useful but inadequate small gymnasium in the top of the Walker Memorial, an unattractive and inadequate drill and basketball floor in one of the old war buildings, and the great out-of-doors. I cannot recall having visited any college large or small whose facilities for maintaining and encouraging physical fitness throughout the winter (which is the greater part of the college year) are relatively so inadequate and unattractive as ours. Physical fitness and the spirit which goes with it are essential attributes of a well-balanced and integrated course of training young people for a useful life, and they demand our consideration.

From the time of President Walker the Institute has been a leader among engineering schools in recognizing the importance of attention to the economic environment in which the engineer works. A valuable outgrowth of this viewpoint has been the development of our strong Department of Business and Engineering Administration. Another step was taken last year in the establishment of the Five-Year Course in Engineering and Economics or Science and Economics, these courses stressing the education of scientists and engineers for greater public service. I believe that the next important step in this direction should be a closer integration of the work of the economist and the engineer, looking toward a situation in which economics may be a hand-maiden or tool of the engineer in a manner analogous to the rôle of mathematics, physics, and chemistry in engineering. The most likely means of bringing this about is probably from the engineering rather than from the economics standpoint, and it is therefore proposed to try the experiment in one of the engineering departments, appointing an engineer who has a wide background of experience in the social aspects of engineering to serve as a base for the attack of certain economic problems from an engineering standpoint. The details of this program have been carefully prepared by Professor Jackson of the Department of Electrical

Engineering, and it is hoped that funds may be secured which will enable the experiment to be carried forward in that department over a limited period of years, at the end of which time the results may be evaluated with future plans dependent upon these results.

Another element in our planning, which fortunately does not rest upon a financial basis, is the problem of stabilizing our educational operations. I do not mean by this a stagnation of development, but rather a stabilization of our student body in such a way that we may plan our teaching program more effectively. If, for example, we could know definitely that there would be each year six hundred freshmen, six hundred sophomores, six hundred juniors, six hundred seniors and six hundred graduate students, or any other definite numbers, we could develop a teaching force just adequate to handle these numbers and constituted of men definitely picked for their primary contribution to one or another aspect of the teaching program. As we operate at present there is every fall an uncertainty as to the number of students to be handled, necessitating last minute emergency arrangements which in general tend to decrease the standard of teaching excellence.

Such a stabilization might be secured, for example, by placing a limitation on the number of students which will be admitted to each class and perhaps to each department, basing this limitation on a careful study of the maximum number of students which can be handled with best results with our present facilities.

A plan of this type would have additional valuable results, such, for example, as strengthening the hand of the Dean of Students, who would be able to point out to any unsatisfactory student the fact that there were others anxious to have his place. But most important of all, it would permit us so to select our students as to ensure the greatest return on our investment in facilities and effort.

There has obviously been no point in considering this problem during the last few years of decreasing enrolment when we have been somewhat over-staffed. Now that the trend of enrolment shows a tendency upward I believe that this question should be studied and planned. As a first step I plan to

ask the faculty to make a survey of the situation, with recommendations regarding what steps, if any, should be taken.

We have, I think wisely, maintained the policy of attracting our students by the opportunities which we can offer them and the value of their training here and not by purchasing them in the open market through widespread awards of fellowships. It is nevertheless a practical fact that the wise use of a limited number of attractive fellowships has proved, in several institutions, to be a predominant and comparatively inexpensive means of giving to these institutions that prestige which has enabled them widely to attract students. In the post graduate field it is true in every subject that there is each year a relatively small group of men of the very highest quality who are eagerly sought after by the leading graduate schools and to whom the honor and financial assistance of the fellowship award constitute the deciding element in their choice between schools. The Institute has absolutely nothing of this type to offer, and while we are able to attract a goodly number of well qualified students, we miss every year and in nearly every subject the very top men in the selective list of applicants. I believe that attention to this point will strengthen our educational program and will assist rather than undercut the purpose of our great loan fund, at an annual expense which will be small in comparison to the benefits derived.

The salary scale of our staff was raised, just before we were engulfed in the depression, to a point about midway between what it had been and what it should be to be on a par with the leading educational institutions. However loyal the staff may be, we cannot permanently maintain a position of first rank with staff salaries in second rank. This situation has already cost us the services of certain men whom we very much wanted on our staff, whose loss has also cost us the enrolment of some outstanding students who have gone to work with these particular men elsewhere.

This Corporation has recognized not only the responsibility and opportunity of the Institute to render public service through research, but the necessity of encouraging research work as an essential part of our educational program, essential to our prestige, to our teaching and to our ability to place our graduates. As I understood it, my own connection with the

Institute was made, on your part and mine, in order that I might assist the Institute in putting its work on the high plane demanded by the increasing requirements to strengthen this aspect of our work, against the alternative of slipping toward mediocrity. So far as our limited finances have permitted, and with the effective coöperation of the staff I believe that we have made good progress, but there remains much to be done and some of it is very urgent.

Certain things which I have in mind will be brought out forcibly in the report of the Visiting Committee on the Department of Chemistry. What is said there applies in principle to all the departments of the Institute. We must face the fact that our funds available for carrying on this type of work are, in many important fields, decidedly inferior to those of several other institutions. You may not feel that a comparative argument based on other institutions is a proper one. If so, the argument can be stated in another way. Our staff have a large number of problems and ideas of the greatest importance, several of them decidedly exciting as to their intellectual value, and in some cases as to their possible practical and monetary value. In some instances this work has had to be laid on the shelf completely; in other cases it has been prosecuted on a very inadequate basis, but as effectively as available funds permitted; in still other cases we have seen outsiders gain world reputation by going ahead with work which our staff have for years awaited an opportunity to tackle. Such a situation is detrimental to morale and represents a social loss.

Four years ago the Rockefeller Foundation made a grant tapering down over a period of six years to encourage our research work in the sciences. This has been of great value and has assisted greatly in enabling our scientific departments to demonstrate the kinds of things which they could do if given opportunity. The grant has already served its purpose in permitting this demonstration to be made and it is now our responsibility to find means whereby this work may be continued on a more permanent and adequate basis.

Engineering education is much younger than scientific education and the possibilities and advantages of research in an engineering school are only now coming to be generally recognized. Our recent experience in this field, although

limited, has been more than encouraging; it has been compelling in its implications. We must somehow find funds for engineering research.

I wish that I might amplify these statements by giving concrete examples, but this would take far too much time. I simply wish you to have the picture of our situation as I and my colleagues of the Administration see it. We have much cause for satisfaction in our situation. At the same time we see clearly some things which are urgently needed, and I ask your advice and help in finding means to bring these things to pass. I believe that they should be made the principal subjects of consideration by the Corporation and its Visiting Committees during the coming year.

KARL T. COMPTON, *President.*

REPORTS OF ADMINISTRATIVE OFFICERS

Dean of Students. Pressing demands for financial assistance continued to be the major problem of this office during 1933-34 although there is at this writing, in view of a comparatively smaller number of applications for loans for 1934-35, some reason to feel that the past two years will mark the peak of the demand. It is also encouraging to note that the indices of repayments have been moving higher since June 1933, and that many men are finding it possible to discharge their maturities in advance.

During the year 712 individuals made application for assistance from the Technology Loan Fund as compared with 744 during 1932-33. Of these requests 543, or 76.3 per cent were granted, the total amount loaned being \$202,905. The corresponding figures in the previous year were: 527, 70.8 per cent, and \$203,780.

In its four years of operation, up to June 30, 1934, 1,183 students have borrowed \$639,360 from this Fund, of which \$52,049 has been already repaid. This latter figure, equal to 58 per cent of the face value of matured notes, contrasts with 48 per cent on June 30, 1933.

Undergraduate scholarship awards for 1933-34 numbered 358 and amounted to \$62,559 as compared to 368 totaling \$75,050 for 1932-33. Of this year's awards, 69 carrying stipends of \$18,900 went to entering freshmen, the corresponding figures for 1932-33 being 49 and \$18,100. The percentage of the undergraduate body receiving scholarship aid during 1933-34 was 17.0 as compared with 15.9 in 1932-33, 14.95 in 1931-32, 18.2 in 1930-31, 15.8 in 1929-30, and 15.0 in 1928-29.

Conditions in respect to student employment improved during 1933-34 as 235, or 53 per cent of those registering with the Undergraduate Employment Bureau of the Technology Christian Association, found some sort of work. These 235 students earned over \$31,323 as compared with \$28,617 made by 81 men placed in 1932-33, and with \$52,010 by the 291 placed in 1931-32.

Tutorial sections for freshmen failing in Chemistry, Physics and Mathematics on the five and ten week intermediate reports of the first semester were inaugurated experimentally last November. The purpose was not to assist the manifestly unfit to negotiate the midyears successfully but, by small sections, to permit experienced instructors to search for the root of a student's difficulties and endeavor to prescribe ways and means by which the student himself might accomplish more in his regular lessons. On the basis of this beginning the idea will have a second experimental test during 1934-35.

Coincident with the above, all private tutoring for fees in first and second year subjects by members of the Institute staff was abolished through executive order, and a "Corps of Student Tutors"—an approved list of duly qualified undergraduate and graduate students—was established under the direction of this office.

The problem of dormitory vacancies, noted in reports of the past several years, apparently has been solved, for with the initial year of operation of the Graduate House the percentage of unoccupancy in our student housing system never rose above three per cent. The Graduate House, with accommodations for 78, was filled throughout the entire year and, in addition, 54 graduate students lived in the undergraduate sections. This has led to the conversion, during the summer of 1934, of the three remaining units of the Faculty Group of Dormitories as part of the Graduate House, thus providing for 206 advanced students.

Despite the segregation of the graduate students, the Dormitories continued to operate satisfactorily under the student government system, suitable representation of the graduate students on the undergraduate committees being arranged. Coöperation between the two groups, particularly in intramural athletics, has been exceptionally well carried out.

The plan to effect an organization of the commuting students, noted last year, matured during 1933-34 and, with the enthusiastic support of the Institute Committee, the Com-muter's Association, now officially known as "The 5.15 Club of M. I. T.," has assumed an active part in undergraduate life. This Club, in potential strength nearly half the undergraduate enrolment, has already given ample evidence that the com-

muting student, the often-called "brown bagger," is in fact interested in and has time for participation in athletics and other phases of student life, and that his support in undergraduate affairs will bring about a more diversified development at the Institute. To encourage this desirable result the spacious former billiard room of Walker Memorial has been converted into a lounge for the "5.15 Club."

One particular undertaking of this organization — the cultivation of a closer interest in the Institute by the fathers of students living nearby — will, it is hoped, continue to receive emphasis. To that end the Institute Committee has altered the date and program of the All-Technology Smoker to encourage the fathers of incoming students to attend.

Open House was held on May 5, again under the skilful management of the student government through the Combined Professional Societies. The Musical Clubs and Tech Show concluded their seasons despite declining revenues, and the four publications experienced in the main a successful year.

The average scholastic record of 670 men in 25 student activity groups was 3.48 in June of 1934; the corresponding averages being 3.42 for 633 men in 26 activities in June of 1933, and 3.36 for 417 men in 22 activities in June of 1932. Improvement is also to be noted in the grades of fraternity men: 593 averaged 3.23 in June of 1934, while 598 averaged 3.14 in June of 1933, and 622 averaged 3.10 in June of 1932.

In spite of a further shrinkage in income, reflecting the decline in student registration, the athletic program, as in the earlier years of the depression, was carried through without curtailment. This gratifying state of affairs resulted both from the liberal policy of the Corporation in maintaining its several grants without reduction, and also from the prudence and economy with which the M. I. T. A. A. administered its affairs.

Participation of Technology crews in the Poughkeepsie Regatta has been permanently discontinued. The primary reason for this decision lay in the impossibility of developing a four-mile crew without danger to the individual contestants during the brief space of time falling between the close of our examination period and the date of the races. Colleges rowing this distance in late June inaugurate training for it in May, which is impossible at Technology on account of the Institute's

calendar. In the future, therefore, our rowing will be confined to races of two miles or less, this being a program falling well within our imposed limitations.

There is one matter of major importance which, as it had its beginnings in the year just closing, may find suitable place in this report. Since the Institute moved to Cambridge, dressing and bathing facilities for our own students and for visiting athletes have been most inadequately cared for in a wooden field house adjacent to the Hangar. Early in 1933-34, the Corporation, recognizing the handicap which this wholly unsatisfactory equipment imposed, voted an appropriation for the erection of a modern, properly equipped structure. Members of the Institute Staff have given their services toward the realization of this plan, with the double result that a large financial saving has been effected, and the project has had the benefit of the highest quality of professional advice and direction. The building — to be known as the Barbour Field House — has been completed this summer and is ready for occupancy this autumn.

Another service rendered by members of the Staff of the Department of Civil Engineering, in the benefit from which Technology shares with the community as a whole, has been the survey of the Charles River Basin. Under the direction of Professor John B. Babcock, a complete remeasurement of the rowing courses in the Basin has been made, the improvements carried out by the Metropolitan District Commission having changed the contour and destroyed the earlier marks. The M. I. T. Athletic Association has provided the funds necessary for the erection of permanent markers and the Commission has authorized their installation. This is a small, but nevertheless significant service to the community in which our Faculty and student body have jointly coöperated.

H. E. LOBDELL.

Dean of the Graduate School. The Graduate School has completed a successful year judged from the standpoint of registration, social welfare of students, standard of scholarship, productivity in research, and degrees conferred.

The registration of 503 students as of November 1 showed a decrease of 20 from the preceding year, which was less than anticipated. The falling off would have been greater had it not been for the action taken by the Corporation in augmenting available graduate scholarship funds, to which further reference will be made below. The number of students returning for the Master's degree showed a decrease, while there was a marked increase in the number of students matriculating for the doctorate. The trend during the past three years is shown in the following table:

	1933	1932	1931
Doctor of Philosophy.....	94	84	66
Doctor of Science.....	77	65	85
Doctor of Public Health.....	0	0	2
Master in Architecture.....	11	9	12
Master of Science.....	297	332	386
Special Graduate Students.....	24	33	27
	<hr/>	<hr/>	<hr/>
Total.....	503	523	578

The Graduate School included students from every state in the Union except West Virginia, Kentucky, South Dakota, Wyoming, and Nevada; from Porto Rico, and from the following sixteen foreign countries: Australia, Canada, China, Colombia, Cuba, England, Germany, India, Ireland, Japan, Manchuria, Norway, Russia, South Africa, Sweden, and Switzerland. One hundred and forty colleges and universities, 22 of which were outside the United States, were represented.

During the year (December 1933 and June 1934) 234 higher degrees were conferred as follows: Doctor of Philosophy, 23; Doctor of Science, 18; Master of Science, 193.

The Graduate House accommodating 78 students has proved all and more than was anticipated in providing not only splendid living quarters but also the social environment for graduate students so long desired. The greatest credit is due to Dr. Ashdown, the resident House Master, for the able manner in which he has handled the various problems which have arisen in connection with this Graduate House plan. Coöperating with him was an efficient Student House Committee which, among other activities, arranged weekly dinners and frequent teas at which the students had an opportunity

of entertaining their friends and meeting members of the Faculty. The plan was a success from the start and throughout the year there was a long waiting list of graduate students desirous of obtaining rooms in the House. For this reason it was decided this spring to expand the Graduate House to include the whole group of dormitories adjacent to the President's house. The remaining dormitories have therefore been completely renovated and refurnished so that at the opening of the term, accommodations for two hundred and six graduate students will be available. Nothing of greater importance for the success of the Graduate School has been undertaken in recent years than the inauguration of the Graduate House. The contacts which students from all parts of the world have the opportunity of making with one another in the House have an educational value of which no rating system is a measure.

The research activities of the students and staff connected with the Graduate School may be judged by reference to the list of publications appended to the President's Report. These include not only the results of theses presented for the Doctor's and Master's degree but also of research carried out by Research Associates and visiting Research Fellows. Of the latter, thirteen National Research Fellows were welcomed to our laboratories last year — six in Chemistry and seven in Physics; also two Rockefeller Fellows were carrying on research in Geology and one Textile Research Fellow in the Department of Biology and Public Health. A list of all researches in progress throughout the Institute was prepared last winter for discussion at a meeting of the Alumni Council. No less than four hundred and eight projects were reported, embracing the widest diversity of subjects. This, so far as is recalled, was the first general survey of the research activities of the Institute as a whole which had ever been attempted.

The plan for the exchange of graduate students between Harvard University and the Institute of Technology has been operative during the past year to a greater extent than ever before. Thirty-two students have availed themselves of the privilege, nineteen from Harvard and thirteen from the Institute. Students in the former group were recommended from the Schools of Arts and Sciences, Engineering, Business Administration, Public Health, and Education, respectively, and

elected advanced courses in our Departments of Biology, Geology, Physics, Meteorology, Mining Engineering, Naval Architecture, Business Administration, and Economics. Institute students were admitted at Harvard to courses in the Schools of Arts and Sciences, Business Administration, Engineering, Public Health, and Architecture.

The income available for graduate scholarships from endowed funds and special fellowships was \$54,550, approximately the same as last year. The number of applications for aid and the financial need were, however, far greater than ever before. In view of the emergency the Corporation voted to augment the budget for graduate scholarships by \$12,000 for scholarships to members of the instructing staff who were working for higher degrees and by \$20,000 for the creation of eighty half-tuition graduate scholarships of \$250 each. Recipients of these scholarships had the privilege of applying to the Technology Loan Fund Board for a supplementary loan to meet their full tuition. Had it not been for this action of the Corporation the registration of the Graduate School would have been materially less. The total number of applications received was 462. Two hundred and thirty-one awards were made, of which 115 were to students pursuing courses leading to the Doctor's degree and 116 to students working for the Master's degree. These included grants to 71 members of the Staff. As the total registration in the Graduate School was over 500, less than 50 per cent of the students received scholarship assistance.

Graduate work in engineering schools is rapidly assuming more and more importance as the futility of attempting to incorporate the more advanced phases of science and its applications into a four-year curriculum becomes recognized. The Society for the Promotion of Engineering Education has appointed a committee, of which President Compton is a member, to report on graduate study in Engineering. The discussion at the annual meeting of the Association of Land Grant Colleges in Chicago last year was also focused on graduate work. One session was devoted to the consideration of whether the present four-year curriculum for the Bachelor's degree should be extended to five years or whether the fifth year should be considered as graduate work and lead to a Master's degree.

The consensus of opinion was strongly in favor of the latter plan. In a paper presented by the writer on graduate work, as organized at the Institute, the importance of engineering schools maintaining a high standard for their higher degrees was emphasized. It was the opinion of many present at this meeting that unnecessary duplication of graduate work in specialized fields of engineering should be avoided on account of the great cost involved in maintaining an expert staff, and in providing adequate research equipment.

In conclusion, Dean Hughes' recent report to the American Council of Education on the relative standing of institutions conferring Doctors' degree is of interest. His findings are based upon replies received from scientists and engineers selected by their respective professional societies, who were asked to pass upon the qualifications of American universities and technical schools to confer the Doctor's degree in their respective fields. In this comparison the Institute stood high, all departments reported in which Doctor's degrees have been conferred being placed in the starred or preferred list. May this complimentary estimate of our graduate work serve as an incentive to still greater effort.

H. M. GOODWIN.

The Registrar. The total registration decreased last year from 2,831 to 2,606, a drop of 225 or 8 per cent. The number of undergraduate students (2,106) was the smallest since 1918, while there was only a slight decline in the number attending the Graduate School.

The decline in the number of new students each year has been different in the several groups from which new students are drawn. Two of the minor groups of new students are former M. I. T. students who return for further study and new special students. Table I, which includes both undergraduates and graduates, shows that, although these groups have decreased, the numbers are not much lower than existed in the preceding decline from 1924 to 1926.

TABLE I
Former Students Returning and New Special Students

1924-1933

Year	Former Students Returning	New Special Students
1924-25	125	12
1925-26	137	57
1926-27	138	52
1927-28	147	65
1928-29	132	87
1929-30	152	70
1930-31	165	76
1931-32	231	87
1932-33	126	58
1933-34	120	44

The changes in the number of new undergraduate students are shown in Table II. The students from secondary schools are about one-third less than in 1930 and the number of students entering from other colleges is about one-half. The total number of new students was the smallest for over ten years.

TABLE II
New Students Entering the Undergraduate School

1924-1933

Year	New Students from Second. Schools	Col. Transfers Entering Undergrad. Yrs.	Total New Undergrad. Students	Total Undergrad. Registration
1924-25	440	328	768	2,652
1925-26	405	248	653	2,465
1926-27	381	222	603	2,309
1927-28	465	250	715	2,338
1928-29	483	297	780	2,456
1929-30	549	280	829	2,621
1930-31	609	230	839	2,670
1931-32	526	208	734	2,610
1932-33	491	146	637	2,308
1933-34	428	132	560	2,106

The number of new students entering the graduate year is given in Table III. The number of our own S.B. graduates of June returning for graduate work the following September has remained practically constant, while the smaller group

returning a year or more later has been declining. The group entering from other colleges has been smaller the last two years.

TABLE III
New Students Entering the Graduate School
1924-1933

Year	M.I.T. S.B. Returning following Sept. for Grad. Study	M.I.T. S.B. Returning a Year or More Later for Grad. Study†	College Transfers Entering Grad. Year	Total New Graduate Students	Total Graduates
1924-25	*	*	136	*	286
1925-26	*	*	110	*	348
1926-27	*	*	160	*	362
1927-28	*	*	131	*	374
1928-29	52	12	120	184	412
1929-30	87	10	154	251	445
1930-31	89	23	191	313	539
1931-32	107	26	187	320	578
1932-33	89	22	143	254	523
1933-34	92	16	134	242	500

* Data not available for these years.

† These students are included in Table I.

The statistics for the year 1933-34 follow:

All statistics on registration are as of November 1, 1933

All statistics on degrees are through June, 1934

TABLE 1
THE CORPS OF INSTRUCTORS

	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	'31	'32	'33
Faculty Members of the Staff	170	174	175	174	179	185	199	215	220	240	253	242	235
Professors	56	56	61	64	63	68	73	82	81	86	98	93	88
Associate Professors	35	40	43	42	49	55	58	61	59	63	68	60	57
Assistant Professors	54	48	46	51	53	51	58	64	71	80	79	81	80
Ex-Officio	—	—	—	—	—	—	—	2	2	4	3	3	5
Instructors	25	30	25	17	14	11	10	8	7	7	5	5	5
Other Members of the Staff	224	217	200	220	236	264	268	272	295	323	335	283	263
Instructors	84	80	92	98	112	116	115	119	116	123	133	105	90
Teaching Fellows	—	—	—	—	—	—	—	—	—	—	—	21	22
Assistants	93	87	60	59	53	63	55	53	68	70	96	45	43
Technical Assistants	—	—	—	—	—	—	—	—	—	—	—	28	31
Lecturers	15	15	6	16	21	23	30	29	32	32	34	28	25
Research Associates	19	19	25	26	21	24	29	22	21	31	31	32	25
Research Assistants	13	16	17	21	29	38	39	49	58	65	36	20	21
Research Fellows (D.I.C.)	—	—	—	—	—	—	—	—	—	2	5	3	3
Research Fellows	—	—	—	—	—	—	—	—	—	—	—	—	3
Special Investigator	—	—	—	—	—	—	—	—	—	—	—	1	—
Total	394	391	375	394	415	449	467	487	515	563	588	525	498
Other Members of the Faculty	14	16	16	15	17	14	13	11	14	15	15	17	25
Professors: Emeriti	5	8	8	7	7	6	6	4	4	6	7	13	21
Retired	7	6	5	5	7	5	4	3	4	3	3	—	—
Non-Resident	2	2	3	3	3	3	3	4	6	6	5	4	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	1933-34	2,606

TABLE 3
CLASSIFICATION OF STUDENTS BY COURSES AND YEARS

Course Name and Number	1931-32							1932-33							1933-34						
	YEAR							YEAR							YEAR						
	1	2	3	4	G	Total	1	2	3	4	G	Total	1	2	3	4	G	Total			
Aeronautical Engineering XVI	82	26	12	32	25	193	87	22	26	28	30	193	56	25	24	10	27	162			
Architectural Engineering IV-A	7	15	12	18	1	53	5	5	13	9	34	31	5	6	8	12	31	62			
Architecture IV, IV-B	29	45	36	42	13	*165	18	25	31	38	13	*125	16	20	24	27	18	*105			
Army Ordnance	—	—	—	10	—	10	—	—	11	—	—	11	—	—	—	—	—	9			
Biology and Public Health VII	11	21	18	23	27	100	11	19	20	21	23	94	10	20	17	19	26	92			
Building Engineering and Construction XVII	14	17	15	20	1	67	8	12	15	9	1	45	9	11	9	13	1	43			
Business and Engineering Administration XV	102	98	84	71	23	378	88	107	91	62	23	371	58	86	83	17	343				
Chemical Engineering X	92	85	62	48	61	348	68	61	61	43	40	273	83	66	56	51	37	293			
Chemical Engineering Practice X-A, X-B	—	—	—	7	47	54	—	—	—	3	39	42	—	—	—	3	27	30			
Chemistry V	24	21	22	16	75	158	23	22	17	19	65	146	22	20	21	17	65	145			
Civil Engineering I	37	38	40	42	53	210	35	23	33	44	35	170	32	23	22	38	25	140			
Electrical Engineering VI, VI-C	48	40	69	67	55	279	47	40	61	66	70	284	43	36	51	60	56	246			
Electrical Engineering (Cooperative) VI-A	64	61	30	31	37	223	37	41	28	28	25	159	39	34	24	26	26	149			
Electrochemical Engineering XIV	13	13	11	4	4	45	10	14	8	7	3	42	8	7	11	8	1	35			
Fuel and Gas Engineering	—	—	—	9	—	9	—	—	—	—	—	—	—	—	—	—	—	—			
General Engineering IX-B	1	3	11	28	—	43	4	5	7	16	—	32	2	12	10	11	—	35			
General Science IX-A	2	2	4	4	—	4	1	4	4	5	—	10	1	1	3	8	—	12			
Geology XII	4	2	3	4	12	20	2	3	3	4	11	20	3	3	2	2	14	21			
Mathematics XVIII	4	7	3	7	11	32	3	3	6	12	3	31	3	5	3	8	9	28			
Mechanical Engineering II	57	72	99	68	48	344	62	57	57	91	48	315	59	51	53	55	52	270			
Metalurgy III, 4	6	20	15	13	16	70	2	8	20	11	17	58	9	3	9	21	21	63			
Mining Engineering III, 2	9	10	18	9	18	44	5	5	10	7	5	36	5	5	8	10	7	35			
Mining Engineering (Ceramics)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2			
Naval Architecture and Marine Engineering XIII	14	23	13	12	2	64	17	13	19	10	4	63	13	18	14	19	2	66			
Naval Construction XIII-A	—	—	—	13	7	20	—	—	10	11	13	34	—	—	5	10	11	26			
Physics VIII	10	36	21	23	35	125	23	23	38	15	39	138	10	22	25	32	52	141			
Railroad Operation I-A	2	2	4	6	14	34	2	3	5	2	3	11	2	2	2	5	2	2			
Sanitary Engineering XI	1	3	3	5	2	12	2	1	3	3	2	11	2	2	2	5	2	13			
Ship Operation XIII-C	2	1	3	6	—	25	3	7	13	7	—	30	—	5	7	12	—	24			
Unclassified	—	—	—	—	—	54	1	9	11	4	—	25	—	—	7	6	—	15			
*Architecture (IV) Fifth Year	—	—	—	—	—	25	—	—	—	—	—	34	—	—	—	—	—	30			
Totals	628	672	608	623	578	3,188	562	526	606	680	523	2,831	485	487	513	591	500	2,606			

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 3 Cer.	—	—	—	—	4	4	I
II Mechanical Engineering		—	—	1	—	4	5	II
III Mining Engineering and Metallurgy		—	—	—	—	1	1	III ₁
Ceramics	—	—	—	—	1	1	III ₂	
IV Architecture	1	1	2	4	5	2	*14	IV
IV-A Architectural Engineering		—	—	—	—	—	1	IV-A
V Chemistry	1	2	—	1	2	2	7	V
VI Electrical Engineering		—	—	1	1	1	3	VI
VII Biology and Public Health		—	3	1	—	—	2	VII
VIII Physics		—	—	—	—	—	2	VIII
X Chemical Engineering		—	—	—	—	5	5	X
XII Geology		—	—	1	—	—	1	XII
XIII Naval Architecture and Marine Eng.		—	—	—	3	1	4	XIII
XV Business and Eng. Administration		—	—	—	3	2	5	XV
XVI Aeronautical Engineering		—	—	—	2	2	4	XVI
Army Ordnance		—	—	—	9	—	9	A.O.
Unclassified	—	1	—	—	—	1	Unc.	
*Architecture IV (Fifth Year)	—	—	—	—	—	6	IV (5th Yr.)	
Total		3	6	9	26	30	80	

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	1 2 3 4	—	1	1	2	7	11	I
II Mechanical Engineering		1	—	1	4	1	7	II
III Mining Engineering and Metallurgy		1	—	—	—	1	1	III ₁
Ceramics		—	—	—	—	2	2	III ₂
IV Architecture	1	—	1	2	—	—	1	III ₄
IV-A Architectural Engineering		—	—	—	4	—	7	IV
V Chemistry	1 2	2	2	1	1	5	10	V
VI Electrical Engineering		1	2	1	1	2	12	VI
VI-A Cooperative		—	—	—	—	—	—	VI-A
VII Biology and Public Health		—	—	—	1	2	3	VII
VIII Physics		—	—	—	1	2	3	VIII
IX-A General Science		—	—	—	2	—	2	IX-A
IX-B General Engineering		—	—	1	—	—	1	IX-B
X Chemical Engineering		—	2	—	3	1	1	X
XI Sanitary Engineering		—	—	—	—	—	2	XI
XII Geology		—	—	1	—	—	1	XII
XIII Naval Architecture & Marine Eng.	—	—	—	1	—	1	XIII	
XIV Electrochemical Engineering	—	—	—	—	1	2	XIV	
XV Business and Eng. Administration	—	1	3	3	2	5	14	XV
XVI Aeronautical Engineering	—	3	1	1	—	2	7	XVI
XVII Building Eng. and Construction	—	—	2	1	—	—	3	XVII
XVIII Mathematics	—	—	—	2	1	—	1	XVIII
Unclassified	—	—	—	—	—	3	3	Unc.
Total		11	13	22	20	43	109	

Excluding 11 Special Students.

TABLE 5
CLASSIFICATION OF STUDENTS BY COURSES SINCE 1926

	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
<i>Engineering Courses</i>	2,253	2,240	2,305	2,405	2,564	2,495	2,197	2,008
<i>Total</i>								
Aeronautical Engineering XVI	72	170	224	278	233	193	193	162
Architectural Engineering IV-A	110	84	84	73	72	53	34	31
Building Engineering and Construction XVII		66	90	102	82	67	45	43
Business and Engineering Administration XV	334	307	303	289	347	378	371	333
Chemical Engineering X, X-A, X-B	286	300	318	384	404	402	315	323
Civil Engineering I, I-A, VI-A, VI-C	273	233	260	240	236	224	175	342
Electrical Engineering VI, VI-A, VI-C	622	554	513	484	523	502	443	385
Electrochemical Engineering XIV	50	55	50	47	37	45	42	35
Fuel and Gas Engineering	8	14	13	7	11	9		
General Engineering IX-B	44	32	30	37	46	43	32	35
Mechanical Engineering II	329	297	283	303	369	344	315	270
Military Engineering	1							
Mining Engineering and Metallurgy III	57	51	51	67	105	114	94	100
Naval Architecture and Marine Eng. XIII, XIII-C	35	39	55	56	71	89	83	90
Naval Construction XII-A	15	15	12	14	15	20	34	26
Sanitary Engineering XI	17	17	19	14	13	12	11	13
<i>Total</i>	227	248	291	341	378	439	439	439
<i>Science Courses</i>								
Biology and Public Health VII		51	68	93	99	100	94	92
Chemistry V	36	108	123	118	146	158	146	145
General Science IX-A	6	10	11	13	17	4	10	12
Geology XII	15	14	26	24	17	20	20	21
Mathematics XVIII	17	18	19	24	26	31	31	28
Physics VIII	31	47	44	69	78	125	138	141
<i>Total</i>	150	189	218	228	200	190	159	135
<i>Architecture IV, IV-B</i>								
Army Ordnance	8	10	9	11	11	10	11	9
Unclassified	33	25	45	81	50	54	25	15
<i>Total</i>	41	35	54	92	61	64	36	24
<i>Grand Total</i>	2,671	2,712	2,868	3,066	3,209	3,188	2,831	2,606

TABLE 6
GEOGRAPHICAL CLASSIFICATION OF STUDENTS SINCE 1929

UNITED STATES	1929	1930	1931	1932	1933
<i>North Atlantic</i> Total	2,241	2,361	2,375	2,178	2,050
Connecticut	89	76	81	72	69
Maine	45	41	54	45	38
Massachusetts	1,640	1,612	1,558	1,373	1,264
New Hampshire	36	32	39	41	37
New Jersey	105	109	113	118	122
New York	285	322	345	347	337
Pennsylvania	100	107	114	111	119
Rhode Island	25	43	54	55	49
Vermont	16	19	17	16	15
<i>South Atlantic</i> Total	146	156	143	130	94
Dela are	8	15	12	8	4
District of Columbia	51	46	43	53	35
Florida	10	11	10	6	3
Georgia	6	5	4	2	1
Maryland	22	19	22	19	14
North Carolina	11	13	10	8	7
South Carolina	9	5	4	3	3
Virginia	23	33	27	27	24
West Virginia	6	9	11	4	3
<i>South Central</i> Total	85	86	81	52	45
Alabama	8	6	11	7	4
Arkansas	4	6	3	2	2
Kentucky	15	13	12	10	7
Louisiana	12	10	10	8	7
Mississippi	4	5	4	4	2
Tennessee	9	11	11	5	8
Texas	33	35	30	16	15
<i>North Central</i> Total	290	302	286	250	226
Illinois	86	83	64	58	54
Indiana	15	17	16	13	10
Iowa	10	8	11	7	6
Kansas	9	15	11	11	7
Michigan	35	43	27	28	19
Minnesota	13	20	20	14	18
Missouri	42	36	37	37	34
Nebraska	8	7	8	7	5
Nebraska	4	3	6	2	4
North Dakota	—	—	—	—	—
Ohio	53	58	66	58	55
Ohio	—	—	—	2	—
South Dakota	—	—	—	—	—
Wisconsin	15	12	20	13	14
<i>Western</i> Total	98	103	109	78	74
Arizona	5	3	4	1	2
California	27	30	39	31	24
Colorado	15	22	13	11	11
Idaho	2	2	3	2	2
Montana	9	8	6	4	3
Nevada	—	—	—	—	—
New Mexico	3	2	1	—	4
Oklahoma	5	8	7	7	7
Oregon	8	5	9	4	6
Utah	4	3	1	4	4
Washington	18	18	19	13	11
Wyoming	2	2	1	1	—
<i>Territories and Dependencies</i> . Total	19	20	12	8	8
Alaska	1	1	1	1	—
Canal Zone	—	—	1	1	1
Hawaii	4	4	5	4	4
Philippine Islands	7	6	3	—	1
Porto Rico	6	8	2	2	2
Virgin Islands	1	1	—	—	—
Total for United States	2,879	3,028	3,006	2,696	2,497

TABLE 6 (Continued)

FOREIGN COUNTRIES	1929	1930	1931	1932	1933
Total	187	181	182	135	109
Africa	1	—	—	—	—
Argentina	—	—	1	1	1
Australia	3	1	2	2	1
Austria	1	1	1	1	1
Bahamas	—	1	—	—	—
Belgium	3	1	2	3	1
Bermuda	1	—	—	—	1
Brazil	—	2	—	—	—
British West Indies	—	1	2	1	1
Canada	29	32	34	26	31
Chile	1	1	1	1	1
China	29	24	17	16	12
Colombia	6	6	6	5	5
Costa Rica	2	2	1	—	—
Cuba	6	10	14	9	8
Czechoslovakia	—	—	1	—	—
Denmark	1	1	1	1	—
Dominican Republic	1	1	—	—	—
Dutch East Indies	—	—	—	1	—
Ecuador	1	1	2	1	—
Egypt	3	2	1	—	—
England	5	7	3	1	3
Estonia	1	1	—	—	—
France	4	5	4	4	2
Germany	8	7	5	2	2
Greece	1	1	—	—	—
Guatemala	—	1	—	—	—
Haiti	1	—	—	—	—
Hungary	—	—	—	1	—
Iceland	1	—	—	—	—
India	11	12	6	6	3
Irak	1	—	2	3	1
Ireland	—	1	1	1	1
Italy	1	2	—	—	—
Japan	5	6	5	4	3
Java	—	—	—	—	1
Korea	1	—	—	—	—
Lithuania	3	1	2	—	—
Manchukuo	—	—	—	—	2
Mexico	14	13	13	6	5
Netherlands	1	—	—	—	—
Norway	2	2	2	2	3
Palestine	4	3	4	3	1
Panama	8	7	3	3	1
Peru	1	1	3	2	—
Poland	—	—	1	—	1
Salvador	1	2	2	1	1
Scotland	1	—	—	—	—
Siam	5	4	3	1	1
South Africa, Union of	4	3	4	4	2
Spain	5	6	2	—	1
Straits Settlements	1	—	—	—	—
Sweden	1	2	2	—	2
Switzerland	1	1	1	—	1
Syria	—	2	—	2	—
Turkey	2	1	—	—	—
Union Socialistic Soviet Republic	2	—	25	20	8
Venezuela	3	2	2	—	1
Grand Total, United States and Foreign	3,066	3,209	3,188	2,831	2,606

TABLE 7
WOMEN STUDENTS CLASSIFIED BY COURSES AND YEARS

COURSE	YEAR					Total
	1	2	3	4	G	
Aeronautical Engineering XVI	1	—	—	—	1	2
Architectural Engineering IV-A	—	2	—	—	—	2
Architecture IV	—	3	1	1	—	*5
Biology and Public Health VII	—	2	—	1	6	9
Business and Engineering Administration XV	2	—	—	—	—	2
Chemical Engineering X	—	—	—	—	1	1
Chemistry V	2	1	2	—	5	10
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	—	2	3
*Architecture IV (Fifth Year)	—	—	—	—	—	3
Total	5	8	6	3	17	42

TABLE 8
OLD AND NEW STUDENTS

Year	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
Students registered at end of last academic year (including specials)	1,749	1,861	1,938	1,949	1,866	1,748
Students who have previously attended the Institute, but were not registered at end of last academic year	132	152	165	231	126	120
New students who entered by examination	483	549	609	526	403	241
New students who entered without examination	—	—	—	—	89	187
New students who entered from other colleges as candidates for degrees	417	434	421	395	289	266
New students (specials, not candidates for degrees)	87	70	76	87	58	44
Total	2,868	3,066	3,209	3,188	2,831	2,606

TABLE 8-A
NEW STUDENTS ADMITTED BY EXAMINATION

Status of Admission	Year of Entrance				
	1929	1930	1931	1932	1933
Clear	319	419	373	288	164
1 Condition	134	110	81	72	47
2 Conditions	60	57	48	31	24
3 Conditions	25	21	16	7	6
More than 3 Conditions	11	2	8	5	—
Total	549	609	526	403	241

TABLE 9

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

<i>College</i>		<i>College</i>		<i>College</i>	
A. & M. College of Texas	1	Middlebury College	3	University of Idaho	1
Alabama Polytechnic Inst.	3	Mount Holyoke College	2	University of Illinois	2
Amherst College	5	Municipal Univ. of Akron	1	University of Maine	1
Bates College	3	New York University	6	University of Maryland	1
Boston College	1	North Dakota Agric. Col.	1	University of Michigan	5
Boston University	4	Northeastern University	2	University of Minnesota	2
Bowdoin College	3	Oberlin College	1	University of Missouri	2
Brigham Young Univ.	1	Ohio State University	3	University of Montana	2
Brown University	2	Ohio Wesleyan Univ.	1	University of Nebraska	1
Bryn-Mawr College	2	Oregon State Agric. Col.	2	Univ. of New Hampshire	5
Bucknell University	1	Poly. Inst. of Brooklyn	1	Univ. of North Carolina	2
California Inst. of Tech.	2	Pomona College	4	Univ. of North Dakota	1
Carleton College	2	Princeton University	5	University of Notre Dame	2
Carnegie Inst. of Tech.	3	Purdue University	1	University of Oklahoma	2
Case School of App. Sci.	2	Radcliffe College	1	University of Oregon	2
Catholic Univ. of America	1	Randolph-Macon College	2	Univ. of Pennsylvania	3
Colby College	1	Rensselaer Poly. Inst.	3	University of Redlands	1
Colgate University	1	Rhode Island State Col.	2	University of Richmond	2
College of Puget Sound	1	Rice Institute	3	University of Rochester	1
College of City of Detroit	1	St. Louis University	1	University of the South	1
College of Wooster	2	St. Olaf College	2	University of Texas	3
Colorado College	2	Simmons College	1	University of Utah	2
Columbia University	3	Smith College	1	University of Virginia	5
Cornell University	4	Stanford University	6	Univ. of Washington	7
Dartmouth College	12	State Col. of Wash.	1	University of Wisconsin	2
Davidson College	2	Stevens Inst. of Tech.	1	Vanderbilt University	1
De Pauw University	1	Swarthmore College	3	Virginia Military Inst.	2
Drexel Institute	3	Temple University	1	Virginia Poly. Inst.	2
Georgia School of Tech.	2	Trinity College		Wake Forest College	1
Hamilton College (N.Y.)	1	(Hartford, Conn.)	2	Washington and Lee Univ.	1
Hamden-Sidney College	1	Tri-State College	1	Wellesley College	2
Harvard University	16	Tufts College	10	Wesleyan University	1
Holy Cross College	1	Tulane University	2	Westminster College (Mo.)	1
Hunter College	1	Union College	1	Willamette University	1
Iowa State Col. of A. & M. A.	1	U. S. Military Academy	13	Williams College	3
Johns Hopkins Univ.	3	U. S. Naval Academy	30	Worcester Poly. Inst.	2
Kenyon College	2	University of Akron	1	Yale University	13
Lafayette College	2	University of Alabama	1	Total	565
Lehigh University	6	University of Arizona	1	Number of American Col- leges Represented	126
Lincoln Memorial Univ.	1	University of California	2	Number of Foreign Col- leges Represented (Not listed)	32
Louisiana State Univ.	1	University of Chicago	1	Total	158
Loyola University	3	University of Cincinnati	1		
Mass. State College	2	University of Dayton	2		
Mass. Inst. of Tech.	229	University of Denver	1		
Mich. St. Col. of Ag. & Ap. Sci.	1	University of Florida	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	28	11	2	1	42
Second year	9	26	3	9	47
Third year	—	7	10	18	35
Fourth year	—	—	—	8	8
Graduate year	—	—	5	129	134
Total	37	44	20	165	266

TABLE 11
REGULAR STUDENTS FROM COLLEGES CLASSIFIED BY COURSES

COURSE	No Previous Degree			Graduates of Other Colleges						S. B. Degree June 1933		Graduates of M. I. T. Taking Graduate Work	
	Entered			Sept. 1933			Previous Years			Total	Other Graduates	Total	
	Sept. 1933	Pre-vious Years	Total	Under-grad.	Grad.	Total	Under-grad.	Grad.	Total				
										Under-grad.	Grad.	Under-grad.	Grad.
Aeronautical Engineering XVI	3	13	16	1	7	12	1	1	2	4	6		
Architectural Engineering IV-A	1	2	3	4	8	1	6	1	7	—	7		
Architecture IV, IV-B	4	17	21	—	7	1	1	5	3	9	12		
Biology and Public Health VII	4	6	10	4	7	1	1	1	3	1	1		
Building Engineering and Construction XVII	—	4	4	3	4	3	5	3	2	6	8		
Business and Eng. Administration XV	15	37	52	1	16	1	1	14	7	—	7		
Chemical Engineering X	—	22	37	—	—	—	—	—	5	—	5		
Chemical Engineering Practice X-A	—	1	1	—	—	—	—	—	8	—	8		
Chemical Engineering Practice X-B	—	1	1	—	—	—	—	—	23	—	23		
Chemistry V	3	1	4	5	13	2	11	3	2	19	27		
Civil Engineering I, I-A	10	13	23	5	11	2	18	10	2	12	19		
Electrical Engineering VI, VI-A, VI-C	13	34	47	5	18	2	21	20	31	43	92		
Electrochemical Engineering XIV	—	—	—	—	—	—	—	—	—	—	—		
General Engineering IX-B	—	8	8	—	—	—	—	—	—	—	—		
General Science IX-A	—	2	2	—	—	—	—	—	—	—	—		
Geology XII	—	2	2	—	—	—	—	—	—	—	—		
Mathematics XVIII	2	1	3	—	—	—	—	—	1	—	1		
Mechanical Engineering II	16	25	41	2	18	2	21	10	4	25	56		
Mining Engineering and Metallurgy III	3	8	11	2	6	1	8	3	9	11	20		
Naval Architecture XIII, XIII-C	—	9	9	2	—	—	—	—	6	7	13		
Naval Construction XIII-A	—	—	—	5	—	—	—	—	1	—	1		
Physics VIII	—	9	9	—	—	—	—	—	—	—	—		
Sanitary Engineering XI	3	1	4	—	—	—	—	—	4	—	4		
Unclassified	8	1	9	1	1	—	—	—	—	—	—		
Total	103	216	319	29	134	44	149	356	92	95	187		

TABLE 12
NUMBER OF DEGREES AWARDED IN DECEMBER, 1933 AND JUNE, 1934

Name of Course	S.B.		B.Arch.		S.M.		M.Arch.		Ph.D.		Sc.D.		Totals	
	Dec. '33	June '34	Dec. '33	June '34	Dec. '33	June '34	Dec. '33	June '34	Dec. '33	June '34	Dec. '33	June '34	Dec. '33	June '34
Aeronautical Engineering	4	24	—	—	4	6	—	—	—	—	—	—	8	30
Architectural Engineering	—	8	—	—	—	—	—	—	—	—	—	—	—	8
Architecture	—	—	2	21	—	—	—	—	—	—	—	—	—	—
Biology and Public Health	1	8	—	—	—	3	—	—	1	—	—	—	2	21
Building Engineering and Construction	4	12	—	—	3	4	—	—	—	—	—	—	2	12
Business and Engineering Administration	4	76	—	—	4	4	—	—	—	—	—	—	7	80
Chemical Engineering	1	42	—	—	4	13	—	—	—	—	—	—	7	58
Chemical Engineering Practice	—	6	—	—	—	15	—	—	—	—	—	—	7	21
Chemistry	—	14	—	—	3	8	—	—	7	8	—	—	11	30
Civil Engineering	9	30	—	—	3	6	—	—	—	—	—	—	9	36
Electrical Engineering (Inc. VI-A)	15	75	—	—	13	41	—	—	—	—	—	—	29	117
Electrochemical Engineering	1	7	—	—	—	—	—	—	—	—	—	—	1	7
General Engineering	2	7	—	—	—	—	—	—	—	—	—	—	2	7
General Science	—	9	—	—	—	—	—	—	—	—	—	—	—	9
Geology	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Biology	—	6	—	—	—	3	—	—	—	—	—	—	—	6
Mathematics	1	8	—	—	—	1	—	—	—	—	—	—	—	8
Mechanical Engineering	6	44	—	—	4	12	—	—	—	—	—	—	10	59
Metallurgy	—	17	—	—	1	4	—	—	—	—	—	—	2	23
Meteorology	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Military Engineering	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mining Engineering	—	7	—	—	—	2	—	—	—	—	—	—	—	7
Naval Architecture and Marine Engineering	1	14	—	—	1	2	—	—	—	—	—	—	1	14
Naval Construction	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Physics	1	28	—	—	1	3	—	—	1	—	—	—	2	32
Public Health Engineering	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Railroad Operation	—	2	—	—	—	2	—	—	—	—	—	—	—	2
Sanitary Engineering	—	5	—	—	1	—	—	—	—	—	—	—	1	5
Ship Operation	—	11	—	—	—	—	—	—	—	—	—	—	—	11
Without Course Classification	—	—	—	—	6	14	—	—	—	—	—	—	6	14
Totals	46	460	2	21	41	152	—	—	8	15	7	11	104	659

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	Bldg. Eng. & Constr.	Business and Eng. Admn.	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									14	
1869										2													5	
1870										1				1									10	2
1871										4													17	
1872										2													12	
1873			1							3													26	
1874			1							10													18	
1875			1							10													28	
1876			1		2					12				4									43	
1877			4							12													32	
1878			3							6													19	
1879			1		1					6												1	23	
1880										3													8	25
1881			3							8				2									28	
1882			3		1					3				1									24	
1883			3							2													19	
1884										4													36	
1885			2							4				1									28	
1886			1		1					7				1									59	
1887			1		1					9				1								1	58	
1888			5		3					10													77	
1889			3		1					8													75	
1890			5		3					11													103	50
1891			6		3					25													103	
1892			2		2					17													133	
1893			13		2					22													129	
1894			14		1					41													188	
1895			15		2					21													146	
1896			24		3					17													191	
1897			16		3					26													179	
1898			29		3					35													199	
1899			22		2					30													176	
1900			21		3					32													185	1.57
1901			21		3					37													200	
1902			18		5					14													192	
1903			15		3					13													190	
1904			24		3					34													232	
1905			12		3					23													244	
1906			22		2					13													278	
1907			21		2					10													230	
1908			19		4					15													208	
1909			18		5					13													232	
1910			18		3					18													251	2.25
1911			10		1					19													232	
1912			21		4					31													261	
1913			26		2					30													269	
1914			19		6					37													304	
1915			30		3					23													289	
1916			37		5					32													321	
1917			27		10					43													345	
1918			28		7					40													324	
1919			16		9					28													299	
1920			19		2					44													319	2.96
1921			11		3					63													565	
1922			32		8					92													637	
1923			13		6					15													608	
1924			6		15					82													557	
1925			6		18					57													564	
1926			9		24					53													561	
1927			2		15					13													514	
1928			8		19					39													471	
1929			25		26					73													483	
1930			29		15					38													459	5.40
1931			39		10					59													495	
1932			27		16					32													505	
1933			27		9					45													467	
1934			24		8					76													437	
Total	185	151	865	230	86	1,284	1,314	125	725	2,166	2,516	269	306	162	60	41	2,711	5	814	412	194	253	14,874	--

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

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

‡Prior to 1923 degrees were awarded in Architecture.

§Includes only June degrees awarded in Class 1934.

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	Metalurgy	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
1888																											1
1889																											1
1890																											1
1891																											1
1892																											1
1893																											1
1894																											1
1895																											1
1896																											1
1897																											1
1898																											1
1899																											1
1900																											1
1901																											1
1902																											1
1903																											1
1904																											1
1905																											1
1906																											1
1907																											1
1908																											1
1909																											1
1910																											1
1911																											1
1912																											1
1913																											1
1914																											1
1915																											1
1916																											1
1917																											1
1918																											1
1919																											1
1920																											1
1921																											1
1922																											1
1923																											1
1924																											1
1925																											1
1926																											1
1927																											1
1928																											1
1929																											1
1930																											1
1931																											1
1932																											1
1933																											1
*1934																											1
Total	101	14	84	25	27	150	353	95	132	712	26	26	1	34	23	187	10	9	23	9	222	5	38	14	15	407	2,760

* 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	24	7
*1934	21	—
Total	56	84

TABLE 16
DEGREES OF DOCTOR OF PHILOSOPHY AWARDED

Year	Biology	Chemistry	Geology	Mathe- matics	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.	2	10	3	3	—	18
*1934.	2	8	2	2	1	15
Total.	16	124	23	13	11	187

*Includes only June degrees. •

TABLE 17
DEGREES OF DOCTOR OF SCIENCE AWARDED

Year	Aero. Eng.	Chem. Eng.	Chemistry	Civil Eng.	Elec. Eng.	Electrochem. Eng.	Geology	Mathematics	Mech. Eng.	Metalurgy	Meteorology	Min. Eng.	Naval Arch.	Physics	Total
1911	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
1912	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1915	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
1916	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1917	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
1918	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1919	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1920	1	—	—	—	—	—	1	—	—	—	—	1	—	—	3
1921	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1922	1	—	1	—	1	—	—	—	—	—	—	—	—	—	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	—	10	1	2	3	—	—	1	—	6	—	1	—	—	24
*1934	—	3	—	—	1	—	1	—	3	2	1	—	—	—	11
Total	6	44	5	5	24	1	5	3	9	24	1	2	1	7	137

* 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 (1868-1934)

Bachelor of Science	14,874
Bachelor in Architecture	56
Master of Science	2,760
Master in Architecture	84
Doctor of Philosophy	187
Doctor of Science	137
Doctor of Public Health	4
Doctor of Engineering (Discontinued after 1918)	4
Grand Total	18,106

J. C. MACKINNON.

Summer Session. The registration for the Summer Session of 1934 was 926, a decrease of 129, or 12 per cent, from last summer. The decline was slightly larger than was anticipated.

The program last summer was practically the same as that for 1933, which consisted of only the regular subjects and one special course in Spectroscopy.

The attendance in the Summer Session is more dependent upon economic conditions than that of the academic year. The decrease in the registration in the regular academic year since the peak in 1930 has been 22 per cent, while the decline in the Summer Session registration in the same period of time has been 44 per cent. Although the Summer Session registration was probably at or near a minimum last year, it does not seem advisable to resume the other activities which are supplementary to the regularly scheduled courses until conditions are more favorable.

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

The Librarian. The home use of the Institute Library showed a net increase of 21 per cent during the past year. At the Central Library a slight falling off in the circulation of books was more than offset by a 40 per cent increase in the circulation of periodicals; and a falling off in the use of certain branch libraries was overcome by an increase in the use of others. Of the 8,212 volumes added to the Library, about one-half went to the Central Library and one-half to the branches. The total contents of the Institute Library at the close of the year was approximately 296,000 volumes.

To help meet the financial situation the Central Library was closed daily at 7.30 p.m. instead of 10, furloughs of one or two weeks were taken by the Library staff, and, through the efforts of the Library Committee, the periodical subscription and binding lists were reduced by \$1,169.

Throughout the year Institute departments were weeding out old material from their branch libraries and asking for the transfer of periodical files from the Central Library to the branches. These renovations constituted a needed step towards the greater effectiveness of the branch libraries.

The Library issued a printed list of popular books on science and engineering, which was distributed to the high school pupils who visited the Institute during the year.

In the Vail Library there was a slight increase in faculty as compared with student demand and in requests for help in the preparation of material for publication.

At the Eastman Library there was an average daily attendance of 129, with a total for the year of over 30,000. On April 24 the Special Libraries Association, Boston chapter, held its regular monthly meeting in Eastman lecture hall.

The Lindgren Library, serving the departments of Geology and of Mining and Metallurgy, was successfully launched, with gratifying results. There was an attendance for the year of over 9,000 and a circulation of 7,696 volumes. Committees chosen by the two departments met and adopted rules for the conduct of this branch and at the suggestion of Professor Hutchinson it was named the Lindgren Library, in honor of Dr. Waldemar Lindgren, a former Head of both Departments.

In the Civil Engineering-Economics library there was increasing demand from faculty members for bibliographical assistance. The branch librarian accompanied the Course XV students on the Thorne-Loomis European trip of 1934.

At Walker Memorial Library, where service was not curtailed, circulation increased slightly. A part-time cataloger was added to the staff and service was greatly speeded up and improved.

Much time was given to the assembling and cataloging of the Crafts Library for the use of residents of the new Graduate House.

An exhibit of early scientific books was shown in December for the benefit of visitors to the meeting of the American Association for the Advancement of Science, and rare books of more general character at the time of Open House. Other exhibits, of fine printing, bookplates, and aeronautical caricatures, were arranged during the year.

A notable accession to the Library's resources was the loan by Mrs. Ingalls Kimball, widow of the late Bertram Goodhue, of Mr. Goodhue's valuable architectural collection, amounting to over one thousand volumes.

A noteworthy gift was received from Edward W. Atkinson,

'84, who presented 393 volumes on economic subjects from the library of his father, Edward Atkinson. The annual gift of the publications of certain English engineering societies was received from the Earl of Camperdown whose death occurred during the year.

It will be evident to anyone who has followed the history of the Institute Library since 1916 that the plan of that time for a completely centralized library has been yielding to the demand for local, specialized collections. Looking back now, it seems clear that the selection of the fifth floor rotunda for the main Library prevented the carrying out of any plan for centralization of collections. Fortunately the tendency to break up into a large number of small department libraries was halted in 1931, so that we now seem headed towards the middle ground of a system of well-supervised group libraries under centralized administration. Whether this process should be allowed to continue until the Central Library becomes simply an administrative headquarters deserves serious thought.

But this is only one of the many problems that the Library must face in the near future. Equally important is careful study of the adequacy of the Library's various collections, with a plan for strengthening the weak places; and with it should come inquiry into the need of an endowment for the purchase of books and periodicals beyond what can be obtained from the annual appropriation. This will naturally revive discussion of the need of a new, well-planned Library building worthy of the Institute. The possible development of a high grade of research assistance to the Instructing Staff similar to that already sponsored by the Carnegie Corporation at some universities might well have early consideration; but along with such a development should come fuller understanding of and more adequate provision for the cataloging, stack care and circulation activities of the Library—those routine branches of the work so often lightly dismissed as "technical" but without whose skilful and accurate functioning the more conspicuous work of satisfying the research worker's needs would be hopelessly handicapped.

Under present economic conditions such problems can be attacked only piecemeal; but when better times return it would

seem the part of wisdom to have the whole condition of the Institute Library thoroughly surveyed and a comprehensive plan worked out for its future development. Such a survey might well be made under the general oversight of the Library Committee, which body could competently interpret the educational and research needs of the Institute. It should, however, have also the benefit of direction by a trained investigator from outside, thoroughly acquainted with the aims, achievements and problems of university libraries, scientific and technical libraries, and other great reference collections. The studies already made by men like Dr. Works, Dr. Randall, Dr. Raney, and Mr. Charles H. Brown, and the faculty survey at Dartmouth, have set high standards for such an undertaking. The Librarian urges it for consideration in the near future.

W. N. SEAVER.

Medical Director. The Department of Hygiene has just rounded out its fourteenth year. Each year has seen new development and enlargements. Since the completion of the Homberg Memorial Infirmary six years ago, the Department has increased materially, despite the fact that the student enrolment has been somewhat less.

During the year 1933-34, the number of calls made was 22,674 — subdivided as follows:

<i>Outpatient</i>		<i>Homberg Infirmary</i>	
Faculty	756	Bed cases	272
Students	18,243	Treated after hours	756
Employees	1,649		<hr/>
Follow-up cases	998		1,028
	<hr/>		
	21,646		

Physical Examinations

There were 2,756 physical examinations completed during the year, as follows:

1,165 complete examinations
1,591 reexaminations
<hr/>
2,756

The total number of defects found was 637, of which nephritis (118), defective vision (108), defective heart (80), and underweight (78), make up more than 50 per cent.

Services rendered to the Department of Military Science are increasing yearly. The physical condition of all candidates for camp and commission is checked and rechecked. Their enrolment cards for advanced R. O. T. C. must first be approved by the Medical Director. If, for any reason, the man is unable to qualify at that time he is notified by letter and advised that he must have special examinations on blood pressure, heart, etc. In the course of the year several hundred applicants have passed through this Department. There were 159 men sent to camp this year. Each man was inoculated against typhoid and vaccinated against smallpox. Duplicate records were kept here and when completed sent to Military Science headquarters.

There were but five contagious cases during the past year, due to constant watchfulness and isolation. They were:

Chicken-pox	2
Measles	2
Scarlet Fever	1
	<hr/>
	5

The number of days lost by students confined to the Infirmary totaled 1,344, or approximately 0.5 day per student.

There were 1,577 excuses issued, making a total of 3,103 days lost, or an average of $1\frac{1}{4}$ days per man. The loss of time, through illness, is becoming less each year because the students are taking advantage of the medical service offered by this Department.

The records of approximately six hundred students were passed upon for potential loans and scholarships, necessitating many times new physical examinations and the rechecking of old defects. This involved the writing of several hundred letters and many extra hours of work on the part of the doctors and clerical force.

The x-ray service has been one of our greatest assets this year because of the nature of injuries and accidents which have occurred. There were 230 x-rays taken.

One death occurred in the Infirmary during the year.

Next year during the period of physical examinations it is hoped that an accurate checkup of the teeth by a dentist, including x-rays and records of the findings, may be accomplished without too much expense to the Department. We also hope to have the services of a psychiatrist as a consulting member of the staff to treat and advise students when necessary.

GEORGE W. MORSE, M.D.

Industrial Coöperation. The research and development work carried on through the Division of Industrial Coöperation has shown a considerable increase during the year, perhaps reflecting somewhat better conditions of general business. Both the number of undertakings and the income resulting from them, have more than doubled in comparison with last year. Further, there has been an increase in the number of important undertakings involving a number of members of the staff and continuing through a considerable period of time in comparison with the shorter and less important researches. The investigations are distributed throughout the several departments of the Institute, the more important now under way being in the Departments of Mechanical Engineering, Chemistry, Chemical Engineering, Metallurgy, Biology and Civil Engineering.

The problems under investigation include, of course, a great variety of subjects. Their diversity is shown by the following partial list. These are problems which relate to the preservation of food, the safe operation of automobiles, the waterproofing of tunnels, the conservation of heat in high temperature furnaces, the flow of metals under great pressures at high temperatures, the more economical operation of house heating units, and the better safeguarding of water supplies in case of earthquake. The Division has kept in contact with the problem of the permanency of the foundations of the Boston Public Library referred to in last year's report, and has now undertaken a more prolonged and involved investigation for the City of Boston in connection with some of its other engineering problems, including some structural problems in connection with building the East Boston tunnel.

The administrative policy first definitely established last year relating to the care of research work involving the facilities of the Institute by routing it through the Division has continued to operate satisfactorily, and has greatly simplified much of the work undertaken and increased its efficiency and minimized the cost to the Institute as well as to the industrial companies.

The Institute's policy in relation to outside work does not permit the carrying on of routine testing. It is only where the unique equipment of the Institute or the special knowledge and experience of some member of the staff renders it particularly desirable that the work should be done here that it has been encouraged. Wherever there are available facilities in the commercial testing laboratories for this work, it has seemed best that the Division should not undertake it.

The patent policy of the Institute has continued to show further development in the matter of protection of inventions developed by members of the staff, and seems certain to become an important factor in the utilization of some of these inventions and as a means of providing support for further research.

The number of unemployed alumni still continues to be large in number, although it is a small proportion of the total alumni body, and it is encouraging to be able to report that the number of placements during the past year has been more than fifty per cent greater than during the year 1932-33, and one hundred and twenty per cent greater than during the year 1931-32.

The names of more than seventeen hundred alumni have been added to the list of available graduates during the year, largely as the result of a circular letter sent to the graduates of 1920-29 inclusive, and a note placed on the last alumni ballot. Fortunately, a large percentage of these graduates are employed, but wish to be considered for new openings offering greater opportunities. The increased number of alumni registered has enabled the Placement Bureau to make more recommendations for openings requiring specialized experience, thus increasing the usefulness of the Bureau to both the alumni and industry.

One of the major undertakings during the year was the development of a new classification system, in order that each

alumnus might be accurately and promptly classified according to his experience under one or more headings.

C. L. NORTON.

Society of Arts. The activity of the Society of Arts during the past year consisted in sponsoring the usual series of Popular Science Lectures.

As comments received from science teachers in several high schools suggested that the lectures might stimulate greater interest in Engineering if they stressed applied rather than pure science, the topics were chosen with this in view.

Although the attendance both of high school pupils and of the general public was excellent, applications for tickets exceeding in all cases the capacity of the lecture hall, nevertheless it was not as large as in past years, indicating perhaps that recent developments in the field of pure science command a greater interest in the community than their technical applications. It may also be accounted for in part by the fact that Science lectures, particularly in the fields of Physics and Chemistry, lend themselves more readily to spectacular demonstrations than do lectures on Engineering subjects which can be illustrated in many cases only by slides and motion pictures. The Popular Science lectures in the past have been so elaborately illustrated by striking demonstrations that the schools and public have come to expect all subjects will be presented in a corresponding manner.

The loud speaker which has been installed in the large lecture hall has proved of great value in making the lectures easily audible in all parts of the hall.

The 1933-34 series of lectures was as follows:

- December 15, 16, 17. THE CONTROL OF WATER POWERS AND HOW IT IS STUDIED IN THE LABORATORY.
By Kenneth C. Reynolds, S.M., Assistant Professor of Hydraulics.
- January 12, 13, 14. THE ROMANCE OF TEXTILE TECHNOLOGY.
By Edward R. Schwarz, S.B., Assistant Professor of Textile Technology.
- February 9, 10, 11. SOUND AND SILENCE.
By Philip McC. Morse, Ph.D., Assistant Professor of Physics.

March 9, 10, 11.

OIL — THE BLACK GOLD OF THE TWENTIETH CENTURY.

By Horace T. Mann, Sc.D., Associate Professor of Petroleum Engineering.

After the first two lectures many of the audience availed themselves of the opportunity of visiting the Hydraulics River Laboratory and the Textile Laboratories, respectively, which were shown in operation. This practice is to be encouraged as it brings before the public and young students who may be contemplating entering the Institute the facilities provided for laboratory instruction and research.

H. M. GOODWIN.

Admissions. During the year the Institute has adopted Plan B, the so-called new plan, as an alternative to Plan A, the old plan of College Board admissions. The Institute also admits students by its own fall examinations, as well as by New York State Regents records and by the acceptance of qualified candidates who are in the upper fifth of the graduating class of an accredited secondary school. The College Board Plan B has steadily grown in favor among the private schools, some of which have given up preparing their students on Plan A. Several of the leading private schools desired that the Institute adopt it. By Plan B a student of high standing may offer four of his senior subjects by College Board examinations, his other subjects on his secondary school record. The subjects in which he is examined are required to be in the advanced stages of his work. Under this plan the Institute expects the following subjects to be offered for examination:

Mathematics Cp H (Solid Geometry and Trigonometry)

Physics or Chemistry (whichever subject the student may have taken in his senior year)

English Cp

French Cp 3 or German Cp 3 (Elementary and Intermediate)

Under this plan the Institute and the high or preparatory school, to which it applies alike, share the responsibility of determining a student's fitness, for which, under Plan A, the Institute takes practically the entire responsibility by holding

him for seven or eight examinations, accepting only a few of his subjects on his school record.

Negotiations with school authorities thus far indicate that slight changes in the program offered under Plan B may sometimes be necessary in order to make it practical and that the Institute and the school will have to approve beforehand the student's program of studies for his final year. The number of students who entered the Institute under it this year (1934-35), however, was comparatively small. Although the Upper Fifth Plan has been in operation only two years it has worked admirably and is the form of admission under which most students have been admitted who did not enter under Plan A.

The Director of Admissions, during the past year as in recent years, has divided his time between his office duties and visiting educational institutions from which our students come, whether for graduate or undergraduate work. This year he devoted his attention particularly to schools, colleges and universities along the Atlantic Seaboard, ranging from the Maritime Provinces to Georgia, together with portions of the Middle West. He has given in outside institutions about one hundred lectures on "Preparation for the Technical Professions," explaining the leading educational features — cultural, scientific and technical — of the courses of study that are pursued at the Institute and outlining the various careers to which they lead.

Our Honorary Secretaries, the President, the Secretary, and other members of our alumni have coöperated effectively with the Director in his relations with college and school authorities. The motion picture, as well as the new pictorial bulletins, notable for their attractiveness, have added greatly to the efforts to increase a popular understanding of the work and life of the Institute.

JAMES L. TRYON.

News Service. The position of the Institute News Service has been materially strengthened during the year as a result of tangible developments both within and without Technology. Outstanding among these constructive trends can be noted: steadily increasing coöperation from Institute staff

members; an unprecedented public and editorial interest in technological news; and the furtherance of Institute publicity by the News Service through new channels of distribution. The standards of science news reporting are improving, and more and more newspapers are assigning specially trained men to this field. In this connection it is interesting to note that science writers covering the recent autumn meeting of the American Chemical Society at Cleveland formed the National Association of Science Writers, the founder members including all the science writers who are in contact with the Institute News Service.

A wealth of publicity material, both newsworthy and constructive, has been brought to light during the year with the aid of Institute officials and faculty members. An understanding of publicity methods and possibilities is increasingly apparent among the staff, and has been responsible in no small part for the wider scope and diversity of Technology news releases during the past twelve months. Not only have many faculty members been helpful in suggesting and developing stories, but they also have coöperated frequently in interpreting technical news for the benefit of science writers.

The ever-expanding public interest in scientific news is strikingly evidenced by the new editorial contacts which are constantly being made by the News Service. It is significant that Technology publicity material is not only accepted, but requested, by the largest and most reputable news agencies in this country and abroad. During the past year an increasing number of requests for photographs, news articles, and technical information have been received from current magazines, newspapers, professional journals, business men, scientists, news syndicates, radio broadcasting companies, and newsreel concerns.

Among the outstanding science and engineering news announcements from Technology during the past year were the first test of the Van de Graaff electrostatic generator; the successful demonstration of Mr. Houghton's method of fog dissipation; Professor Bennett's expedition to Mt. Evans to test Dr. Arthur H. Compton's cosmic ray intensity meter; the seismological research by Mr. A. C. Ruge; model studies by Professor K. C. Reynolds in the river hydraulics laboratory;

the development of the new proton source by Dr. E. S. Lamar and Mr. O. Luhr; the results of studies of cavitation; the method of accelerating the condensation of steam, developed by Messrs. T. B. Drew and W. M. Nagle; aerological research by the division of meteorology; special features on the differential analyzer; reports on the progress of the Massachusetts Highway Accident Survey, which was directed by the Institute; and reports on papers read at the summer conference on spectroscopy. Numerous photographs made by the Edgerton high speed photography method were distributed.

Motion picture and radio audiences are destined to see and hear more of Technology and its work. Broadcasting companies are becoming increasingly aware of the dramatic and news possibilities in science. The dramatization of the Van de Graaff generator tests in the "March of Time" last winter, the growing number of radio science lectures, sports news, and verbal accounts of such projects as the highway accident survey, point to the microphone as an important channel for publicity.

The newsreels, which for several years have featured certain student activities, are responding to popular interest in actual scientific experiments.

One of the most successful news outlets yet employed by the News Service is the personal story, prepared especially for and sent direct to the home town newspapers of students. Since last October, such news items have been sent to the home town papers of two thousand students. This type of story apparently constitutes one of our most effective means of familiarizing residents of small cities and villages with the name of the Institute. At the same time, such items carry with them a warm personal touch highly desirable in this era of increasingly impersonal education.

News of the Institute has been presented to the alumni for the past three years in a special section of the *Technology Review*. For the first two years this section was specifically devoted to actual news announcements. Last year the section became part of the Institute Gazette department of the magazine, and its interest to readers was greatly enhanced by association with other material concerning Technology affairs.

JOHN J. ROWLANDS.

SCHOOL OF ENGINEERING

Aeronautical Engineering. The curriculum of Course XVI has been examined this year with unusual care and needed realignments and consolidations in several subjects have been effected as general improvements and in order to make way for new material. One new course has been added in the graduate group entitled "Advanced Topics of Aeromechanics," which will extend the professional training available in theoretical and applied aerodynamics to three years. Four texts are in progress in the fields of structures, motors, airplane stability and aeronautical instruments.

The applications for admission to the course in Aeronautical Engineering exceeded thirty again this year, which is the enrolment limit. Selection was made, as in previous years, on the basis of scholarship and an estimate of general fitness based on personal conferences.

In the field of Aerodynamics, Dr. Peters completed his two years' study of boundary layer on a full sized wing section with particular reference to the mechanics of flow separation and presented the results before the International Congress for Applied Mechanics at Cambridge, England, in July. He also collaborated with Visiting Professor Clark B. Millikan in preparing a new general course in Fluid Mechanics, which is to be added to the undergraduate curriculum in Mechanical Engineering.

Professor R. H. Smith's research on drag in non-turbulent air, conducted on the apparatus for coasting models along a wire, was extended this year to include the drag of spheres with a view to the precise calibration of sphere drag as a turbulence indicator for wind tunnels. These experiments have proved, among other things, the suspected variation with diameter of the critical sphere drag coefficient at constant Reynolds Number. These studies were published in the *Journal of the Aeronautical Sciences* as a part of a broader investigation of sphere drag.

Studies of unsteady flow phenomena have continued under Professor Rauscher. Attention this year has been chiefly on methods for measuring a variable tension of high frequency in a loaded wire for use in research on wing flutter, and on the theory of vibrations of non-linear systems. The general subject

of unsteady flow, particularly with reference to wing behavior during landing manoeuvres, will receive increased attention.

Professor Newell completed the testing of a series of four large circular cylinders, constructed of thin aluminum alloy and stiffened against buckling in various ways. The data from these tests have already been of great value to the aeronautical industry in reducing the weight-strength ratio of the stressed-skin type of structure, which has now become almost universal in large airplanes. These data, together with a large amount of data procured during the last four or five years on aluminum alloy panels, flat and curved sheets tested in compression and shear, are now being studied with a view to their rationalization and reduction to an engineering practice suitable for the routine design of the typical stressed-skin structures used in aeronautical construction. The structures courses have benefited greatly through these investigations.

The Aeronautical Instrument Laboratory, under the immediate direction of Mr. Draper, has made notable contributions in this field during the last two years and is attracting wide attention. New types of automotive engine indicators and vibration indicators have been developed. Progress has been made in the rationalization of instrument behavior through analysis by means of instrument theory and the experimental evaluation of constants. A notable example has been a study of the magnetic compass. The thesis by W. McKay and G. R. Struck on this subject was awarded the James Means Memorial Prize. Because of the important and increasing service to the industry, this laboratory should be given every possible support.

Wind Tunnel work in coöperation with the aeronautical industry has continued as usual. Tests this year have been chiefly on an extensive development of improved cowls for air-cooled, radial engines and an investigation of the aerodynamic characteristics of a stream-lined train. In this connection attention is again called to the advisability of modernizing wind tunnel equipment when funds are available.

Aeronautical Engineering participated in a professor exchange for the second term with the California Institute of Technology. Our Professor R. H. Smith exchanged with Professor C. B. Millikan. While Professor Smith was in Pasadena he collaborated with Professor von Karman on studies of ship

resistance and atmospheric turbulence, in addition to carrying classroom instruction. Similarly, Professor Millikan, while here, collaborated with Dr. Peters in preparing the elementary course in Fluid Mechanics, which has already been referred to, and carried also the graduate course in "Hydrodynamics and Applications to Aeronautics." This exchange worked well and greater use of this arrangement is recommended.

In June the Aeronautical Engineering Society, known as the Glider Club, sent its second expedition to Elmira, New York, to take part in the Fifth Annual National Soaring Contest. The basic group consisted of eight members, which at times increased to as many as fifteen, as the meeting progressed. Their flying equipment was the "Professor" sailplane and the "Franklin" utility glider. The Society was successful in winning the Sherman Fairchild Trophy for the greatest aggregate soaring time (over twenty-eight hours), a first prize for the greatest number of flights over fifteen miles, and a prize for the greatest aggregate distance flown, counting flights over fifteen miles.

J. C. HUNSAKER.

Building Engineering and Construction. The registration in the Course in Building Engineering and Construction shows a reduction from the previous year, attributable probably to the lack of opportunity in the building industry in which recovery has been very slow. In spite of this fact, practically all of our graduates have found employment. There is gratification to be found in the quality of the students in the course, most of them showing a commendable ambition to qualify for the Dean's list.

The thesis work during the past year has shown greater application and originality and a desire on the part of the men to give thesis work more time than is required in the schedule. The seminar, which was introduced into the course schedule to give the students practice in speaking and the presentation of reports on subjects of general interest to the industry, is serving a useful purpose. The schedule, as revised two years ago, seems to be well balanced and of sufficient breadth to provide a sound preparation for the many opportunities that building and its allied professions and industries have to offer.

Owing to the inability of the interested industries to furnish financial support, the staff has not undertaken any new research problems, but it has been able to continue the studies of the Permeability of Masonry Walls and of Building Economics and Low Cost Housing, which were mentioned in last year's report. Professor Voss' studies of the absorption of masonry units in combination with mortars of various kinds, and the formation of the Bond Layer have been embodied in reports which have been favorably received and promise to establish definite rules for the specifying of watertight masonry, a subject which architects and builders have known little about heretofore.

Professor Tucker has presented papers on Low Cost Housing which have attracted comment. In the past the speculative system has characterized the development of real property, and has resulted in the construction of vast numbers of poorly built houses at a cost much higher than is warranted and in the defeat of all attempts to provide housing for people in the lower income groups. Proposals have been offered for approaching the problem from a different standpoint, namely, by eliminating speculative costs, beginning with the land and applying the same brains and ability to the building of homes as has heretofore been applied to the building of skyscrapers. Professor Tucker does not believe that there is any future for a standardized house manufactured in a fixed plant like an automobile, but that there is a great opportunity for large scale building of entire communities, with standardized methods of shop practice on the site, which would eliminate the slow and costly and wasteful field methods heretofore employed and result in the construction of much better houses at much less cost, together with a great broadening of the field of home building, and home ownership, particularly if a system of financing is developed that will make the long time loan available to people with the lower incomes.

ROSS F. TUCKER.

Business and Engineering Administration. The energies of departmental members have been largely given to the transitional requirements of the new curriculum. Most of the changes called for transposition of subjects to earlier years,

involving a doubling of teaching load, coincident with an increasing class enrolment.

Perhaps the most noteworthy change has been the re-design of the curriculum applying to the Industrial Practice Group. An extensive introduction of electives in the form of approved subjects in the junior and senior years permits students to plan, under the approval of a committee of the department, a coördinated program of studies of wide variety, in a selected branch of science or engineering. This increased latitude in technical complementation should make the course of increased value to young men whose later industrial opportunities relate to specific technical areas.

During the year a group of five professors, including a member of the Department of Economics and Social Science, published a textbook, "Introduction to Business Management," and offered a corresponding two-term General Study to students in other courses. The success of the subject has justified an increasing of classroom hours and preparation and a ranking as a Professional Elective. It is a recommended elective in the curriculum of the Department of Mechanical Engineering and is a required subject in the new five-year program organized in conjunction with the Department of Economics and Social Science.

A professional elective in Management Laboratory involving exercises in the more recent aspects of motion and time study and the use of management equipment, was presented during the first term. Student interest in the subject was sufficiently great to justify its repetition in the second term.

The second stage in the development of the senior coördinative subject, Industrial Problems, was effected by opening the subject to graduate students as well as to members of the Industrial Practice Group. This larger enrolment involved certain changes in the methods of instruction used by the four professors presenting the subject. The final stage in development will occur next year when the subject becomes required of all seniors in the department. Its organization will then take the form of a comprehensive examination extending throughout the second term of the senior year.

The concentration of the lecture periods in Industrial Research Methods into the first five weeks of the first senior term

served to stimulate earlier attack by students upon thesis problems, the conduct of which showed distinct improvement for the year. As a result, it is probable that increased allocation of time for thesis will be introduced into the first term of the senior year.

A second summer tour of European industries was sponsored by the Thorne-Loomis Foundation of New York, the number of students enrolled being double that of last year. The itinerary provided for larger allotment of time to English and North German industries. Austria and Italy were not visited. Despite the fact that the students were not under faculty guidance, a somewhat larger number of industrial visitations were made than during the previous year.

The continued significance and value of informal contacts between students and distinguished industrialists has justified the establishment of a special suite of rooms in the new Graduate House to be used for the purpose of informal conferences and dinner meetings. These will replace similar facilities hitherto made use of at the Hotel Fensgate.

The fourth departmental Industrial Address was presented during the year by Henry I. Harriman, President of the Chamber of Commerce of the United States, who spoke to undergraduates on the subject of "To Young Men Undertaking the Study of Business."

The Annual New Year's Business Conference was held on January 2 in Walker Memorial for the benefit of Technology graduates in New England. Despite the unusual significance of the holiday, attendance was large. The program which was presented with the collaboration of the Department of Economics and Social Science, dealt with current business problems. Dr. Wilson Compton, General Manager of the National Lumber Manufacturers Association, was guest speaker.

The department wishes to express its appreciation to the English Department for the continued coöperation in offering the consultation service in English, to members of the senior class. This development, while entirely unofficial and optional with the students, has enlisted a large majority of the class during the past three years, and its practical benefits are now being reported by both graduates and employers.

The department is also very grateful to the members of its

visiting committee and to its New York and Boston advisory groups who so generously gave of their counsel and time during the recent discussions of changing business conditions and their probable effect upon business education.

ERWIN H. SCHELL.

Chemical Engineering. The work of the Department was handicapped by the loss of Professor Ryan and the absence on leave of Professor Weber. The problem was met by distributing the overload among members of the Staff and by transferring Professor Tauch during the second term from the Buffalo Station of the Practice School to Cambridge.

The research activities of the Department constitute the capstone of its educational program, for both undergraduate and graduate students. The work on hydrocarbons was extended to mixtures of components differing widely in volatility. The progress here attained was due in no small degree to the hearty coöperation of the Department of Chemistry. Rubber research was expanded to include the vulcanization of latex. Work along new lines included an investigation of dropwise condensation of vapors, which attracted widespread interest; experimental study of the mechanism of eddy diffusion by a new technique, yielding results which promise to throw light on the problem of turbulence, important in various engineering fields; completion of experimental work on radiation of carbon dioxide and water vapor and publication of results on the mechanism of combustion of carbon, both vitally important factors in furnace design; and finally a number of investigations of the industrial practicability of the use of high pressure in various organic syntheses.

An important event of the year was the publication of Perry's Handbook of Chemical Engineering, in the preparation of which the Department, through a number of its members, played an important part.

In the instructional work of the Department, the most interesting event was the organization of the Honors System for seniors. A group of seven students was chosen, and the Department feels that this first year's work with them, even though necessarily somewhat experimental, offers high prom-

ise of development into a valuable method of instruction. Record should also be made of initiation of an effort to improve the quality of thesis work, particularly from the point of view of organization and presentation of results. Experience has shown that the write-up of the thesis often fails to do justice to the quality and results of the experimental work. Two departmental committees devoted considerable time to a systematic attack on this problem, as regards undergraduate theses. It is believed that, while the effort involved is considerable, the results justify it sufficiently to warrant expansion of the program to graduate thesis work.

In the death of William Hults Walker the Department suffered a severe loss. Thirty years ago he initiated its present educational policy. He created and developed the Research Laboratory of Applied Chemistry, which, through the years, has contributed greatly to the effectiveness of the Department's work. Although in recent years he has been a non-resident member of the Staff, he has always kept in close touch with the Department's program and to him it owes important contributions of advice and inspiration.

W. K. LEWIS.

Civil and Sanitary Engineering. To simplify administration and to coördinate more closely the teaching of structural subjects the Corporation has transferred the Course in Building Engineering and Construction to this Department. This combination has effected the desired coöperation with consequent benefits both to the Staff and to students.

The last students in the Coöperative Course in Railroad Operation graduated in June. It is to be regretted that the Boston and Maine Railroad found itself unable to continue the coöperative agreement, but it is hoped that, with the return of prosperity to the railroads, the value of such a relation with the Institute will become so apparent that the course can be reëstablished with some one of the New England railroads.

With a view to giving greater emphasis to research in cement, concrete and reinforced concrete structures Professor Roy W. Carlson, who has had extensive experience in cement

and concrete research, specially on the Boulder Dam, has been appointed an Assistant Professor in the Department. With practically all of the subjects relating to investigations in reinforced concrete now concentrated in the Civil Engineering Department, it is the intention to develop distinctive work in this branch. To strengthen and unify this work Professor Dean Peabody, of the Department of Mechanical Engineering, has been transferred to the Department of Civil Engineering.

Experimental research work has been carried on throughout the year in the Soil Mechanics, the River Hydraulic, the Sanitary Engineering, and the Seismology laboratories.

Fundamental research in soil mechanics under the direction of Dr. Gilboy has emphasized stress-strain relations in soils. These investigations have included (1) stress distribution in soil masses under different systems of load distribution, (2) internal friction and cohesion in clays, (3) elastic properties and strength of sand and of sand-bentonite mixtures under lateral pressure, (4) shearing strains in sand, and (5) the general three-dimensional stress-strain problem in sand. Publications dealing with the first two of these subjects have been prepared by Dr. Jürgenson. Work on the third and fourth problems will be carried further before publication. The fifth problem is well under way and bids fair to be of far-reaching importance since it will demonstrate, for the first time, the possibility of applying to a mass of soil any desired system of major stresses in three dimensions and of measuring the resulting major strains.

Studies of the percolation of water through earth dams have been continued and interesting results with respect to the action of toe filters have been obtained. A new consolidation equation, involving two-dimensional flow with finite discontinuous boundaries, has been developed; this represents a distinct advance in the mathematical treatment of this subject in its relation to hydraulic-fill dams.

Investigations and reports upon foundation problems involved in actual construction work have been made, some of which have presented unusual opportunity for verification of theoretical concepts. During the past summer Dr. Gilboy has been acting as consultant to the United States Corps of Engineers on a flood control project for the Muskingum River

watershed in Ohio. His work consisted of planning and supervising geotechnical studies including seepage analysis, foundation studies, and model tests for the design and construction of several dams.

Papers on soil problems were presented by Dr. Gilboy at the Building Officials Conference of America and at meetings of the Boston Society of Civil Engineers, and by Dr. Jürgenson before the latter Society.

The World Power Conference, to which Dr. Gilboy was a delegate last year, has presented the Institute with a complete set of the Transactions of the last session.

Professor Camp has developed an experimental sectional water filter tube for the purpose of studying the theory of filtration through sand; this will be in operation during the coming year. A new type of water filter bottom was constructed in cooperation with outside interests; this has developed information which should be of distinct value in interpreting the experiments with the sectional filter.

In collaboration with Professor Hazen of the Electrical Engineering Department, Professor Camp has made studies of the application of the electrical network analyzer to analysis of the hydraulics of water distribution systems. A joint paper on this subject was presented by Professors Hazen and Camp at the June meeting of the Society for the Promotion of Engineering Education at Cornell University.

The plumbing research program which has been under way for the past four years has been completed; the results will be published during the coming year.

Interesting and valuable research has been carried on by Mr. Ruge on the subject of practical technique for the study of earthquake effects upon structures by means of models, with particular reference to elevated water tanks. This has led to the design and construction of an instrument known as the "Moment Recorder," which records photographically the magnitude of the bending moment at any point in a model of a framed structure during vibration. This instrument was described by Mr. Ruge at the annual meeting of the Eastern Section of the Seismological Society of America held in New York in April in a paper entitled "Research in Engineering Seismology at Massachusetts Institute of Technology."

A model of a standard 60,000-gallon tank on a 100-foot tower was tested on the shaking table, also in free vibration, for the purpose of developing a practical method of design for water towers which must resist forces caused by earthquakes. This work is still in progress. A paper on "The Determination of Earthquake Stresses in Elastic Structures by Means of Models," written by Mr. Ruge, is about to appear in the *Bulletin of the Seismological Society of America*. In this field the Institute is doing pioneer work of considerable value.

In the River Hydraulic Laboratory Professor Reynolds directed the calibration of three sewer nozzles for the Rutland-Holden Sewer being constructed by the Metropolitan District Water Supply Commission.

A report on the subject of bed-sediment movement, which was investigated by Mr. MacDougall last year, has been prepared; this is being published by the United States Waterways Experiment Station.

As these several interesting model studies have been made on the holding ability of anchors, on bed movement when composed of a sand mixture, effect of bridge piers on the flow over a spillway, and the flow of water through sluice gates.

Professor Reynolds was chairman of the National Conference on Hydraulic Models held by the Society for the Promotion of Engineering Education at Cornell University, and presented a paper on "Model Studies of the Effect of Angularity and Depth of Approach on the Flow over Sharp-Crested Weirs and over Spillways." As a result of the splendid support given to this conference as well as to the one on Structural Models, an American Society of Civil Engineers section of the Society for the Promotion of Engineering Education was formed and Professor Reynolds was elected a director.

Analytical research in structures has been continued. Professor Mirabelli has made an original analysis of rectangular reinforced concrete slabs supported along the four edges and another mathematical investigation of the ultimate strength of steel beams the first of which will be published soon. He has also contributed a discussion on "What is Plate Action?" appearing in the July issue of *Civil Engineering*, and another discussion on "Experiments with Concrete in Torsion," published in the *Proceedings of the American Society of Civil Engi-*

neers, August, 1934. A paper entitled "A New Method for Analyzing Stresses due to Lateral Forces in Building Frames," which has attracted considerable attention, was presented by Dr. Wilbur before the Boston Society of Civil Engineers.

Continuation of the development of a method for analyzing road costs with particular reference to Massachusetts has been made by Professor Breed and Mr. Bone. A paper on the subject was presented by Professor Breed at the annual meeting of the Highway Research Board in Washington; it was published in the Thirteenth Annual Proceedings of the Board.

Several members of the Staff have served on committees in connection with public affairs, notably the N.R.A., municipal building codes and other civic problems.

Several textbooks by members of the Department have been revised and rewritten during the year; namely, the fourth edition of "Higher Surveying" by Professors Breed and Hosmer, the fourth edition of "Hydraulics" by Professor Russell, and the second edition of "Water Power Engineering" by Professor Barrows.

CHARLES B. BREED.

Electrical Engineering. A major matter before the Department is the revision of the undergraduate curriculum mentioned in last year's report. The revision has now progressed to a point where the detailed development of subject matter is under way. This revision, utilizing in the fullest practicable way the latest experimental and theoretical principles in the field of electricity and magnetism and also our fullest experience in exposition, will more than ever emphasize our integration of research and pedagogy in electrical engineering education (equally affecting laboratory processes, classroom methods and library study), which has been a major element since 1907 in the educational success of the undergraduate electrical engineering work of the Department. The Department of Physics has cooperated by arranging a modified treatment of freshman and sophomore physics which will be available for students of Courses VI, VIII and XIV.

Operation of the Honors Group plan for juniors and seniors has been further improved by the introduction of seminars for

the group in each class, the meetings of which are mainly devoted to analyzing comprehensive problems of electrical engineering, examining the processes and results of investigation, and critically discussing current (and possible future) practice in electrical engineering. Junior students in the Honors Group have been put on a basis similar to that of the seniors heretofore by being relieved from the usual term examinations of the junior year but must face a comprehensive examination at the year's end. Our technique with comprehensive examinations is improving. The object is to encourage a more comprehensive understanding of the individual subjects in the curriculum and more particularly of the interrelationships and analogies between subjects of the curriculum.

Our Colloquia have been continued and represent, as they always have, an important influence in our educational processes. We are indebted to engineering and industrial concerns for continuing through the depression to furnish the leaders for these Colloquia.

The Coöperative Course has maintained without interruption its organization at the Institute and its close relations with the four coöperating companies on the fundamental educational basis on which it has operated for fifteen years. Because of business conditions, the proper kind of industrial experience has not always been available during the past two years. Therefore, engineering courses at the Institute have been substituted where necessary. Conditions for student relations in the works have been better during the last few months.

The development of the undergraduate laboratories has continued. Our methods involve a distinct deviation from the conventional practices, for the purpose of making the laboratories most effective as creative educational agencies. To this end we encourage and expect each junior and senior student to arrange, as far as practicable, his own laboratory program in accordance with his own particular interests within the scope of the subject, in consultation with his classroom instructor in the subject concerned. That instructor also supervises the chosen work in the laboratory. Experience shows that this method, properly used, is stimulating to the student's imagination and initiative, and the plan is now pretty well established with us.

The illuminating engineering profession for a long time has expressed interest in the establishment of a curriculum especially adapted for illuminating engineers. This is essentially electrical engineering, but requires more emphasis on the physics of radiation and the introduction of material relating to the physiology and psychology of vision. A selection of suitable topics to form a four-year curriculum particularly appropriate for students who wish to work scientifically in the illuminating-engineering field has been made by the Department. The curriculum is now available for election by students.

Two new full-year graduate subjects have been undertaken by the Department, namely, Engineering Electronics treated in an advanced manner, and Electrical and Mechanical Vibrations treated in a manner suited to the most advanced needs of electrical engineering. A need for such treatment of these subjects is recognized among electrical engineers and our undertaking is likely to produce a good response amongst graduate students.

The research in the Department continues to embrace a variety of fields associated with electrical engineering, such as one may appropriately expect of a distinguished staff comprising some fifty members. Most of the staff members are active on one or more research problems, individually or jointly or in connection with work of graduate students. The Department's point of view that participation in research is the most effective means of stimulating engineering students to high endeavor and is a necessary and important adjunct to classroom and laboratory instruction (for juniors and seniors almost as fully as for graduate students) in order that the best educational results may be attained, has not been changed. On the contrary, our experience year by year confirms this view. The research in the Department also has proved its value to the engineering world for many years. Certain of the laboratory projects in hand are noted in the following paragraphs. Most of our projects are primarily of laboratory (experimental) nature, some are primarily of mathematical nature, and a few are economic in nature. Results of research in all of the fields are published in scientific papers by the appropriate members of the Staff.

The Differential Analyzer continues as an important instrumentality and expenditures have been made for a number

of constructional improvements. It has been in almost continuous use on various scientific problems. These include problems solved for staff members in other departments as well as our own.

The Network Analyzer was quite busily occupied with student theses and certain department investigations during the past year. We are anticipating a very active ensuing year for the instrument. It is now being employed by a firm of consulting engineers for studies in connection with an important power-system problem. Also, the officers of a large public-utility holding company have undertaken to locate one of their engineers at the Institute during the ensuing academic year for studying comprehensively their transmission and distribution system relative to numerous problems in connection with regulation, fault currents, stability, and anticipated system extensions. These studies will be sandwiched in with investigations originated in the Department.

Research on the engineering possibilities of Vacuum-Insulated Electrostatic Power Machines has continued, with emphasis on the study of vacuum as a high-voltage insulating medium.

In connection with the cinema-integrgraph development, last year brought to completion a number of separate technical problems important for this device. It is expected that the machine will be completed during the coming year and then may be applied to the purposes of investigation for which it is intended.

In the Illumination field attention has been given to the design of bolometers for operation on alternating current with vacuum-tube amplifiers. The theory has been worked out and an instrument constructed. The instrument will aid in investigations of radiation. An automatic distribution photometer has been designed to make possible the quick determination of candle-power curves from luminaries. Observations have been made of highway visibility under various conditions, and tables and graphs prepared to facilitate computations of illumination emanating from rectangular sources such as windows and luminous panels.

The development of the High-speed Stroboscopic-light type of Motion Picture Camera has progressed during the year

and will continue to progress during the ensuing year. The camera has been used in researches in various fields. Motion problems have been investigated by means of the camera for members of the Department of Electrical Engineering and for six other departments of the Institute in addition to industrial applications.

Precision Power-factor Bridge measurements have continued with important success and the range of usefulness of the bridge has been enlarged by improvements made. Investigation of properties of insulating oils continues.

Much progress has been made in the work at Round Hill aimed at disclosing the physical qualities of fogs and means for dissipating fog under favorable conditions. An effective apparatus for the measurement of light transmission through fog has been developed. The fog dissipation results were recently widely described in the public press. The Round Hill laboratory is also responsible for investigations in the field of antenna theory wherein a general solution is sought, and in the field of thermal agitation voltages. Colonel E. H. R. Green again was a generous patron of the Round Hill work, for which we are deeply indebted to him.

Application of electrical measurement techniques to physiological problems has progressed satisfactorily. The present objective in this work is the development of a technique which will yield more significant data than have heretofore been obtainable. Other work in the medical and physiological field mentioned in previous reports has continued. We are under deep obligation to staff officers of the Evans Memorial and the Massachusetts General Hospital, distinguished physicians of Boston, officers of the General Radio Company, and Mr. Alfred L. Loomis for their lively interest and aid in these projects.

Among other problems which have occupied the department staff may be mentioned the development of a precise method for speed control of direct-current, shunt-wound motors; study and establishment of theory for oscillatory circuits having periodically-varying parameters; farther investigation of transient phenomena in electrical machines; the development of a method for measuring with remarkable accuracy the attenuation of sound in tubes; the study of the propagation and

radiation of sound from intense sources, including the design and construction of a 1-kw. 120-cycle source and special miniature condenser transmitters for the necessary sound-field measurements; and the development of a new cosmic-ray intensity meter. The latter was taken to Colorado this summer by members of the Staff, successfully tested, and used under difficult circumstances for making permanent records. This expedition was organized under the auspices of the Carnegie Institution of Washington as a link in a coördinated program of cosmic-ray-intensity measurements.

As a consequence of a generous gift, we have entered upon an exacting research in the field of very high-frequency electrical measurements.

Members of the Staff aided in several projects of the Civil Works Administration, including the development of apparatus for measuring the response time of automobile drivers for use by highway departments, the development of a mechanical reaction timer, and a study of highway visibility from the standpoint of highway safety when there is automobile traffic at night.

Members of the Department published forty-five papers and written discussions and three books, besides the manuscript for a booklet published by the Technology Press entitled "Elihu Thomson Eightieth Birthday Celebration at the Massachusetts Institute of Technology," covering the memorable events of March 29, 1933, when the Institute acted as host at Professor Thomson's eightieth birthday celebration.

A much-needed relief in the Department's laboratory situation will result from the acquisition of Room 4-109 assigned to us this summer.

The Department acknowledges gifts from the New England Telephone and Telegraph Company of a 230-volt, 200-ampere-hour storage battery (from their old central office in Portland, Maine), and from the Western Electric Company of miscellaneous telephone apparatus for experimental use.

The work of the Vail Librarian in her duty of reference librarian for the Department has been of great service in our affairs.

We consider it a matter for congratulation that the project for exchange of professors has been so favorably received in the

electrical engineering field. We are this year exchanging with Ohio State University, our Assistant Professor Harold L. Hazen going to them and their Assistant Professor John F. Byrne coming to us. Applications from other institutions to make an exchange in the academic year 1935-36 have already come in.

DUGALD C. JACKSON.

Electrochemical Engineering. The changes in the curriculum of this Course, to which attention was called in the last report, materially strengthened the instruction during the past year. In particular the laboratory course in Electrochemistry given in the first term of the fourth year which was increased from nine to twelve units, was revised and extended, and placed in charge of Professor Thompson. Electrochemical Measurements and their applications to electrolytic processes which had previously been given as consecutive subjects were consolidated into one unified course to the distinct advantage of both. A new set of laboratory notes was prepared by Professor Thompson who with Mr. Swift closely supervised the work.

The majority of electives as well as thesis subjects chosen by members of the senior class were closely allied with the work of the Department of Metallurgy. This has been a growing tendency in recent years as many problems in Electrochemistry and Metallurgy — particularly Physical Metallurgy — are closely interrelated. The cordial coöperation of the electrochemical and metallurgical courses in arranging programs for students has made it possible for a graduate of Course XIV, by suitably choosing his undergraduate electives, to complete the requirements for the Master's degree in the Department of Metallurgy in one year.

A most important action affecting the future of the Course in Electrochemical Engineering was taken at the close of the school year. This was the transfer of the administration of the Course from the Department of Physics to the Department of Mining and Metallurgy. Ever since the undergraduate work of the Institute was organized in the Schools of Architecture, Science, and Engineering, respectively, Course XIV, essentially an engineering course, has been in the anomalous position

of being under the administration of the School of Science. The Course, it will be recalled, was originally inaugurated in the Department of Physics as an option of Course VIII and for a number of years after its designation as Course XIV these two Courses had many subjects in common. As the curricula of the Courses have been developed to meet present-day conditions this is, however, now no longer the case and it is therefore logical that Course XIV should be transferred in its administration to an allied department in the School of Engineering.

As already pointed out the work in Electrochemistry is closely related to that of Metallurgy and its future technical developments will probably lie chiefly along metallurgical and electrothermic lines. For these reasons, after conferences with all departments concerned, it was decided to transfer the Course in Electrochemical Engineering together with the electrochemical laboratories to the Department of Mining and Metallurgy. The curriculum of the Course has not been changed. Professor Goodwin will remain a member of the Department of Physics, retaining his present position as professor of Physics and Electrochemistry, and will continue to give his courses in Theoretical Electrochemistry to students in Course XIV. The increasing work connected with the administration of the Graduate School makes it desirable, however, that he relinquish the responsibility of directing the Course and laboratories. He will continue to act in an advisory capacity on matters of policy pertaining to the curriculum. Professor Hutchinson, in charge of the Department of Mining and Metallurgy, will become Head of the Course. Professor Thompson and Mr. Swift will be transferred to the Department of Mining and Metallurgy. Professor Thompson will continue to have charge of the Electric Furnace Laboratory and of the instruction in Applied Electrochemistry.

In these readjustments it has been found necessary to make one change which it is most sincerely hoped may prove to be only temporary. This is the allocation of the space now occupied by the uniquely equipped Electrochemical Laboratory on the first floor of Building 4 to the Department of Electrical Engineering, thus necessitating the transfer of the instruction which has been given in this laboratory to the Physicochemical Laboratory of the Department of Chemistry. The reasons for

this action were, first, the pressing need for more space for research in the Department of Electrical Engineering due to a greatly increased enrolment of graduate students and, second, to decreased enrolment in Electrochemical Engineering, making the facilities of the present laboratory considerably greater than necessary. It was hoped that the situation might be satisfactorily adjusted by transferring a portion of the laboratory to the Department of Electrical Engineering and retaining a sufficient number of desks to accommodate present students and thereby to permit the fourth-year Electrochemical Laboratory work to be carried on as a part of the Department of Metallurgy. Although this plan was not adopted it is understood that the Electrochemical Laboratory will be dismantled as little as possible so that it may be restored to the use for which it was so carefully designed, as soon as conditions may warrant.

The original Electrochemical Research Laboratory in Building 8, used in recent years by the Department of Physics for instruction in Electronics and Spectroscopy, has been restored to its original use and this will provide space and facilities for electrochemical thesis work and research for a limited number of seniors and graduate students.

In concluding this report the writer wishes to record his deep appreciation of the cordial support he has received since the Course was established in 1900 from his colleagues on the Faculty and from the Administration. The Course is necessarily a composite one and whatever success it may have attained is due in large measure to the coöperation received from those members of other departments who have contributed to the instruction. The Course has graduated 268 with the Bachelor's degree, 26 with the Master's degree, and two with the Doctor's degree. Many of these graduates hold leading positions in electrochemical and related industries, in industrial research laboratories, and as professors in universities and technical schools. They form a group of alumni of which the Institute may well be proud. May "Course XIV," under its new auspices, continue to attract as many outstanding students as it has in the past.

H. M. GOODWIN.

Mechanical Engineering. A reorganization of the undergraduate course schedule has been commenced by eliminating certain descriptive subjects from the second and third years and substituting more fundamental analytical work. Physical chemistry is moved to the second year and a new course in applied chemistry added, to strengthen the foundation for the basic mechanics and heat subjects to follow. Time allotted to the study of heat transmission in the third year has been doubled, and one term of engineering laboratory in the third year has been devoted to a lecture and laboratory course in fluid mechanics.

The former course in pattern making is merged with that in foundry to be given under the new title Foundry Practice, to indicate a basic change in content and objective. It is further planned to transform the former forging course into a course of instruction and research in the hot and cold working of metals, including modern welding technique. The laboratories are being rearranged and re-equipped for this purpose to bring the instruction into closer relation with industrial practice and to furnish a background for the professional design courses of the fourth year.

With the revision of the second and third year curriculum to include only the fundamental arts and sciences applied by the mechanical engineer, the fourth year can be devoted to the more strictly professional subjects. Here, the course has been divided into six major divisions or options offering the student a choice of his field of concentration, viz., General, Automotive, Power, Refrigeration and Air Conditioning, Production, and Textile.

It is considered that the time has come to recognize the unlimited scope of the mechanical engineer's possible responsibilities and to prepare him primarily with a training in the underlying arts and sciences of his profession and then to require him to show proficiency in their application in some major field. The alternative of an acquaintance with the applications in many fields cannot be accomplished in a four-year course. For those students who expect to devote five years to their academic training, the general option is expected to furnish a satisfactory foundation for graduate work.

The equipment of the Department has been improved by

the elimination of several obsolete pieces of machinery and the addition of important items for air conditioning studies (air washer, jet refrigeration machine, humidifier), apparatus for study of hydraulic cavitation, surface fatigue, extreme pressure lubricants, fibre structure by polarized light, thermodynamics of textile moisture regain, swelling of fibres by motion picture photography. Additional equipment has been added for testing materials (strain gages, stress-strain recorder, interferometer calibration apparatus and a transverse testing machine for cast iron).

The Springfield Arsenal has loaned the Department a complete battery of machines and tools to produce a small part of a rifle. These are being set up as a production unit for use by groups of students, as an exercise in mass production methods of manufacture.

There have been numerous instances of coöperation with other departments in adjusting the content of subjects taught, notably with the Physics Department in the matter of elementary mechanics, with the Departments of Chemistry and of Mining and Metallurgy in the matter of physical chemistry and subsequent courses in thermodynamics and metallurgy, with the Department of Civil Engineering in the matter of reinforced concrete and again with the Department of Mining and Metallurgy in the matter of modernizing foundry practice and metal working.

A progress report on the results of the research on cavitation was made at the Hydraulic meeting of the American Society of Mechanical Engineers in June, at the International Congress for Applied Mechanics in Cambridge, England, and the Institution of Naval Architects in London, in July, and at the General Meeting of German Physicists and Mathematicians in September. This report disclosed the mechanical periodicity of cavitation by means of Professor Edgerton's motion pictures, and correlated the high frequency collapse of water vapor with the sound and shock recorded by microphone and by automotive pressure indicator. The results are new because of the new technique of examination employed and furnish an excellent example of the advantages of coöperative research when many specialists can be consulted. It is also significant of new knowl-

edge to be gained by high speed motion photography as a tool for engineering research.

The present state of our knowledge of internal combustion engines requires a broad research program to provide the information for rational design. To this end, the Internal Combustion Engine Laboratory has been engaged in investigating the phenomena of combustion and the mechanical problems of design.

The investigation of the physical aspects of detonation is nearly complete, and will be published soon as a report of the N. A. C. A. During the past year, over 2,000 photographs have been obtained of combustion under various conditions. These records are now being analyzed. Two instruments developed in the laboratory, the M. I. T. knockmeter and the M. I. T. high speed indicator, have been perfected and are now available for the use of other laboratories. A combustion system for utilizing a wider range of fuels in the compression ignition engine is being investigated.

The mechanical problems receiving consideration are, first, the variables controlling air capacity (and consequently output) of the internal combustion engine, and, second, the problem of vibration in engines and crankshafts utilizing instruments for vibration measurement, and, third, the determination of stresses in irregular shapes, especially crankshafts. The Department is undertaking an important research for the Navy Department on vibration of airplane engines.

The laboratory work by our students has been revised to include a more general use of the new instruments which have been developed.

J. C. HUNSAKER.

Meteorology. Two degrees in meteorology were awarded, one Sc.D. and one M.S. Our coöperation with Blue Hill Observatory continued and joint seminars were held every Monday evening. Through the courtesy of Dr. C. F. Brooks, Director of Blue Hill Observatory, Dr. B. Haurwitz gave a series of lectures at the Institute on the mathematical theory of atmospheric perturbations.

During the months of December, January, and February

Professor J. Bjerknes of the Geophysical Institute, Bergen, Norway, visited the Institute and gave a series of twenty lectures on the general circulation of the atmosphere. During the last week of Professor Bjerknes' visit (February 26 to March 2) an informal conference on meteorological problems was held at the Institute. Professor Bjerknes reviewed briefly the present status of certain fundamental meteorological questions. Representatives from the Navy and War Departments and from the United States Weather Bureau attended and discussed the meteorological problems of their organizations. At a similar conference held in June at the California Institute of Technology, M. I. T. was represented by Dr. Willett and Mr. Namias.

A special grant was obtained from the Rockefeller Foundation to enable Professors Bjerknes and Rossby to carry out a series of stratospheric soundings with the aid of a new type of balloon meteorograph designed by M. Jaumotte in Belgium. Thirty-eight instruments were released from the St. Louis Municipal Airport during a 72-hour period in February. Of these instruments, thirty-six have been returned. Twenty instruments penetrated well into the stratosphere. The routine evaluation of the data has been completed and the material is now being studied by Dr. Willett.

Coöperation with the Woods Hole Oceanographic Institution continues. Professor Rossby, with the aid of Mr. R. B. Montgomery, has been studying the characteristics of the homogeneous boundary layers in the atmosphere and in the ocean. With the coöperation of Dr. K. O. Lange and Mr. R. Feiber, a recording sea water barothermograph was constructed and tried, with fair success, on several cruises with the *Atlantis*, research vessel of the Oceanographic Institution. This instrument, which records temperature directly against pressure, has enabled us to determine the depth of the homogeneous layer with great accuracy under varying conditions. A report on these investigations may be expected shortly.

Dr. Willett is now at work on a general study of cross sections through selected synoptic situations, based on the airplane data from our station at East Boston Airport. One such cross section has already been analyzed and the results published by Mr. J. Namias.

The War Department is coöperating in our aerological

work at East Boston Airport and an Army airplane was assigned for aerological ascents in coöperation with the Institute. Lieutenant A. Merewether, U. S. A. was assigned to the Institute for meteorological training and flight duty and a second officer will be added for the coming year. Since February our regular aerological flights have been carried out alternately with the Army Fairchild plane and with our own Curtiss-Robin.

For the third consecutive summer, the Institute maintained a meteorological field station during the National Soaring Contest in Elmira. Our participation in the contest was marred by the tragic death of Lieutenant Harris in an automobile accident just before the official opening of the meeting.

The success of our aerological work was in a very large measure due to his inspiring devotion and to his courageous yet intelligently cautious flying under all kinds of weather conditions. As soaring pilot and instructor Lieutenant Harris contributed greatly to the advancement of American Soaring. It was largely due to his enthusiasm that soaring came to receive official recognition as a student activity of value in the training of aeronautical engineers. He leaves behind the memory of a fine pilot and a great friend.

With the official acceptance by the United States Weather Bureau of the method of "Air Mass Analysis" the first objective of our work has been attained.

C. G. A. ROSSBY.

Mining and Metallurgy. Much interesting research has been in progress during the year. In the field of Mining Engineering, economic studies have been made relative to normal and basic prices of petroleum; another problem concerned the development cost of petroleum in Oklahoma. In the field of Ore Dressing interesting results were obtained in measurement of particle-bubble adhesion in flotation action. In the field of Metallurgy a new discovery resulted from experiments in the production of pure metals. Research in the sensitivity of x-ray radiography, in the magnetic transformation in iron-vanadium alloys, and in the action of nitrogen in magnetic arc weld metal, were all productive. A number of problems related to case hardening of iron and steel were studied, as follows: the prop-

erties of nitridable cast iron; the properties of aluminum-free nitriding steel; the nitriding and magnetic properties of certain steel alloys, and successful results in simultaneous carburizing and nitriding. Corrosion studies dealt with the influence of grain size in brass and a special steel. The effect of atmosphere in the casting of copper and brass was investigated, and problems dealing with x-ray studies of age hardening and precipitation hardening were continued.

Plans are on foot which, it is expected, will bring about increase in coöperation between the Department of Mechanical Engineering and the Division of Metallurgy. Both are interested in studying the properties of metals and, by the use of new methods, analyzing stresses in machines under dynamic as well as static loads. Much has been done in this field but there remains much to do particularly in the applications so important to the mechanical engineer.

Electrochemical Engineering, now administered by the Department of Mining and Metallurgy, brings to the division the splendidly equipped electric furnace laboratory which will supplement the fuel-fired furnaces of the metallurgy and ceramics laboratories. There will result an assemblage of furnace equipment not excelled anywhere for purposes of instruction and research.

The year has witnessed more activity than usual on the part of members of the staff of this Department in renewing old and creating new contacts with industry and with other schools. Several members have made trips as far as the Pacific Coast, some to the industrial areas of the Middle East and others to both the old and recently developed gold mining areas of the United States and Canada.

Professor F. H. Norton travelled by motor to schools of ceramics at Alfred, New York, and State College, Pennsylvania, visiting on the way plants engaged in the ceramic industry such as brick, tile, pottery and machine-made bottles and jars in the states of Pennsylvania, West Virginia and Ohio.

Professor Williams spent several weeks in San Francisco at the request of the Division of Industrial Coöperation, studying metallurgical problems connected with the preservation of food. During his stay on the Coast, he spoke at the Annual Meeting of the California Technology Club.

Professor Hayward motored to the Pacific Coast, an eight weeks' trip of twelve thousand miles, making visits to no less than sixteen mines and metallurgical plants engaged chiefly in the production of the base metals — copper, lead, nickel, zinc, and quicksilver. He also visited the Montana School of Mines at Butte.

Professor Mann visited oil and gas producing areas in New York, Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Oklahoma, Texas and Michigan. The trip of eight thousand miles was made by motor and consumed eight weeks. At Tulsa, Oklahoma, he gave an illustrated talk on "Petroleum and Prices" before the Mid-Continent Section of the American Institute of Mining and Metallurgical Engineers.

Professor Bugbee made a three weeks' trip to the gold fields of northern Ontario and Quebec and, on the way, visited the smelter of the International Nickel Company at Sudbury and the Mining Departments of McGill University, Montreal, and the University of Toronto.

Professor Foster visited asbestos mines of the Asbestos Corporation, Ltd., in Quebec, and gives an interesting account of a unique mining method in which no wood timber is used for support of ground because otherwise the asbestos fibre would be spoiled by admixture with crushed wood.

Professor Hutchinson visited the great gold mines of the Porcupine area and the Kirkland Lake district in Ontario and the Noranda copper-gold mine in Quebec; during the summer, three other gold districts in Colorado, South Dakota, and British Columbia were seen. Gold mines are thriving as everyone knows, stimulated by the current high price of gold. Everywhere in these districts were met the signs of prosperity and confidence both on the part of management and labor.

Professor Waterhouse has been interested in various educational activities, particularly in connection with the American Society for Metals which offered a series of lectures at the Institute, an enterprise designed to bring new members into the Society. A lecture was given each Wednesday evening during the winter, seventeen in all, Professors Williams, J. T. Norton, Homerberg and Zimmerman sharing in the work.

During the year, Professor Homerberg lectured before the New Jersey Chapter and the Boston Chapter of the American

Society for Metals; also before the Boston Chapter of the National Metal Trades Association, the membership of the latter being comprised of the executives of the metals industry in Boston and vicinity.

Professor John T. Norton reports that the precision of measurement of lattice constants by the x-ray method has been greatly improved by development of technique, making it possible to follow small changes in the composition of solid metallic phases with considerable accuracy.

W. SPENCER HUTCHINSON.

Naval Architecture and Marine Engineering. During the summer Professor Rossell took part in the trials of the new aircraft carrier *U. S. Ranger*, and he has completed a book on riveting and welding which will be published shortly.

Professor Chapman made an extensive tour of the principal seaports of Europe in order to bring the course on terminal facilities up to date. It is gratifying to record that he was received with extreme courtesy in all the ports which he visited, and obtained much valuable information for use in the Course in Ship Operation.

Professor Jack attended the meetings of the Institution of Naval Architects in London where research on experimental tanks was discussed internationally. He also visited the shipyards of Messrs. Denny in Dumbarton, and White, of Cowes, studying the application of electric welding to ship construction. He also visited the works of the British Thomson-Houston Company at Rugby, where electric welding is being highly developed in the construction of electric generators and motors for marine and other uses.

The Nautical Museum continues to attract a number of interested visitors, and the collection has been enriched by a number of items, the principal being a large model of the yacht *Enterprise*, which defended the *America's* cup against Sir Thomas Lipton's last challenger. This is the model which was used for experimental research in the basin at Washington, and was kindly presented by Mr. Harold S. Vanderbilt on behalf of the syndicate. The other donation was a full model of an Elizabethan galleon which has been constructed prin-

cipally from data in the collection of documents left by Samuel Pepys to Magdalene College, Cambridge. The model was made by Professor J. R. Jack and represents a type of the larger ship which defeated the Spanish *Armada*, and thereby materially affected the political and religious liberties of northern Europe, especially of England and Holland, and through them the American colonies in Virginia, New England and New Amsterdam. This ship therefore is a useful addition to the collection of ship models having an historical interest for American people.

J. R. JACK.

SCHOOL OF SCIENCE

Biology and Public Health. The record for the year has been one of unusual activity. With our present limited teaching staff each member must be responsible for several courses. While this entails to some degree a lessened opportunity for concentration in one field on the part of each instructor, it has also brought about the breadth of educational interest and spirit of coöperation and effective teamwork which characterizes the Department.

While undergraduate teaching is recognized as our major effort, research and development of graduate work have received constant and careful attention. Three new graduate courses, advanced biochemistry, advanced food technology, and serological methods have been given for the first time. Increase in graduate and research work has made it necessary to use space in the undergraduate teaching laboratories, and to transform and utilize space not originally designed for work of this character.

The number of students from other departments who have been registered for biological courses is larger than ever before. The Department has also participated in a greater degree in courses given in other departments and in the General Studies. A partial list of these include economic geography, city planning, refrigeration, photomicrography, and the new General Science course for students in Architecture.

The illness of Professor Horwood deprived the Department of his services during the second term. Fellow members of the

staff carried on his three courses in addition to their own work, with the exception of a dozen lectures in Municipal Sanitation. For these we were fortunately able to secure the services of Mr. Stanley T. Barker whose professional experience, personality and ability in presentation solved a difficult problem in a highly satisfactory manner.

Special mention should be made of two important and valuable pieces of research apparatus which have been made possible through the Rockefeller Fund for Research. One of these is a Bausch & Lomb quartz monochromator of latest design and largest size, by means of which the researches on the effect of monochromatic light on biological phenomena can be advanced. The other is a modern type of micromanipulator, which makes it possible to deal with microbial problems involving the separation and handling of single cells of microscopic or submicroscopic size. The same fund has made possible a liaison between the biological and electrical engineering departments in applying stroboscopic photography for the analysis of rapid biological movement, which is yielding valuable data on the behavior of living organisms.

Every member of the teaching staff has devoted some portion of his time to research in the field of his special interest, or on problems which seem to be both timely and important. Unfortunately, publication of some of these researches has been delayed because of the conditions with which the scientific journals and technical periodicals are confronted.

Members of the staff have also been active in work of a public service character, and in committee work in national societies such as the American Public Health Association and the Society of American Bacteriologists.

Professor Prescott and Dr. Jennison are on the Advisory Editorial Board of the *Journal of Bacteriology*.

Professor Blake has continued his service as Curator of Mollusks at the Boston Society of Natural History.

Professors Prescott and Horwood have completed the revision and entire rewriting of the classic Sedgwick text on Sanitary Science and Public Health.

S. C. PRESCOTT.

Chemistry. Perhaps the most noteworthy change in Course V has been the introduction of a system of electives in the third and fourth years whereby students may extend their acquaintance of subjects of special interest to them. The innovation provides for a desirable flexibility and permits students intending to enter particular lines of industry to prepare more thoroughly. On the other hand students intending to enter the graduate school may elect subjects tending to enhance their ability to utilize the opportunities for advanced study.

The students' thesis work which has always in the past been carried out in the fourth year will now be started in a preliminary way in the third year with a better opportunity for conferences and reports. Moreover the time requirement is to be more flexible with a minimum of thirty units. In this way especially capable students who desire to enter graduate work at the end of the fourth year may arrange a program effectively favoring rapid progress in the graduate years. Thus a student desiring to specialize in organic chemistry may engage on a longer and more comprehensive thesis and elect certain graduate courses. A student who has decided to enter physical chemistry may on the other hand find it advantageous to complete a thesis problem in the minimum time and devote extra time to courses in mathematics and theoretical physics. The plan promises to give the student greater freedom and opportunity for development.

The Department's main undergraduate teaching effort is expended upon students registered in courses other than Course V. It therefore becomes necessary to adjust the content and not infrequently the methods of presentation of the various chemistry courses to suit the needs of students specializing in the practice of numerous branches of engineering. This means often that the same subject must be presented in several separate courses, in different ways and with different time schedules. Without commenting on the desirability of preserving such a situation indefinitely, a practical problem exists which experience proves must be given continuous attention. In order therefore to promote systematic discussion and more effective coöperation within and without the Department, a committee on undergraduate teaching has been meeting regularly throughout the year. The results of the com-

mittee's activity will bear fruit during the forthcoming year, and it is believed that enhanced opportunities for student work will result.

Nowhere in the world, at the present time, does one find better equipped laboratories for undergraduate and graduate students than in the United States. This has not long been true, however, and we in America still tend to regard laboratory courses, as in an earlier day, as adjuncts to lecture courses. A change in this traditional point of view should be considered particularly with an essentially laboratory science such as chemistry. For one thing, the traditional idea tends to put laboratory work on a lower level of importance than the classroom and lecture work. In the second place authority in the conduct of the laboratory work is too often delegated to inexperienced teachers, with danger of resulting inefficiencies and highly standardized or cut and dried laboratory problems. Other points might be cited against the traditional procedure, but the important result is that the student does not derive the educational benefit and valuable training in judgment which may be possible if steps are taken to give especially selected instructors full opportunity for enthusiastic and responsible work in developing our laboratory courses. The policy of the Department is to put interested, responsible and experienced teachers in charge of all laboratory courses.

Some years ago an opportunity of this kind was provided in the instructional work of analytical chemistry with the happy result that the subject has been lifted from the level of a mere course of professional training for analysts to one of very real scientific value. Incidentally, of course, better analysts are produced under the new procedure. The committee on undergraduate teaching problems plans to spend a considerable part of its time in discussing and planning improved laboratory courses, giving particular attention to the most favorable balance between purely classroom work and laboratory work.

The scientific productivity of the Department has been admirably sustained notwithstanding certain necessary restrictions in funds available for research. Six National Research Fellows appointed in the field of Chemistry chose the Department for the prosecution of their investigations. The recipient of the J. T. Baker Chemical Research Fellowship has also

lected to enter the Research Laboratory of Inorganic Chemistry for his work during the coming year.

Thanks to the Rockefeller Fund the permanent research equipment of the Department has been materially increased. The physical apparatus for exact measurements of the characteristics of organic compounds is rapidly being acquired and much interesting work is under way and new investigations being planned. A small shop has been equipped for the Research Laboratory of Organic Chemistry and is contributing very materially to the efficient conduct of Research.

At the conclusion of the year, Professor Gill retired with the title of Professor Emeritus after fifty years of service in the Department. Happily Professor Gill will retain his laboratory and make the Institute his scientific home. His colleagues rejoice in the prospect of many years of contact with one whose loyalty, probity and achievements have been as outstanding as his friendly and helpful character.

FREDERICK G. KEYES.

General Science and General Engineering. The following are some of the specialized fields of study for which students in Course IX have prepared themselves recently: economics, finance, philosophical physics, languages (in application to science), medicine (preparation), law (preparation for patent law), technical journalism, printing engineering, lubrication engineering, sound engineering, illumination engineering, motion picture engineering, gas engineering, petroleum field engineering, production management, manufacturing machinery, testing materials, road building, water supply engineering, and food technology.

Course IX offers to the student of unusual ability and definite objective a unique opportunity in enabling him to plan his program so as to best prepare himself for the particular field which he has selected for specialized study. We have an increasing number of students who choose at an early point in their academic career a specific field for which they wish to make special preparation. In many cases it is necessary for them to elect courses from several different departments. Adequate guidance of such a program by the Committee on

Course IX assures the student of a well balanced program, and at the same time allows him ample freedom in his selection of work which will best prepare him for his career.

R. G. HUDSON.

Geology. There have been a number of accessions to the collections of the Department and these have been properly labelled and catalogued. A sealed-off hot cathode tube with appropriate transformer and controls has been added to the x-ray laboratory and a battery of four powder cameras of novel design has been installed.

The appropriations from the Rockefeller Fund have given opportunity to carry out research which would otherwise have been impossible. Professor Newhouse has continued his work on the formation temperature of minerals, and Professor Buerger in experimental mineralogy.

With the aid of a special appropriation, the Department has established a much needed machine shop for the construction of instruments necessary in research and instruction. The shop is equipped with a small lathe, bench miller, drill press and tool grinder. The Department has been fortunate in adding Mr. Otto von der Heyde to its staff as instrument maker. At present, a temporary arrangement is in operation whereby he devotes half of his time to the Department of Mining and Metallurgy. It is hoped that this expedient may be terminated in the near future, as the entire time of Mr. von der Heyde is very much needed in the Department of Geology.

Professor Lindgren has continued the editing of the Annotated Bibliography of Economic Geology issued semi-annually under the auspices of the National Research Council. Six volumes have now appeared, to which Professor Newhouse and Dr. Whitehead have made substantial contributions. Professor Shimer has continued the work on the correlation of the principal geologic formations of North America which is now ready for publication. During the past summer he completely revised several of his graduate courses.

Professor Morris and a group of his students continued a study of the structural relations between extrusive and intrusive rocks in Massachusetts, supplemented by comparisons

with similar rocks in the far West. Field and microscopic methods were used. With another graduate student, he conducted petrographic studies of specially treated concrete.

Professor Slichter reports that the field measurements in central Massachusetts concerning the electrical resistivity of the crust which were begun in September 1933 were successfully completed in November. A large map covering an area about fifty miles in diameter was obtained. The work of interpreting the results involves an extensive program of computation, in which the Differential Analyzer is an essential feature. The results will soon be published in detail. Work on a seismic investigation of the crust by means of a series of closely spaced portable seismometers has been commenced. Large quarry explosions involving upwards of fifty tons of dynamite will be used as source. Preliminary observations on two such blasts were made last spring. A grant of \$3,000 has been made by the Geological Society of America in support of this research, which will be supplemented by an equivalent appropriation from the Institute's fund for geophysical research. It is hoped to apply to the observational data new theories of interpretation developed here by Dr. Pekeris.

Professor Newhouse has continued work on the formation temperature of minerals, and the relation of temperature to mineral zoning. During the summer mineral deposits were visited in Pennsylvania, Virginia, Tennessee, Georgia, Kentucky, Illinois and Arkansas for material to be used in this work. Attention has been given to minor elements in common minerals. This work has been largely chemical, and in minor part spectroscopic, with the aid of students in Professor Harrison's Laboratory. Spectroscopic facilities are greatly needed and it is hoped that a spectroscope may be obtained by the Department of Geology. Zoning of minor elements in the common minerals is a subject of much theoretical interest, and spectroscopic work is necessary in carrying out such a study successfully.

Professor Buerger has published two studies in crystal projections, the first on transformations in the gnomonic projection, the second on a new projection, the Weissenberg projection. This has been applied to crystal structure analysis, where it reduces the time for indexing Weissenberg photographs to a

few minutes each. An improved Weissenberg x-ray goniometer has been designed and is being constructed. The notion of an ordered-disordered polymorphic crystal phase transformation has been developed and applied to solid solution and unmixing, and has cleared up the anomalous variate atom equipoint situation discovered by Barth. The theory predicts disordered modifications of chalcopyrite and spalerite which have just been confirmed in experimental work in collaboration with N. W. Buerger. A program of research has been instituted on the hitherto unsuspected rôle of minor amounts of hydrogen, water, and other groups, on polymorphic crystal transformations. A preliminary paper has been published on FeS_2 , and work is continuing on FeS_2 , ZnS , Sb_2O_3 and TiO_2 , with encouraging results. Professor Buerger has also published a paper on the theory of ideal solution immersion liquids, and, in collaboration with N. W. Buerger, has investigated the crystallographic relations between unmixed phases in the cubanite-chalcopyrite system. R. D. Butler has published the results of his study on optical properties of immersion liquids of intermediate refractions.

The Department is looking forward with pleasure to welcoming as its new Head, Dr. Warren J. Mead, who will succeed Professor Lindgren who retired in June 1933.

HERVEY W. SHIMER.

Mathematics. The work of the Department has continued without any marked deviation from the programme which has been followed during many years of development. New courses have been introduced as needed by the increasing scope of the Institute work, others modified to meet changing demands. It is gratifying that the Department is now regarded as one of the strongest in the country both in teaching and research. Recognition has come to certain members of the Department from outside sources. The Bocher prize awarded every four years by the American Mathematical Society for a paper in the *Mathematical Journal* has been divided between Professor Wiener and Professor Morse of Harvard. Professor Wiener has also been chosen to give the Colloquium Lectures at the summer meeting of the American Mathematical Society. Professor Struik has been invited to lecture in Mexico City and has done

so on his way to Europe for a year's leave of absence. Professor Jesse Douglas has been called to serve for a year at the Institute for Advanced Study at Princeton. Professor Szasz, visiting professor from the University of Frankfurt, has shared in the seminar and teaching work of the Department during the year.

FREDERICK S. WOODS.

Physics. A number of advances in undergraduate teaching have been made or planned during the year. Conferences with members of the Departments of Mechanical Engineering, Electrical Engineering, and Mathematics have led to valuable suggestions in regard to the teaching of physics in the first two years, which will be put into effect in the year 1934-35. Professor Frank has been writing a text for the first year work which will greatly aid in the effective teaching of this subject. A new third year laboratory course in Physical Measurements has been established for students specializing in physics. This should develop into an important part of the undergraduate instruction. The new text in theoretical physics facilitates the teaching of that subject. The work in acoustics is advancing, under the joint auspices of the Departments of Physics and Electrical Engineering. In the graduate work, the principal instructional advance has been in the form of a new system of general examinations, two written and one oral examination giving a more thorough and at the same time a fairer test than had been previously the case.

The most conspicuous incidents of the year for the Department have been the various scientific meetings to which we acted as host. In November the National Academy of Sciences met at the Institute, the sessions being held in the George Eastman Lecture Room. The American Association for the Advancement of Science and the American Physical Society held their annual Christmas meetings in Cambridge, Harvard University and the Institute acting as joint hosts. In addition, a second Spectroscopic Conference was held by the Department, in July 1934, even exceeding in success the very interesting conference of 1933. The main topic this year was the relation of spectroscopy to biology and other related fields. Many representatives of the biological and medical fields attended, and the

important place of the Institute in spectroscopic science was brought out by the success of and general interest in the Conference. Again there were numerous visiting workers in the Spectroscopy Laboratory during the summer.

The Department was fortunate to have Professor James Franck, formerly of the University of Göttingen, as guest lecturer during December, sharing his visit with Harvard University. The hospitality of the laboratory was also extended to a number of National Research Fellows and guests. The place of the Department in research and graduate work is shown not only by the presence of these visitors and guests, but also by the gratifying and continual increase in the number of graduate students.

Advances in research have been made in many fields during the year, taking advantage of the unusual facilities of the new laboratory. A few of the more striking ones may be mentioned. Professor Warren, by advances in the technique of x-ray crystal measurement, has been able to proceed much further than previously in interpreting the structure of liquids, and of amorphous solids and glasses. Professor Mueller continues his study of the remarkable dielectric properties of Rochelle salt. Professor Stockbarger has been able to grow the largest crystals so far obtained of lithium fluoride, a difficult substance to crystallize, but one which is transparent further into the ultraviolet than any other known substance. It is hoped to use his crystals in constructing optical apparatus for use in the ultraviolet. Professor Harrison has been proceeding with his program of introducing automatic methods into spectroscopy. His interval sorter has already proved its worth, and remarkable progress has been made on an automatic machine for measuring and calibrating spectrum photographs. Dr. Wulff has set up the reflection echelon, one of the few in existence, and is using it to investigate hyperfine structure of spectral lines. Dr. Boyce, in collaboration with members of the Harvard College Observatory, has made important advances in the interpretation of the spectra of nebulae containing the inert gases. Professor Van de Graaff continues his large program of high voltage and nuclear research. During the year, a successful first public demonstration of the generator at Round Hill was made. The highly significant researches on the technical application of high voltage

have continued in collaboration with the Electrical Engineering Department. Professors Stratton and Morse have brought practically to completion their important mathematical research on ellipsoidal wave functions, which may be expected to lead to important practical results in many branches of physics.

JOHN C. SLATER.

SCHOOL OF ARCHITECTURE

Architecture. The addition of four new teachers has provided the Department an excellent opportunity during the year for testing certain revisions in policy that were outlined in last year's report.

The results, if not conclusive, were encouraging. Research supplementing the regular lectures in history not only added interest to the subject but helped to develop individual tastes among the students. Decorative composition in connection with freehand drawing related this subject to the needs of the architect more definitely than ever before, though the programs in this field still need study and adjustment. Satisfactory results were also achieved in the closer relation of the teaching of mathematics and mechanics to the architect's needs in construction.

It is only natural that in this process of adjustment Design should have a generous share of attention. The policy previously announced for the early years is being further developed. The use of models for the study of problems in all grades is now successfully practiced. Special attention is given not only to the sequence but to the form and content of design programs.

The significance of these new methods was further emphasized by staff meetings at which one or another of these subjects was made the major topic of discussion, in order that all teachers, whatever their individual interests, should sense and cooperate in determining the necessary correlation between their subjects to the end that the Department's purpose may be successfully achieved.

The direction of these various efforts is definitely toward developing the individual capacities of the student. Present conditions in America, as well as future prospects, call for the

broadest possible educational foundation commensurate with adequately thorough preparation. The future growth of the School of Architecture should recognize this need. The courses in Architectural Engineering and in City Planning are evidence of such development. Similar opportunity for the direction of student effort to fields reached through the study of Architecture, but not necessarily confined to its professional limits, may well be found in Industrial Design, Architectural Administration, or Archaeology, to mention only a few of such possibilities.

A second year's support of City Planning scholarships by the Carnegie Corporation is gratefully acknowledged, as are also gifts for our Fontainebleau Prize from Mrs. Robert Emmons, Mr. Edwin S. Webster, and Mr. and Mrs. Richard Wheatland. Mrs. Horatio Lamb and Mrs. Guy Lowell both presented examples of old stained glass that add definitely to the value of our teaching equipment.

Generous evidence of the loyalty of our alumni was received from the estate of J. Lawrence Mauran in a gift of ten thousand dollars.

Such acknowledgments would not be complete without mention of the generous coöperation received from the Administration in making possible our new illustrated bulletin of information.

A visit by the head of the School in the early spring to twelve other Schools of Architecture and groups of alumni was stimulating and instructive, showing as it did how far reaching is the influence of our standards and methods.

Students of the School were successful in winning the Fontainebleau Prize offered by the Beaux Arts Institute of Design in New York, as well as the Rotch Traveling Scholarship and the Kelly Scholarship, both of Boston.

WILLIAM EMERSON.

City Planning. The course in City Planning recently inaugurated in the School of Architecture emerged from its first year of operation in a satisfactory state and with greatly improved prospects for the coming year. The past year was somewhat experimental in nature — although few real obstacles were encountered and only two major changes are contemplated for

next year. One is the substitution of a course in Municipal Engineering for the course in Railway and Highway Curves, and the other the inclusion of a course in Social and Economic Factors in City Planning, to be given by Professor Burdell.

The major event of note during the year was the visit of Sir Raymond Unwin, internationally-known expert in city planning and housing, under the auspices of the School of Architecture. Sir Raymond arrived early in December and spent a month in Boston, during which time he gave eight lectures in the course and supervised certain of the students' work in city planning design.

The first year of the course did not attract a large number, and it is not to be expected that such a specialized course will attract more than a small percentage of the students registered in the School. There were only three fourth-year students and an equal number in the graduate year who elected to take their work in city planning. These three attained a high standard of accomplishment, and one of them, Mr. J. Ross McKeever (Research Fellow in City Planning for 1933-34) has been appointed Assistant in City Planning for the coming year. Besides carrying on the regular course of studies required of candidates for the degree of Master in Architecture, Mr. McKeever undertook a research study of the Beacon Hill district of Boston under the direction of Dr. Thomas Adams.

Prospects for the new year are excellent with a fine group of applicants from which to select the scholarship holders.

WILLIAM EMERSON.

Architectural Engineering. There has been no change in general policy during the year. Methods of instruction are being followed which have been developed during the past years and which have been demonstrated through experience to produce the most satisfactory results.

The departmental professional courses in Structural Analysis and Design, for illustration, lend themselves best to a sort of Seminar method of instruction: individual discussion, or discussion among small groups, of the problems under consideration; long class hours with an instructor constantly in attendance but without full time attendance necessarily require

the student; comparatively few formal lectures to the class as a whole, and these used mainly for the presentation of certain fundamental problems which find their application in the work of the course.

This method of teaching requires more alertness and effort and much more time on the part of the instructor than would a series of formal lectures followed by long periods of unsupervised preparation. The latter method may be the more satisfactory in a certain class of subjects but not in those under consideration. Subjects like these cannot be taught by reference to textbooks — there are none — and progress must be sought through personal contact between the individual student and the instructor. It is not a question either of information or of methods but of a gradual and guided development of the student's power to take the initiative and stand on his own feet, to attack new problems and achieve satisfactory solution.

In an institution where many subjects are being studied in widely diversified fields there are necessarily many methods of approach, varying almost as widely as the subjects themselves, some methods suited to certain fields and quite unadaptable to others. Any rules adopted by an educational institution for the conduct of its courses should be broad enough and flexible enough to embrace all rational methods. Otherwise they may prove far more of a handicap than a help.

W. H. LAWRENCE.

Drawing. The Division of Drawing must record with regret a reduction of thirty hours in the time allotted to Drawing and Descriptive Geometry, although we do appreciate the pressing need for more time for teaching English. Because of this reduction in time our teaching must be the most effective possible and the course is constantly being studied more nearly to achieve this result.

The backbone of the course remains the same. Details are ever being modified as experience points the way. It is planned to present the majority of the problems next year by means of descriptive data, thus obliging the student to make his own layout and to become thoroughly familiar with the statement

before beginning his solution — all with the object of initiating logical and independent thinking on the part of the student.

It is planned to introduce many optional problems to be taken by the student who works and thinks rapidly, to be of sufficient interest to tempt him to do work in addition and in advance of the minimum requirement.

It is planned next year to revise somewhat the order of the work so as to bring it more nearly in step with that of the other engineering schools. This will facilitate giving credit to transfer students and will enable us to discontinue the College Course in Descriptive Geometry.

The Division was represented by Professor Bradley and Professor Watts at the Summer School session on Engineering Drawing and Descriptive Geometry held this year by the Society for the Promotion of Engineering Education at Ithaca.

W. H. LAWRENCE.

DIVISION OF HUMANITIES

Economics and Social Science. For the first time in nearly half a century the Department has not been under the guidance of Professor Dewey. With his maintenance of his office and special work at the Institute we shall continue to enjoy and benefit by his influence, friendship and wise counsel. As editor of the *American Economic Review*, he still maintains the high standard of that journal, and that he served during the year as a member of a Railroad Emergency Board appointed by the United States Board of Mediation, is evidence of his service to economic science and the nation which for many years has been enhancing the reputation of this Department and of the Institute.

The addition of "Social Science" to the name of the Department indicates a broadening of its scope and an enlargement of its activities. New courses have been added to strengthen the graduate work and the services of Professor Burdell have been secured to develop the sociological branch. We now feel justified in offering our subjects as minors for the doctorate; and the introduction of "electives" into various professional courses presents a possibility of our greater usefulness to undergradu-

ates. The decision to introduce a five year course in which social studies play an important part is a challenge to this Department which is gladly accepted by its members. In this project we are assured of the coöperation of the Department of Business and Engineering Administration.

The following have been the principal professional activities of the staff outside the classroom: Informing ourselves of developments in various branches of our science; pursuing researches of our own; keeping abreast of a rapidly changing economic world; discussing questions of current economic interest before clubs, scientific societies and business organizations; and preparing a textbook for use in the elementary course. The last task has taken a great deal of our time, and in September 1934 we issue Volume I of "The Economic Process" coöperatively written for students in the elementary course in Political Economy. The problem of familiarizing ourselves with the rapid changes taking place in the economic world, although almost hopeless in a time like this, is one of the most important features of our work. Among the activities may be mentioned the addresses given by members of the Department at the New Year's Conference of institute graduates organized by Professor Schell.

Professor Doten has been on leave of absence on account of ill-health and his work has been carried on by Mr. Harold Williamson. We wish to thank the Visiting Committee of the Department for its advice and timely assistance.

RALPH E. FREEMAN.

English and History. The Department has continued to broaden its work and to make it more useful to the student body. Even in the first year course there is differentiation according to the varied needs. Students entering the first-year class vary widely in the degree of their preparation in English. Those from the best preparatory schools are generally well advanced; others may be deficient for numerous reasons; for example, their school instruction may have been unsatisfactory; they may come from homes where another language is spoken, and thus their command of English is inadequate. Some come from foreign countries and have recently arrived in this country,

whereas others, more interested or preoccupied with their scientific studies, have not as yet developed a taste for English, and no adequate appreciation of its importance to them professionally. Since no rigid program of work in English could possibly meet the needs of students possessing such different degrees of proficiency, the practice of the Department is to arrange these men at the beginning of the year in sections according to ability. A series of carefully planned tests taken during the first exercises makes possible a division that is approximately accurate, and as the term goes on men can be shifted from one section to another as further evidence of their needs comes to light. For the best prepared students work is provided in reading and composition which will be a real and stimulating advance over what they have hitherto done and which will develop in them a mature point of view toward literature and writing; men deficient in the handling of the English language are given the intensive drill that is necessary to bring their work up to the proper level. The adjustments which the graded sections and the differentiation in subject matter make possible are carried still farther by the system of personal conferences between instructor and student. Such conditions obviously encourage good teaching, for although the instructor is guided by a general plan for the running of the different divisions of the course, he is freed from the necessity of marching in lock step with the other sections. Next year an additional element making for efficiency will be two more hours of time, one hour for class work and one hour for preparation, which has been authorized by the Faculty.

HENRY G. PEARSON.

Military Science and Tactics. Demand for enrolment in Advanced Military Science continues to be satisfactory and the several units have had no difficulty in filling their respective quotas with students possessing the requisite qualifications. The Advanced Course of the Coast Artillery unit, which has been steadily increasing from a recently authorized strength of eighty-five, seems to have become stabilized with a strength of one hundred and twenty juniors and seniors.

The only departmental change of the year consisted of an

increase in length and extension of scope of the course in the Chemical Warfare unit. The success of the change has been such that a corresponding extension will be recommended for the Ordnance unit during the coming year.

No applicants for the Air Corps unit were accepted during the year, and with the graduation of the next class that unit will be discontinued.

In addition to the instruction in Marksmanship given the freshman class, the Department coaches three small-bore rifle teams — Freshman, R. O. T. C., and Varsity. Although the rifle range is in constant use during the indoor season, it is impossible to give rifle instruction efficiently on the inadequate five-point range available. A gallery range of twenty firing points is urgently needed.

S. C. VESTAL.

Modern Languages. There have been few changes in the routine work in French and German during the year. The course in Italian, offered originally every year, was again omitted, owing to the decrease in the staff. As a number of students, especially in Architecture, have expressed the need of this language for their research work, the course will be offered again this coming year. In the second term a group of students in Course XV, planning to take the summer tour of European industries, requested special instruction in practical French and German, and two short volunteer courses without credit were given by the Department. There was again a petition for a course in Russian, but as the Department was not in a position to offer one, private classes were encouraged and a room placed at the disposal of students. As soon as practicable a course in Russian will be offered by the Department if the demand continues.

Eighty-seven individual examinations in French and German were given during the year to graduate students wishing to meet the language requirements for higher degrees.

Mr. Koch represented the Institute as reader in French at the College Entrance Board in June. Mr. Currier spent part of the summer in travel and study in Germany, and Professor Langley devoted most of the summer to research at the

Library of the Institut de France and the Bibliothèque Nationale, Paris.

As there is a growing demand for courses on foreign literature with readings in English translations, the Department is planning a cycle of General Study courses of this nature, such as: Molière in English, Dante in English, Goethe in English. Dante in English will be offered in 1934-35. Students who are able and prefer to do the readings in the foreign language will be encouraged to do so. Such additional courses will not involve an increase of the staff, and these courses will not supplant the existing General Studies in which all readings are assigned in the foreign language.

Another experiment to be tried this coming year is to place for an hour or two each day a phonograph room at the disposal of students for private practice in the various languages.

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, 1934, 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:

Coleman duPont Fund, for Endowment (additional)	\$12,154.76	
Anonymous, Rupert Anderson Marden Scholarship Fund	2,000.00	
Industrial Fund, Contributions	8,500.00	
Hiram H. Logan Fund, for Endowment	17,000.00	
John Lawrence Mauran Fund, for Architecture	10,000.00	
Everett Morss Fund, for Endowment	25,000.00	
George Blackburn Memorial Fund (additional)	4,556.34	
Albert G. Boyden Fund, for Scholarship (additional)	3,150.21	
Elihu Thomson Fund, for Professorship in Electrical Engineering	4,760.00	
		\$87,121.31

Miscellaneous Gifts:

American Academy of Arts and Sciences		
Permanent Science Fund	\$500.00	
American Philosophical Society, Fog Research	2,000.00	
Anonymous, Electrical Engineering Department	5,000.00	
Anonymous, Electrical Engineering Research, Special Salary	1,800.00	
Carnegie Corporation of New York, City Planning	8,000.00	
Contributions, Professors Fund	12,720.17	
Paul J. Culhane, Nichols Scholarship Fund	300.00	
Lammot duPont, Boat House Equipment	1,000.00	
Professor and Mrs. William Emerson, City Planning	1,666.66	
Emergency Committee and Rockefeller Foundation, to Aid Displaced German Scholars, Special Salaries	1,900.00	
H. C. Frick Fund (additional)	7,000.00	
General Electric Company for Course VI-A	3,750.00	
Geology Society of America, Special Salaries	1,260.00	
N. H. George Fund	40.00	
Col. E. H. R. Green, for Research at Round Hill	10,000.00	
Charles Hayden, Perpetual Challenge Cup	800.00	
L. J. and Mary E. Horowitz, for Course in Building Construction	10,000.00	
Alfred L. Loomis, President's Special Fund	5,000.00	
John R. Macomber, for Business and Engineering Administration	500.00	
Redfield Proctor, Travelling Fellowship and Stratton Prize Fund	310.00	

Contributions, Architectural Scholarship	\$200.00	
Rockefeller Foundation, for Fluid Research (addi- tional)	37,500.00	
Rockefeller Foundation, for Meteorological Research.	9,881.52	
Tech Club of Japan	200.00	
Estate of Mary E. Fitch	100.00	
Mr. and Mrs. Marden, for Dormitories	85.00	
		121,513.35
Total Capital and Miscellaneous Gifts		<u>\$208,634.66</u>

Excepting conversion of the Power Plant from coal to oil burning, there were no plant changes during the year.

Late in June, work was started on the new Edmund Dana Barbour Field House replacing inadequate facilities at the Athletic Field. Also, as a result of departmental changes, considerable building alteration is under way in anticipation of the coming year. Expenditures for usual repairs and maintenance almost duplicated those of last year. There has been no change in the policy of maintaining both plant and facilities in good condition.

Net operating income again declined approximately \$150,000, largely on account of reduced registration. Income from investments available for current income was about \$17,000 less than in the preceding year.

Operating expenses were in turn reduced to meet this lessened income, principally in the Teachers Salary Accounts — not through salary reductions but by reduction in the staff due to withdrawals and retirements.

The Salaries Reserve Plan was carried on until October 1933 when it was apparent that this Fund would for a second year be unnecessary to balance the year's budget. The Plan is again in effect for 1934-35.

There was a slight balance resulting from operation, \$667, as against the deficit for the preceding year of \$4,772.72. The Institute's cumulative deficit on account of operation since 1865 is now \$29,878.64.

The book value of the endowment funds, \$31,848,515.71, is a decrease of \$882,716.88 over a year ago, due largely to restoring to the Endowment Reserve Fund all profits from previous sales and maturities which were credited to the funds in 1930. After a considerable exchange of securities, increasing the holding of common stocks (see pages 28 and 30), the Endowment Reserve Fund now stands at \$526,338.35.

A year ago the market value of all securities in which the Institute's Funds were invested was 82 per cent of the book value; on June 30, 1934, the market value of all securities was 93 per cent of the book value.

The net yield to all funds for the past year was 4.53 per cent compared with 4.47 per cent last year and 4.54 per cent the year preceding.

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, 1934 and I enclose cumulative statement of receipts and disbursements for the four fiscal years ended June 30, 1931, 1932, 1933, and 1934, together with statement showing how the balance of the Fund is now constituted.

I also enclose report of Messrs. Loomis, Suffern & Fernald (Certified Public Accountants) covering examination of the accounts of the Technology Loan Fund.

The names of the members of the Technology Loan Fund Committee are as follows:

Mr. Charles Hayden, *Chairman*
Mr. Gerard Swope
Mr. Edwin S. Webster
Mr. Pierre S. duPont
Mr. John E. Aldred
Dr. Karl T. Compton
Mr. Horace S. Ford

Respectfully submitted,

CHARLES HAYDEN,
Chairman Technology Loan Fund Committee.

STATEMENT OF RECEIPTS AND DISBURSEMENTS

	<i>Fiscal Year Ended June 30, 1931</i>	<i>Fiscal Year Ended June 30, 1932</i>	<i>Fiscal Year Ended June 30, 1933</i>	<i>Fiscal Year Ended June 30, 1934</i>	<i>Total</i>
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	33,133.29	94,725.61
Profit on Securities sold . . . . .	.....	.....	.....	13,939.75	13,939.75
TOTAL RECEIPTS . . .	\$745,852.01	\$54,202.66	\$386,757.83	\$47,073.04	\$1,233,885.54
†Advances to Institute for Loans to Students	53,848.00	173,484.01	189,695.92	169,190.05	586,217.98
BALANCE OF FUND . .	\$692,004.01	*\$119,281.35	\$197,061.91	*\$122,117.01	\$647,667.56

* Deficit for year.

† See Schedule P.

STATUS OF FUND AS AT JUNE 30, 1934

*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 Co. \$6 Pfd.	6,000.00
*382 23/200	North American Co. com.	22,075.00
250	Stone & Webster Co.	24,718.75
		<u>\$87,793.75</u>

Securities Purchased

		<i>Cost</i>
\$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 1937	50,000.00
100,000	Bklyn. Man. Transit 6s 1949A	99,000.00
16,000	Bklyn. Man. Transit 6s 1968	14,487.50
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
50,000	Edison Elec. Illum. Co. of Boston 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	316.67
		<u>\$486,296.67</u>

TOTAL INVESTMENTS \$574,090.42

Cash on Hand 73,577.14

TOTAL FUND \$647,667.56

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, 1934

<i>Assets</i>	
Investments (as listed below)	\$802,765.16
Cash	18,747.93
Total	\$821,513.09

<i>Liabilities</i>	
Teachers' Annuity Fund (5% salary deduction, plus interest)	\$440,781.99
*M. I. T. Pension Fund (3% appropriation, plus interest)	298,384.11
Reserve Fund (and interest)	23,323.31
Special Reserves for Annuity Payments (13 Annuitants)	59,023.68
Total	\$821,513.09

<i>Par</i>	<i>Investments (as above)</i>		<i>Book Value</i>
\$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	Allis-Chalmers Mfg. Co.	5% 1937	35,002.00
30,000	Atlantic Refining Co.	5% 1937	30,622.00
10,000	Chile Copper Company	5% 1947	9,587.50
60,000	Standard Oil Co. of N. Y.	4½% 1951	58,972.97
25,000	Texas Corp., Conv. Deb.	5% 1944	25,377.00
35,000	Amer. Tel. & Tel. Co.	5% 1946	35,851.00
30,000	Bell Tel. Co. of Pa.	5% 1948	32,352.00
10,000	Cedars Rapids Mfg. & Pr. Co.	5% 1953	10,000.00
25,000	Central Hudson Gas & Elec. Co.	5% 1957	25,000.00
25,000	Connecticut Light & Power Co.	5% 1962	23,812.50
3,000	Cumberland Tel. & Tel. Co.	5% 1937	3,132.00
25,000	Detroit Edison Company	5% 1949	24,315.65
29,000	Mississippi River Power Co.	5% 1951	29,410.00
25,000	Narragansett Electric Co.	5% 1958	25,232.00
30,000	N. Y. Edison Co., 1st & Ref.	5% 1951	29,025.00
30,000	N. Y. Power & Light Corp.	4½% 1967	29,400.00
30,000	Public Service Elec. & Gas Co.	4% 1971	29,775.00
30,000	Tennessee Elec. Power Co.	5% 1956	29,900.00
20,000	Western Union Tel. Co.	5% 1938	18,597.70
25,000	Atlantic Coast Line, 1st	4% 1952	24,753.15
25,000	Baltimore & Ohio R.R.	4% 1948	25,254.00
10,000	Canadian National Rwy.	4½% 1957	9,775.00
25,000	Canadian Pacific Rwy.	5% 1944	25,421.00
30,000	Chicago, Burlington & Quincy R.R.	3½% 1949	29,399.08
5,000	Chicago & North. Rwy. Eq. Tr.	5% 1937	5,000.00
16,000	Kansas City, Mem. & Burl. R.R.	5% 1934	16,000.00
30,000	Long Island R.R.	4% 1949	29,775.00
25,000	Pere Marquette Rwy. Co.	4½% 1980	24,812.50
22,000	Southern Rwy. Co.	4% 1956	19,580.00
34,000	Union Pacific R.R. Co.	4½% 1967	31,056.11
7,000	Central Mfg. Dist., 1st Mtge.	5½% 1937	7,000.00
\$811,000			\$802,765.16

The market value of these securities as of June 30, 1934 was \$808,000.00.

*The Institute appropriates annually the equivalent of the 5% salary deduction, using approximately 2% for payment of group insurance premiums.

Respectfully submitted,

HORACE S. FORD,
Treasurer.

SCHEDULE A
FINANCIAL RESULT OF OPERATION FOR YEAR ENDED JUNE 30, 1934

	<i>Regular Courses Budget</i>	<i>Research and Funds Non-Budget</i>	<i>Total</i>
Operating Income (Schedule B) . . .	\$2,646,647.58	\$667,649.09	\$3,314,296.67
Operating Expense (Schedule C) . . .	2,645,980.58	902,355.03	3,548,335.61
Excess Income, Budget Operation	\$667.00		
Excess Expense, Non-Budget Operation		\$234,705.94	
Net Excess Expense, Total Operation			\$234,038.94
To meet this Excess Expense the following amounts were available:			
(1) Profit and Loss, balance from previous years' operation (Schedule S)		\$4,881.31	
(2) Special Funds for Excess Expense, Non- Budget Operation		234,705.94	239,587.25
Thus there remained a Balance applicable to reduc- tion of Current Deficit (Schedule S)			\$5,548.31

**SCHEDULE B
OPERATING INCOME FOR YEAR 1933-1934**

<u>INCOME FROM STUDENTS.</u>	<i>Regular Courses Budget</i>	<i>Research and Funds Non-Budget</i>	<i>Total</i>
(a) Tuition Fees	\$1,282,194.63	.....	.....
Locker Fees	977.06	.....	.....
Entrance Examination Fees . .	1,890.00	.....	.....
Condition Examination Fees . .	5,290.00	.....	.....
Late Registration Fees	1,167.00	.....	.....
Net Dormitory Income (Schedule C-20)	28,384.80	.....	.....
	<u>\$1,319,903.49</u>	.....	<u>\$1,319,903.49</u>
<u>INCOME FROM INVESTMENTS:</u>			
Endowments, General Purposes (Schedule M)	\$1,148,142.41	\$9,035.39	\$1,157,177.80
Endowments, Designated Purposes (Schedule M)	65,182.72	204,645.81	269,828.53
(b) Net (Schedule M)	<u>\$1,213,325.13</u>	<u>\$213,681.20</u>	<u>\$1,427,006.33</u>
<u>INCOME FROM OTHER SOURCES:</u>			
Federal Aid from Acts, 1862-90 . .	\$22,255.00	.....	.....
W. T. Sedgwick Fund	5,000.00	.....	.....
Edward Whitney Fund	9,000.00	.....	.....
Carnegie Corporation, City Planning	4,000.00	.....	.....
General Electric Co., Course VI-A . .	3,750.00	.....	.....
William Emerson, City Planning	1,666.66	.....	.....
Horowitz Foundation	10,000.00	.....	.....
Industrial Fund, D. I. C.	24,494.27	.....	.....
W. E. Nickerson Fund	5,830.21	.....	.....
Division of Laboratory Supplies	4,988.92	.....	.....
Trustees H. C. Frick Estate	7,000.00	.....	.....
U. S. Government, Torpedo Research	1,640.16	.....	.....
Rockefeller Foundation and Institute of International Education	1,900.00	.....	.....
Bank Interest	593.74	.....	.....
Huntington Hall Rental	3,500.00	.....	.....
Walker Building, Boston	7,500.00	.....	.....
Miscellaneous	300.00	.....	.....
	<u>\$113,418.96</u>	.....	<u>\$113,418.96</u>
<u>MINOR FUND EARNINGS:</u>			
Total (Schedule R) . . . . .	.....	\$453,967.89	\$453,967.89
TOTAL OPERATING INCOME (Schedule A)	<u>\$2,646,647.58</u>	<u>\$667,649.09</u>	<u>\$3,314,296.67</u>
(a) TUITION FEES — Cash, Institute Year 1933-34			\$857,262.37
Cash, Summer Session 1933			81,697.52
Fees Receivable			2,171.24
Undergraduate Scholarships			62,559.00
Graduate Scholarships			71,561.00
Technology Loan Fund, Loans			202,835.00
Emerson Fund			4,108.50
Total			<u>\$1,282,194.63</u>
(b) Additional Income offset by Accrued Interest, etc.			\$19,655.07

SCHEDULE C
OPERATING EXPENSE FOR YEAR 1933-1934

<u>ACADEMIC EXPENSES:</u>	<i>Regular Courses Budget</i>	<i>Research and Funds Non-Budget</i>	<i>Total</i>
Salaries of Teachers (C-1)	\$1,398,286.10	.....	.....
Wages Accessory to Teaching (C-1)	45,808.71	.....	.....
Wages, Laboratory Service (C-1)	59,657.17	.....	.....
Department Expenses (C-2)	121,431.14	.....	.....
General Library (C-3)	58,605.00	.....	.....
	<hr/> \$1,683,788.12	.....	<hr/>\$1,683,788.12
 <u>ADMINISTRATION EXPENSES:</u>			
Salaries, Officers	\$91,000.00	.....	.....
Wages, Clerical Staff (C-4)	69,551.41	.....	.....
Expenses, Offices (C-5)	23,331.39	.....	.....
Bulletins and Publicity (C-6)	9,590.89	.....	.....
General Expense (C-7)	117,278.99	.....	.....
	<hr/> \$310,752.68	.....	<hr/>\$310,752.68
 <u>PLANT EXPENSES:</u>			
Wages, Building Service (C-8)	\$115,108.27	.....	.....
Power Plant Operation (C-9)	99,030.61	.....	.....
Fire Insurance (Net)	5,183.62	.....	.....
Repairs and Alterations (C-10)	107,016.55	.....	.....
	<hr/> \$326,339.05	.....	<hr/>\$326,339.05
 <u>MISCELLANEOUS EXPENSES:</u>			
Department of Hygiene (C-11)	\$59,420.33	.....	.....
Summer Camps 1933 (C-12 and C-13)	5,509.61	.....	.....
Division of Industrial Coöpera- tion	24,494.27	.....	.....
Athletic Field, Boat House and Launches (C-14)	15,355.74	.....	.....
Special Appropriations (C-16)	199,317.63	.....	.....
*Walker Memorial (C-17)	21,003.15	.....	.....
	<hr/> \$325,100.73	.....	<hr/>\$325,100.73
 <u>EXPENSES OF MINOR FUNDS:</u>			
Total (Schedule R) . . . . .	.....	\$755,360.16	\$755,360.16
 <u>AWARDS FROM FUNDS:</u>			
Total (Schedule C-18) . . . . .	.....	\$133,088.74	\$133,088.74
 <u>PAYMENTS FROM SPECIAL FUNDS:</u>			
Total (Schedule C-19) . . . . .	.....	\$13,906.13	\$13,906.13
 <u>TOTAL OPERATING EXPENSE</u>			
(Schedule A)	<hr/> \$2,645,980.58	<hr/> \$902,355.03	<hr/> \$3,548,335.61

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

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

<i>Department</i>	<i>Teachers Salaries</i>	<i>Wages Accessory to Teaching</i>	<i>Wages Laboratory Service</i>
Summer Session, 1933	\$61,894.72	.....	.....
Aeronautical Engineering	79,172.97	\$1,981.00	.....
Architecture	66,500.00	3,648.69	\$2,789.64
Biology and Public Health	41,040.00	1,372.00	1,820.00
Business and Eng. Administration	48,802.00	1,451.00	.....
Chemistry	155,024.78	5,405.00	4,204.00
Chemical Engineering	39,242.00	1,560.00	1,750.00
Chemical Engineering Practice School	12,300.00	1,326.00	.....
Civil Engineering	93,637.63	3,840.00	.....
Division of Laboratory Supplies . . . . .	.....	.....	16,361.00
Drawing	24,000.00	312.00	.....
Economics	35,662.00	2,975.33	.....
Electrical Engineering	135,233.00	5,449.00	10,548.43
English and History	58,420.00	1,041.00	.....
General Eng. and General Science	1,000.00	* .....	.....
General Studies	1,600.00	.....	.....
Geology	31,400.00	1,889.00	.....
Humanics	5,000.00	* .....	.....
Lantern Operation . . . . .	.....	.....	1,000.83
Mathematics	74,175.00	1,050.00	.....
Mechanical Engineering	147,883.00	3,975.69	13,098.19
Military Science	7,480.00	980.00	.....
Mining and Metallurgy	76,195.00	2,509.00	4,545.08
Modern Languages	17,300.00	470.00	.....
Naval Architecture	34,450.00	1,340.00	1,790.00
Physics	150,874.00	3,234.00	1,750.00
Totals (Schedule C)	<u>\$1,398,286.10</u>	<u>\$45,808.71</u>	<u>\$59,657.17</u>

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

SCHEDULE C-2

***DEPARTMENT EXPENSES (Net)**

<i>Department</i>	<i>Expense (Net)</i>	<i>Overdraft</i>
Aeronautical Engineering	\$4,100.00	\$212.53
Architecture	*6,250.00	69.81
Biology	*3,000.00	.....
Business and Engineering Administration	4,135.99	.....
Chemistry	15,503.17	.....
Chemical Engineering	*6,182.93	.....
Chemical Engineering Practice School	7,506.43	.....
Civil Engineering	*1,955.83	.....
Drawing	335.24	.....
Economics	*1,621.08	.....
Electrical Engineering	*22,550.00	90.74
English and History	327.77	.....
General Engineering and General Science	449.63	.....
General Studies	84.65	.....
Geology	*2,050.00	46.52
Humanics	830.21	.....
Mathematics	*141.76	.....
Mechanical Engineering	*14,884.15	.....
Military Science	1,425.71	.....
Mining and Metallurgy	6,000.00	.....
Modern Languages	218.61	.....
Naval Architecture	1,150.00	10.74
Physics	*20,524.56	.....
United States Army and Navy Officers	203.42	.....
Totals	<u>\$121,431.14</u>	<u>\$430.34</u>
	(Schedule C)	(Schedule D)

SCHEDULE C-3

GENERAL LIBRARY

	<i>Expense (Net)</i>	<i>Overdraft</i>
Salaries of Officers	\$14,552.67	.....
Wages, Clerical Staff	27,972.64	.....
Expenses	16,079.69	\$86.55
Totals	<u>\$58,605.00</u>	<u>\$86.55</u>
	(Schedule C)	(Schedule D)

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

SCHEDULE C-4
WAGES, CLERICAL STAFF, ADMINISTRATION OFFICES

President and Vice-President	\$5,258.37
Dean of Science	940.00
Dean	2,040.00
Registrar	24,748.41
Director of Admissions	6,385.00
Bursar	19,382.90
Superintendent	6,920.00
Undergraduate Scholarship and Loan Fund Board	3,876.73
Total (Schedule C)	<u>\$69,551.41</u>

SCHEDULE C-5
EXPENSES, ADMINISTRATION OFFICES

President and Vice-President	\$2,680.12
Dean of Science	209.68
Dean	527.28
Registrar	9,858.56
Director of Admissions	1,054.43
Bursar	5,389.49
Superintendent	731.85
Undergraduate Scholarship and Loan Fund Board	1,327.20
Graduate School and Scholarship Committee	273.76
New Student Publicity Account	1,279.02
Total (Schedule C)	<u>\$23,331.39</u>

SCHEDULE C-6
BULLETINS AND PUBLICITY

Advertising — M. I. T. Publications	\$1,261.89
Printing — President's and Treasurer's Reports	1,197.00
Directory	555.00
Summer Session 1934	1,673.00
General Catalogue	4,904.00
Total (Schedule C)	<u>\$9,590.89</u>

SCHEDULE C-7
GENERAL EXPENSE

News Service	\$6,318.18
Allowances	24,714.70
Pensions	12,164.92
Care of Securities	20,000.00
Workman's Compensation and General Liability Insurance, etc.	6,391.67
Taxes, Cambridge and Maine	7,258.24
Auditing	1,000.00
Miscellaneous Dues, Fees, etc.	1,484.17
Receptions, Graduation	5,468.04
Ice — ice water	927.60
Trucking of Mail	1,034.01
Travel	7,801.14
Telephone Service	21,741.75
Catalogue of Former Students	4,157.67
Total	<u>\$120,462.09</u>
Less Credits	3,183.10
Total (Schedule C)	<u>\$117,278.99</u>

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

Shop Foremen (net)	\$2,924.59
Janitors: Supervisory and Staff	53,536.85
Night Cleaners	21,756.77
Watchmen (including Cambridge Police)	12,949.90
Window Cleaning	7,715.85
Heating and Ventilation	8,702.23
Messengers, Mail, Elevator, Shipper, Stock Room	7,522.08
Total (Schedule C)	<u>\$115,108.27</u>

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

Oil	\$52,289.77
Coal	11,125.42
Water	2,784.60
Supplies	2,348.19
Repairs	8,425.95
Trucking, etc.	203.31
Salaries	26,980.57
Electricity, Rogers Building	3,030.89
Oil Burning Conversion ($\frac{1}{2}$ cost)	14,400.00
Total	\$121,588.70
Less Transfers and Credits	22,558.09
Total (Schedule C)	<u>\$99,030.61</u>

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

Buildings 1, 2, 3, 4, 5, 6, 8, 10, 11	\$39,659.17
Rogers Building, Boston	5,373.29
Buildings No. 30, 31, 33, 35, 36, 38, 46	2,587.58
Miscellaneous Wooden Buildings, etc.	579.13
Alterations	908.51
President's House	2,553.57
Furniture	4,560.67
Elevators	1,838.82
Mains and Conduits	6,095.09
Water	7,641.57
Gas	2,293.79
Grounds, Roads, Tennis Courts, etc.	27,117.80
Building Protection	1,486.18
Rubbish	2,242.93
Undistributed (net)	2,078.45
Total (Schedule C)	<u>\$107,016.55</u>

SCHEDULE C-11

DEPARTMENT OF HYGIENE

Salaries, Medical Director, Assistants and Infirmary Staff . . .	\$30,213.79
Additional Medical Services	725.00
Physical Training and Coaching	20,830.50
Medical and Other Supplies	1,638.34
Physical Examinations	2,929.61
Equipment	449.67
Food Account (Net)	895.74
Laundry	704.07
Miscellaneous	1,033.61
Total (Schedule C)	<u>\$59,420.33</u>

SCHEDULE C-12

CIVIL ENGINEERING SUMMER CAMP (1933)
TECHNOLOGY, MAINE

<i>*Income:</i>	
From Students and Staff	\$3,563.28
Miscellaneous	174.91
Total Income	<u>\$3,738.19</u>
<i>*Expenses:</i>	
Travel Expense	\$324.16
Construction and Repairs	681.79
Caretaker	1,440.00
Taxes and Insurance	1,277.71
Administration, Telephone, etc.	497.62
Wages — Operating	840.00
Provisions and Supplies	2,017.64
Coal, Wood, Gas and Ice	769.13
Express and Freight, Laundry	156.47
Total Expense	<u>8,004.52</u>
Net Expense	<u>\$4,266.33</u>

SCHEDULE C-13

MINING ENGINEERING SUMMER CAMP (1933), DOVER, N. J.

<i>*Income:</i>	
From Students and Staff	\$828.07
Miscellaneous	16.95
Total Income	<u>\$845.02</u>
<i>*Expenses:</i>	
Travel Expense	\$125.12
Repairs and Equipment	188.79
Caretaker, Insurance, Tel. Adm., Light	972.05
Wages — Operating	400.00
Provisions and Supplies	402.34
Total Expense	<u>2,088.30</u>
Net Expense	<u>\$1,243.28</u>
Total Expense of Camps (Schedule C)	<u>\$5,509.61</u>

*Tuition Receipts and Staff Salary Payments included in Summer Session, pp. 121 and 123.

SCHEDULE C-14
ATHLETIC FIELD, BOAT HOUSE, LAUNCHES

Athletic Field, Maintenance	\$8,182.75
Boat House, Maintenance	4,903.82
Launches, Maintenance	2,269.17
	<u>15,355.74</u>
Total (Schedule C)	\$15,355.74

SCHEDULE C-15
DINING SERVICE (Net)

Inventory, June 30, 1933:

Utensils	\$8,707.01
Stock	1,880.27
	<u>\$10,587.28</u>

Expenditures:

Food	\$40,419.31
Salaries	38,655.63
Light, Heat and Water	4,539.64
Ice, Refrigeration	381.60
Laundry	1,927.76
Dining Room and Kitchen Equipment	2,282.69
Repairs	995.91
Printing and Advertising	928.95
Administration Expense	762.92
Insurance	676.93
	<u>91,571.34</u>
Total	\$102,158.62

Income:

Coupon Books	\$41,504.70
Less Outstanding Coupons (Schedule D)	161.46
	<u>\$41,343.24</u>
Cash	48,720.38
Drawn from Dining Service Reserve Fund	1,159.75
	<u>\$91,223.37</u>

Inventory, June 30, 1934:

Utensils	\$9,264.60
Stock	1,670.65
	<u>10,935.25</u>
Total	\$102,158.62

**SCHEDULE C-16
SPECIAL APPROPRIATIONS**

Graduate Students and Staff Tuition Awards				\$31,457.00
Undergraduate Dues				17,859.50
Pension and Insurance Plan — Staff				64,918.79
Insurance Plan — Employees				5,114.65
No. 980 and 1008, Alumni Placement Work				850.00
Society of Arts				2,051.36
No. 1026, Power Plant, Boiler No. 1 Conversion				5,445.00
No. 982, Maclaurin Portrait				350.00
President's Fund				2,000.00
Technology Movie (Additional Expense)				647.09
High Voltage Power Project				1,395.11
No. 981, Technology Review				600.00
No. 985, A. A. A. S.				900.00
No. 968 and 1028, Century of Progress Exhibit				4,215.16
No. 1027, Technique				192.50
No. 1034, Special Departmental Alterations				6,000.00
No. 1018, Graduate Dormitory and Special Repairs (additional)				6,728.70
No. 1002, 1006, 1022, Undergraduate and Architectural Bul- letins				8,809.43
No. 998 and 1017, Open House				1,193.38
No. 987, Crafts Library				1,000.00
No. 984, Publicity				250.00
No. 1003 and 1019, Nuclear Research				14,000.00
No. 991, Osborne Fund				1,000.00
No. 992, Placement Training Committee				400.00
No. 1011, Library for Economics Department				300.00
No. 993, Airplane photographs rights				50.00
No. 994, Special Tuition Appropriation				500.00
No. 1001, Public Address System				1,830.56
Engineering Research				5,000.00
No. 1002, Special Publicity				129.27
Biography, Dr. Richard C. Maclaurin				800.00
To DEPARTMENTS:				
<i>Architectural</i>			Total	305.22
No. 995 \$205.22 No. 1029 \$100.00				
<i>Biology and Public Health</i>			Total	1,600.00
Food Research \$1,200.00				
Health Education 400.00				
<i>Chemical Engineering</i>			Total	731.75
No. 997 \$431.75 No. 1007 \$300.00				
<i>Civil Engineering</i>			Total	1,825.00
Soil Mechanics \$300.00 No. 1024 \$1,325.00				
Special Res. \$200.00				
<i>Economics</i>			Total	100.00
Moving Expenses \$100.00				
<i>Electrical Engineering</i>			Total	1,746.81
No. 1005 \$500.00 No. 977 \$946.81				
No. 983 \$300.00				
<i>Geology</i>			Total	2,000.00
No. 1021 \$2,000.00				
<i>Mathematics</i>			Total	2,000.00
<i>Journal of Mathematics and Physics</i> , \$2,000.00				
<i>Mechanical Engineering</i>			Total	1,171.35
Textile School \$271.35 No. 1014 \$900.00				
<i>Physics</i>			Total	1,850.00
No. 989 \$350.00 No. 1023 \$1,500.00				
Total (Schedule C)				<u><u>\$199,317.63</u></u>

SCHEDULE C-17
WALKER MEMORIAL (Net)

Income:

Games	\$1,150.93
-----------------	------------

Expenses:

Salaries	\$8,851.05
Light, Heat, Power	3,984.60
Water	585.48
Repairs, Alterations, Maintenance	6,332.71
Trucking, Administration	148.05
Supplies, Magazines and Papers	571.58
Account of 5:15 Club Room	1,680.61

Total	22,154.08
-----------------	-----------

Net Expense (Schedule C)	<u>\$21,003.15</u>
------------------------------------	--------------------

SCHEDULE C-18
AWARDS FROM FUNDS

Teachers' Fund, for Retiring Allowances	\$3,904.74
Robert A. Boit Fund, for Prizes	245.00
Class of 1904 Fund for Prize	10.00
Arthur Rotch Prize Funds, for Prizes	400.00
James Means Prize Fund, for Prizes	112.50

Roger Defriez Hunneman Fund, for Prizes	50.00
Samuel W. Stratton Fund, for Prizes	100.00
Frances and William Emerson Fund, for Student Aid	4,108.50
William Barton Rogers Fund, for Student Loans	3,128.50
Bursar's Fund, for Student Loans	2,225.00

Dean's Fund, for Student Loans	475.00
Summer Surveying Camp Fund, for Loans	150.00
Edward Austin Fund, for Graduate Scholarships	20,000.00
Jonathan Whitney Fund, for Graduate Scholarships	21,004.00
Misc. Funds, for Graduate Scholarships and Fellowships	10,616.50

Misc. Funds for Undergraduate Scholarships	62,559.00
Jonathan Whitney Fund, for Technology Christian Association	4,000.00

Total (Schedule C)	<u>\$133,088.74</u>
------------------------------	---------------------

SCHEDULE C-19
PAYMENTS FROM INCOME OF SPECIAL FUNDS

Edward Whitney, for Research	\$70.35
Walter S. Barker, for Books	429.89
Frank Harvey Cilley, for Books, etc.	2,053.70
Charles Lewis Flint, for Books	138.85
William Hall Kerr, for Books	58.01
George A. Osborne, for Books	220.89
Technology Matrons' Fund, for Teas	390.72
John Hume Tod, for Books	90.49
Theodore N. Vail, for Vail Library	1,681.01
Ednah Dow Cheney, for Margaret Cheney Room	1,389.81
F. Jewett Moore, for Chemical Department	219.42
F. W. Boles Memorial, for Architectural Department	288.02
Edmund K. Turner, for Annuity and Tax	2,078.10
Pratt Naval Architectural, for Nautical Museum and Annuity	2,873.48
Charles W. Eaton, for Special Expense and Taxes	757.37
W. T. Sedgwick, Expenses	20.03
Crosby Honorary, for Geology	1.50
Arthur Rotch, for Books	93.60
Sedgwick Memorial Lecture, Expenses	231.65
Richards Portrait, Expenses	3.00
Ellen H. Richards, for Research	816.24
Total (Schedule C)	<u>\$13,906.13</u>

SCHEDULE C-20
DORMITORY OPERATION (Net)

Income:

From Rentals	\$122,265.15
Less Refunds	3,912.80
	<u>\$118,352.35</u>
From Miscellaneous	1,814.84
Total	\$120,167.19

Expenses:

Salaries	\$36,030.77
Laundry	3,365.12
Heat, Light, Power	15,935.18
Water	2,004.75
Repairs	20,502.51
Supplies	\$6,198.28
Less Inventory (June 30, 1934) (Schedule D-2)	3,102.80
	<u>3,095.48</u>
Printing, Administration, Telephone	3,208.97
New Equipment	139.61
Interest on Mortgage Loan (Whitney Fund)	7,500.00
Total	<u>91,782.39</u>
Net Income (Schedule B)	<u>\$28,384.80</u>

**SCHEDULE D
TREASURER'S BALANCE SHEET**

1

ENDOWMENT FUNDS, ASSETS

Securities and Real Estate (Schedule H)	\$31,444,739.48
Loaned for Current Purposes (Contra)	26,920.90
Cash: For Investment (Schedule D-3)	376,855.33
	\$31,848,515.71
Total June 30, 1934	\$31,848,515.71

2

STUDENT LOAN ASSETS

Notes Receivable (Schedule P)	\$629,153.74
	\$629,153.74
Total June 30, 1934	\$629,153.74

3

CURRENT ASSETS

Cash: For General Purposes (Schedule D-3)	\$1,711.12
Accounts Receivable (Schedule D-1)	15,678.69
Students' Fees, Receivable	2,171.24
Students' Deposits, Receivable	240.78
Deposit on Fire Insurance Account	40,230.00
Inventories and Advances for 1934-35 (Schedule D-2)	92,635.33
Deferred Expense Accounts (Schedule D-4)	40,966.30
Current Deficit (Schedule S)	29,878.64
	\$223,512.10
Total June 30, 1934	\$223,512.10

4

PLANT ASSETS

Land, Buildings, and Equipment, June 30, 1933	\$15,703,258.55
	\$15,703,258.55
Total June 30, 1934 (Schedule J)	\$15,703,258.55
Total Assets June 30, 1934	\$48,404,440.10

SCHEDULE D**JUNE 30, 1934**

1

ENDOWMENT FUNDS, CAPITAL

Endowment Funds (Schedule M)	\$31,848,515.71
Total June 30, 1934	<u>\$31,848,515.71</u>

2

STUDENT LOAN CAPITAL

Total (Schedule P)	\$629,153.74
Total June 30, 1934	<u>\$629,153.74</u>

3

CURRENT LIABILITIES

Minor Funds (Schedule R)	\$132,792.76
Accounts Payable	13,701.32
Students' Fees and Deposits (Schedule D-5)	49,470.10
*Undergraduate Dues, Balance	465.56
Dining Room Coupons, Outstanding	161.46
Borrowed from Investment Assets (Contra)	26,920.90
Total June 30, 1934	<u>\$223,512.10</u>

4

EDUCATIONAL PLANT CAPITAL

Endowment for Educational Plant, June 30, 1933	\$15,703,258.55
Total June 30, 1934 (Schedule K)	<u>\$15,703,258.55</u>
Total Liabilities June 30, 1934	<u>\$48,404,440.10</u>

*See also Undergraduate Dues Reserve (Schedule M, p. 165).

SCHEDULE D-1
DETAIL OF ACCOUNTS RECEIVABLE

Division of Industrial Coöperation	\$4,556.81
Investment Income	3,162.50
Miscellaneous Accounts	7,959.38
	<hr/>
Total (Schedule D).	<u>\$15,678.69</u>

SCHEDULE D-2
DETAIL OF ADVANCES AND INVENTORIES FOR 1934-1935

Department Overdrafts (Schedule C-2)	\$430.34
Summer Session Salaries, Advanced	3,008.00
Overdraft, General Library (Schedule C-3)	86.55
Civil Engineering Summer Camp 1934, Advanced	487.24
Mining Engineering Summer Camp 1934, Advanced	33.82
Premiums Paid on Unexpired Insurance	4,628.59
Inventories — Notes held by Coöperative Society and M.I.T.	3,289.19
Dormitory Supplies	3,102.80
Dining Service, Food, Utensils, etc.	10,935.25
Oil	1,460.58
Walker Memorial Games, Candy, Cigars, etc.	180.38
Letter Shop Supplies	650.25
Stamps	217.83
Office Supplies	914.86
Building and Janitors' Supplies	1,809.86
Architectural Students' Supply Room, Stock	776.07
Stock Room: Pipe, Fittings, Lumber, Hardware, Paint, Oil, Glass and Miscellaneous Supplies	11,855.83
Photostat Service, Supplies, Equipment, etc.	1,159.37
Photographic Service, Supplies and Equipment	6,328.57
Division of Laboratory Supplies: Chemicals, Glassware, Platinum, etc.	38,354.09
Liquid Soap	79.68
Blue Print Service, Supplies and Equipment	2,846.18
	<hr/>
Total (Schedule D).	<u>\$92,635.33</u>

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

Total Cash Receipts	\$7,084,151.40
Total Cash Disbursements	7,203,358.47
	<hr/>
Excess of Disbursements	\$119,207.07
Cash, June 30, 1933	497,773.52
	<hr/>
Cash, June 30, 1934	<u>\$378,566.45</u>

CASH BALANCE

Cash for Investment — on Deposit (Schedule D)	\$376,855.33
Cash for Current Purposes (Schedule D)	
On Deposit	\$68.12
In Office	1,643.00
	<hr/>
	1,711.12
	<hr/>
Total Cash (Schedule D)	<u>\$378,566.45</u>

SCHEDULE D-4**DEFERRED EXPENSE ACCOUNTS**

Power Plant Conversion (Bal.)	\$30,081.68
Barbour Field House	8,101.70
Barbour Field House — Drains and Conduits	1,824.13
Metals Working Laboratory	190.81
Graduate Dormitories	268.00
Undergraduate Dormitories, Equipment	287.48
Visual Education Account	212.50
	<hr/>
	<u>\$40,966.30</u>

SCHEDULE D-5**STUDENTS' FEES IN ADVANCE, AND DEPOSITS RETURNABLE**

Tuition Fees, in Advance for 1934-35	\$250.00
Tuition Fees, Summer Session 1934	41,423.10
Students' Deposits Returnable	1,633.47
Students' Deposits, Summer Session 1934	2,373.61
Dormitory Rental in Advance 1934-35	5.00
Dormitory Rentals, Summer Session 1934	3,494.92
Students' Deposits, account C. E. Summer Camp and Mining Camp	290.00
	<hr/>
Total (Schedule D)	<u>\$49,470.10</u>

SCHEDULE H

INVESTMENTS, BONDS, STOCKS,

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1933</i>
<u>GOVERNMENT AND MUNICIPAL BONDS</u>				
\$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
260,000	Canada, Dominion of, 30-Yr. Gold	5%	1952	258,511.88
18,000	Kansas City, Sewer, 2d Issue	4¼%	1935	18,101.00
5,000	Kansas City, 23d St. Trafficway	4½%	1935	5,027.00
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	101,230.00
100,000	Montreal, City of	5%	1963	101,372.00
50,000	Omaha, City of, Water Works	4½%	1941	51,439.00
150,000	Ontario, Province of	5%	1942	151,132.00
50,000	Ontario, Province of	5½%	1937	50,148.00
50,000	Ontario, Province of	6%	1943	52,248.00
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
35,000	Ottawa, City of, Ontario	5%	1945	35,160.00
36,000	Ottawa, City of, Ontario	5%	1934	36,034.00
35,000	Ottawa, City of, Ontario	5%	1940	35,209.00
25,000	Ottawa, City of, Ontario	5%	1946	25,197.00
5,000	Ottawa, City of, Ontario	5%	1947	5,039.00
29,000	Ottawa, City of, Ontario	5%	1954	29,484.00
60,000	Ottawa, City of, Ontario	5½%	1939	60,773.00
5,000	Ottawa, City of, Ontario	6%	1936	5,075.00
1,000	Ottawa, City of, Ontario	6%	1938	1,025.00
8,000	Ottawa, City of, Ontario	6%	1939	8,236.00
8,000	Ottawa, City of, Ontario	6%	1940	8,273.00
1,000	Ottawa, City of, Ontario	6%	1948	1,056.00
10,000	Ottawa, City of, Ontario	6%	1951	10,610.00
100,000	Quebec, Province of	4½%	1950	97,000.00
10,000	San Francisco, City & Cty. of Hetch Hetchy	4½%	1954	10,130.00
15,000	San Francisco, City & Cty. of, Hospital	4½%	1952	15,180.00
25,000	San Francisco, City & Cty. of, Hospital	4½%	1953	25,311.00
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

SCHEDULE H

REAL ESTATE AND MORTGAGES

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$6,000.00	.....	\$255.00
.....	.....	26,000.00	.....	1,105.00
.....	.....	483,534.60	.....	23,750.00
.....	.....	258,511.88	.....	13,000.00
.....	\$101.00	18,000.00	.....	810.00
.....	27.00	5,000.00	.....	225.00
.....	.....	15,000.00	.....	750.00
.....	.....	68,250.00	.....	3,500.00
.....	50.00	101,180.00	.....	5,000.00
.....	46.00	101,326.00	.....	5,000.00
.....	180.00	51,259.00	.....	2,250.00
.....	142.00	150,990.00	.....	7,500.00
.....	49.00	50,099.00	.....	2,750.00
.....	225.00	52,023.00	.....	3,000.00
.....	.....	99,934.00	.....	5,000.00
.....	.....	24,875.00	.....	1,250.00
.....	.....	945.00	.....	45.00
.....	16.00	35,144.00	.....	1,750.00
.....	34.00	36,000.00	.....	1,800.00
.....	30.00	35,179.00	.....	1,750.00
.....	16.00	25,181.00	.....	1,250.00
.....	3.00	5,036.00	.....	250.00
.....	23.00	29,461.00	.....	1,450.00
.....	129.00	60,644.00	.....	3,300.00
.....	25.00	5,050.00	.....	300.00
.....	6.00	1,019.00	.....	60.00
.....	40.00	8,196.00	.....	480.00
.....	39.00	8,234.00	.....	480.00
.....	4.00	1,052.00	.....	60.00
.....	34.00	10,576.00	.....	600.00
.....	.....	97,000.00	.....	4,500.00
.....	7.00	10,123.00	.....	450.00
.....	10.00	15,170.00	.....	675.00
.....	17.00	25,294.00	.....	1,125.00
.....	.....	22,622.25	.....	973.16
.....	.....	9,845.00	.....	491.79
.....	.....	34,475.00	.....	1,750.00
.....	.....	17,721.00	.....	900.00
.....	.....	22,655.00	.....	1,150.00

Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1933</i>
GOVERNMENT AND MUNICIPAL BONDS (Continued)				
\$9,000	Toronto, City of, Ontario	5%	1942	\$8,830.80
5,000	Toronto, City of, Ontario	6%	1934	5,018.00
23,000	Toronto, City of, Consolidated Loan	6%	1944	23,680.00
18,000	Toronto, City of, Consolidated Loan	6%	1945	18,572.00
9,000	Toronto, City of, Consolidated Loan	6%	1946	9,299.00
	Sold or matured during year			785,182.47
\$2,108,325	Total Government and Municipal Bonds			\$2,880,440.00
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
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%	1935	24,302.50
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
100,000	Midvale Steel & Ordnance Co.	5%	1936	16,200.00
387,000	Pocahontas Corp., Gold	6%	1943	291,100.00
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
115,000	Standard Oil Co. of N. Y.	4½%	1951	62,156.25
74,000	Swift & Co., 1st S. F.	5%	1944	69,883.13
50,000	Swift & Co., 10-Yr. Gold	5%	1940	50,772.00
75,000	Texas Corp. Conv. Deb.	5%	1944	75,577.00
100,000	United Drug Co.	5%	1953	100,000.00
25,000	U. S. Cold Storage Co., 1st Mtg. R.E.	6%	1945	25,341.00
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			321,371.75
\$2,413,000	Total Industrial Bonds			\$2,412,578.38

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$8,830.80	.....	\$450.00
.....	\$18.00	5,000.00	.....	300.00
.....	62.00	23,618.00	.....	1,380.00
.....	48.00	18,524.00	.....	1,080.00
.....	25.00	9,274.00	.....	540.00
\$170,291.41	955,473.88	.....	.....	29,735.08
\$170,291.41	\$956,879.88	\$2,093,851.53	.....	\$134,220.03
.....	.....	\$14,812.50	.....	\$750.00
.....	.....	48,000.00	.....	2,250.00
.....	.....	175,116.25	.....	9,000.00
.....	.....	41,125.00	.....	2,750.00
.....	.....	87,080.00	.....	4,500.00
.....	.....	268,806.25	.....	.....
.....	.....	24,607.25	.....	1,125.00
.....	.....	24,573.75	.....	1,125.00
.....	.....	24,302.50	.....	1,250.00
.....	.....	99,750.00	.....	5,500.00
.....	.....	96,750.00	.....	5,000.00
.....	.....	99,500.00	.....	5,000.00
\$83,907.50	\$54.50	100,053.00	\$523.88	900.00
.....	.....	291,100.00	.....	23,220.00
.....	.....	98,885.00	.....	5,000.00
.....	.....	16,830.00	.....	935.00
50,077.76	.....	112,234.01	208.43	5,175.00
.....	.....	69,883.13	.....	3,700.00
.....	129.00	50,643.00	.....	2,500.00
.....	57.00	75,520.00	.....	3,750.00
.....	.....	100,000.00	.....	5,000.00
.....	31.00	25,310.00	.....	1,500.00
.....	.....	49,000.00	.....	3,000.00
.....	.....	188,288.75	.....	9,500.00
.....	.....	42,750.00	.....	.....
34,150.63	355,522.38	.....	.....	12,955.48
\$168,135.89	\$355,793.88	\$2,224,920.39	\$732.31	\$115,385.48

Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Div.</i>	<i>Shares</i>	<i>Balance June 30, 1935</i>
INDUSTRIAL STOCKS				
*\$100,000	Air Reduction Co.	\$3.00	1,000	.....
25,000	Algonquin Printing Co.	8%	250	\$67,500.00
25,000	American Can Co., Com.	4%	1,000	71,312.50
105,300	American Manufacturing Co., Pref.	5%	1,053	46,332.00
66,000	American Manufacturing Co., Com. . . . .	..	660	16,500.00
50,000	Amoskeag Mfg. Co., Pref.	4½%	500	41,395.00
51,000	Anaconda Copper Mining Co., Cap. . . . .	..	1,020	28,744.00
250,000	Central Aguirre Associates	1.50	2,500	.....
*37,000	Cerro de Pasco Copper Corp.	50c	370	18,870.00
30,000	Continental Can Co.	\$3.00	1,500	.....
37,525	Corn Products Ref. Co., Com.	\$3.00	1,501	6,950.00
*100,000	Curtis Publishing Co., Cum. Pref.	7%	1,000	59,375.00
*60,000	Draper Corp.	\$2.40	600	.....
20,000	Dupont, E. I. deN., Com.	\$2.60	1,000	.....
*.....	Eastern Mfg. Co., New Common . . . . .	..	1,000	.....
*25,000	Eastern Mfg. Co., Pref. . . . .	..	500	15,000.00
*2,825,000	Eastman Kodak Co., Common	3%	28,250	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	60c	4,000	38,095.83
30,000	General Motors Corp., Common	\$1.00	3,000	49,958.75
1,230	Harmony Mills, Common . . . . .	..	246	246.00
*70,000	Inter. Bus. Machines, Corp. Com.	\$6.00	700	.....
*100,000	Inter. Harvester Co., Com.	60c	1,000	.....
*100,000	Inter. Nickel Co. of Canada, Com.	20c	1,000	.....
*40,000	Johns-Manville Corp. Com. . . . .	..	400	.....
*150,000	R. H. Maey & Co., Inc., Com.	\$2.00	1,500	.....
20,000	Monsanto Chemical Co., Com.	\$1.00	2,000	.....
20,000	National Biscuit Co.	\$2.00	2,000	.....
25,000	Owens-Illinois Glass Co., Com.	\$3.00	1,000	.....
52,500	Pittsburg Plate Glass Co., Com.	\$1.40	2,100	.....
*49,700	Pullman Incorporated, Capital	\$3.00	497	36,961.83
*120,000	Proctor & Gamble Co., Com.	\$1.50	1,200	.....
*.....	Quebradas Company . . . . .	..	2,249	.....
*56,100	Radio Corp. of America, Com. . . . .	..	561	4,910.67
25,000	Rhode Isl. Malleable Iron Wks. Pref. . . . .	..	250	25,000.00
*7,500	Samson Cordage Company	8%	75	5,000.00
100,000	Shell Union Oil Co., Conv. Pfd. . . . .	..	1,000	97,750.00
*300,000	Standard Brands, Inc., Com.	\$1.00	3,000	.....
*120,000	Standard Oil Co. of California, Capital	\$1.00	1,200	29,149.25
25,000	Standard Oil Co. of Indiana	\$1.00	1,000	.....
50,000	Standard Oil Co. of N. J.	\$1.00	2,000	5,542.00

* No par value.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
\$100,103.30	\$100,103.30	.....	\$675.00
.....	67,500.00	.....	2,000.00
49,722.91	121,035.41	.....	2,800.00
.....	46,332.00	.....	5,265.00
.....	16,500.00	.....	.....
.....	41,395.00	.....	2,250.00
.....	28,744.00	.....	.....
73,801.24	73,801.24	.....	1,125.00
.....	18,870.00	.....	185.00
114,048.65	114,048.65	.....	1,937.50
106,683.47	113,633.47	.....	1,051.50
39,723.04	99,098.04	.....	625.00
36,402.75	36,402.75	.....	.....
92,675.87	92,675.87	.....	1,050.00
.....
.....	15,000.00	.....	.....
4,087.51	\$264,564.91	2,452,828.85	.....	90,675.00
.....	198,000.00	.....	10,800.00
.....
.....	38,095.83	.....	1,800.00
56,243.75	106,202.50	.....	3,262.50
.....	246.00	.....	.....
98,826.00	98,826.00	.....	.....
42,000.00	42,000.00	.....	.....
28,250.20	28,250.20	.....	.....
23,095.00	23,095.00	.....	.....
73,467.50	73,467.50	.....	600.00
84,550.74	84,550.74	.....	750.00
86,525.20	86,525.20	.....	.....
87,350.89	87,350.89	.....	675.00
96,593.18	96,593.18	.....	350.00
.....	36,961.83	.....	1,491.00
49,393.38	49,393.38	.....	1,087.50
.....	1,925.00
2,569.19	5,235.86	2,244.00	.....	.....
.....	25,000.00	.....	.....
.....	5,000.00	.....	525.00
.....	97,750.00	.....	.....
65,850.36	65,850.36	.....	.....
22,616.01	51,765.26	.....	1,069.00
34,012.50	34,012.50	.....	750.00
84,016.00	89,558.00	.....	1,081.50

Schedule H (Continued)

Par Value	Description of Securities	Div.	Shares	Balance June 30, 1933
<u>INDUSTRIAL STOCKS (Continued)</u>				
\$60,000	Stevens Linen Works	10%	600	\$39,000.00
*535,700	United Fruit Company, Capital . .	\$2.00	5,357	220,979.50
*150,000	Texas Gulf Sulphur Co., Com. . .	\$2.00	1,500	.....
*250,000	Union Carbide & Carbon Corp. . .	\$1.40	2,500	.....
14,175	Texas Corporation	\$1.00	567	14,175.00
33,000	U. S. Steel Corp., Common . . . .	..	330	29,436.00
100,000	U. S. Steel Corp., Cum. Pref. . . .	2%	1,000	55,162.50
37,500	United Shoe Machinery Corp., Com.	\$2.50	1,500	.....
14,600	Wamsutta Mills, Capital . . . . .	..	146	3,638.00
15,000	Woolworth Co., Com.	\$2.40	1,500	.....
	Sold during year			361,240.07
<u>\$7,058,830</u>	<u>Total Industrial Stocks</u>			<u>\$4,299,530.15</u>

<u>PUBLIC UTILITY BONDS</u>		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
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	203,590.00
70,000	Arkansas Pow. & Lgt. Co., 1st & Ref. Mt.	5%	1956	70,743.00
45,000	Bell Telephone Co. of Penn.	5%	1948	48,570.00
50,000	Blackstone Valley Gas & El. Co., Mt.	5%	1939	50,052.00
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., 1st Mt. S.F.	5%	1953	276,853.85
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
3,750	Chicago Railways Co., 1st Mtge. . .	5%	1927	2,750.00
50,000	Cincinnati Gas & Elec. Co., 1st Mtge	4%	1968	49,750.00
150,000	Cleveland Elec. Ill. Co., 1st Mtge. .	5%	1939	150,419.00
50,000	Columbia Gas & Elec. Corp. Deb. . .	5%	1952	.....
44,000	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	75,502.00
200,000	Consolidated Gas Co., N. Y., Deb. .	5½%	1945	201,719.00
200,000	Consumers Pow. Co., 1st & Ref. . . .	5%	1936	199,000.00
50,000	Const. Gas & Elec. Corp., Deb. "A"	5%	1958	42,500.00
55,000	Cumberland Cty. Pow. & Lt. Co., 1st Mt.	4½%	1956	51,837.50
51,000	Cumberland Tel. & Tel. Co., 1st Mtge .	5%	1937	50,229.00
10,000	Dallas Power & Lt. Co., 1st Mtg. "A"	6%	1949	10,445.00

*No par value.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$39,000.00	.....	\$6,000.00
.....	.....	220,979.50	.....	13,392.50
\$57,876.07	.....	57,876.07	.....	1,900.00
116,413.47	.....	116,413.47	.....	675.00
.....	.....	14,175.00	.....	567.00
.....	.....	29,436.00	.....	.....
48,250.35	.....	103,412.85	.....	1,250.00
99,705.00	.....	99,705.00	.....	.....
.....	\$1,983.33	1,654.67	.....	.....
79,737.50	.....	79,737.50	.....	720.00
18,344.66	379,584.73	.....	.....	2,062.60
<u>\$1,972,935.69</u>	<u>\$651,368.83</u>	<u>\$5,621,097.01</u>	.....	<u>\$162,372.60</u>
.....	.....	\$49,125.00	.....	\$2,250.00
.....	.....	191,501.25	.....	10,000.00
.....	.....	60,902.09	.....	3,100.00
.....	.....	216,928.00	.....	11,250.00
.....	\$164.00	203,426.00	.....	10,000.00
.....	34.00	70,709.00	.....	3,500.00
.....	255.00	48,315.00	.....	2,250.00
.....	11.00	50,041.00	.....	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
.....	.....	44,750.00	.....	2,250.00
.....	.....	49,000.00	.....	.....
.....	250.00	2,500.00	.....	193.75
.....	.....	49,750.00	.....	2,000.00
.....	84.00	150,335.00	.....	7,500.00
\$43,301.33	.....	43,301.33	\$527.79	2,500.00
296.32	2,180.00	41,440.80	.....	3,150.00
.....	.....	49,465.00	.....	2,340.00
.....	30.00	75,472.00	.....	3,375.00
.....	156.00	201,563.00	.....	11,000.00
.....	.....	199,000.00	.....	10,000.00
.....	.....	42,500.00	.....	2,500.00
.....	.....	51,837.50	.....	2,475.00
.....	.....	50,229.00	.....	2,550.00
.....	28.00	10,417.00	.....	600.00

Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1933
<u>PUBLIC UTILITY BONDS (Continued)</u>				
\$15,000	Dallas Power & Lt.Co.,1stMtge."B"	7½%	1949	\$15,985.00
50,000	Dallas Ry. & Terminal Co., 1st Mtge.	6%	1951	48,125.00
100,000	Dayton Pow.&Lt.Co.,1st & Ref.Mtg.	5%	1941	103,150.00
100,000	Detroit Edison Co.,Gen.&Ref.Mt."D"	4½%	1961	100,000.00
50,000	Detroit Edison Co.,Gen.&Ref.Mtg."E"	5%	1952	24,812.50
100,000	Duquesne Light Co., 1st Mt., Gold . .	4½%	1967	94,750.00
175,000	Edison Elec. Ill. Co. of Boston, Gold .	5%	1934	174,335.00
275,000	Edison Elec. Ill. Co. of Boston, Gold .	5%	1936	272,250.00
50,000	Fall River Elec. Light Co.,1st Mt."A"	5%	1945	51,146.00
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.ofNiag.F'ls,Ref.&Im.	5%	1951	165,139.00
59,000	Illinois Bell Tel. Co., 1st & Ref. "A" .	5%	1956	56,712.50
50,000	Indianapolis Water Co.,1stLien & 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	50,817.00
100,000	Kansas City Pow.&Lt.Co.,1stMt.Gold	4½%	1961	99,721.25
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	Minnesota Pow.&Lt.Co.,1st&Ref.Mt.	4½%	1978	48,500.00
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	199,843.36
92,000	New York Pow.& Lt. Corp.,1st Mtg. . .	4½%	1967	87,949.87
65,000	North Boston Lighting Properties . . .	5½%	1937	.....
100,000	North American Co., Deb.	5%	1961	101,215.00
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	98,888.50
100,000	Oklahoma Gas & Electric Co.,1stMtg.	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	178,833.00
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	168,971.00

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$65.00	\$15,920.00	.....	\$1,125.00
.....	.....	48,125.00	.....	3,000.00
.....	450.00	102,700.00	.....	5,000.00
.....	.....	100,000.00	.....	4,500.00
\$26,937.50	98.00	51,652.00	\$277.78	1,250.00
.....	.....	94,750.00	.....	4,500.00
.....	.....	174,335.00	.....	8,750.00
.....	.....	272,250.00	.....	13,750.00
.....	104.00	51,042.00	.....	2,500.00
.....	.....	43,187.50	.....	3,000.00
.....	.....	46,875.00	.....	2,500.00
.....	.....	165,139.00	.....	8,650.00
.....	.....	56,712.50	.....	2,950.00
.....	.....	48,250.00	.....	2,750.00
.....	.....	24,625.00	.....	1,500.00
.....	63.00	50,754.00	.....	2,500.00
.....	.....	99,721.25	.....	4,500.00
.....	.....	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
.....	.....	48,500.00	.....	2,250.00
.....	.....	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
.....	.....	199,843.36	.....	9,000.00
.....	.....	87,949.87	.....	4,140.00
66,562.50	390.50	66,172.00	419.38	1,100.00
.....	45.00	101,170.00	.....	5,000.00
.....	.....	147,125.00	.....	6,750.00
.....	.....	45,000.00	.....	2,500.00
.....	.....	98,088.50	.....	4,500.00
.....	.....	94,750.00	.....	5,000.00
.....	.....	49,312.50	.....	2,500.00
.....	.....	98,368.75	.....	4,500.00
.....	548.00	178,285.00	.....	10,500.00
.....	.....	73,915.10	.....	3,750.00
.....	159.00	168,812.00	.....	9,075.00

Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1933</i>
<u>PUBLIC UTILITY BONDS (Continued)</u>				
\$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	97,235.00
75,000	Providence Gas Co., 1st Mtge. "B"	4%	1963	74,437.50
99,000	Public Ser. Co. of No. Ill., 1st Mtge.	4½%	1980	97,294.72
70,000	Public Ser. Elec. & Gas Co., 1st & Ref. Mt.	4%	1971	66,362.50
50,000	Salmon River Power Co., 1st Mtge.	5%	1952	47,625.00
50,000	San Joaquin L & P Co., Gen. & Ref. Gold D	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	101,281.00
50,000	Sierra Pacific Pow. Co., 1st Mtge.	5½%	1957	44,875.00
30,000	Sierra & San. Fran. Pow. Co., 1st Mtge.	5%	1949	31,066.00
100,000	Southern Bell Tel. & Tel. Co., 1st Mt. S.F.	5%	1941	100,417.00
165,000	Southern Calif. Edison Co., Gen. Mtge.	5%	1939	163,218.75
100,000	Southern Calif. Gas Co., 1st & Ref. Mtge.	4½%	1961	89,250.00
50,000	Syracuse Lighting Co.	5%	1951	54,958.00
50,000	Syracuse Lighting Co., 1st & Ref. Mtge.	5½%	1954	50,515.00
20,000	Tennessee Elec. Pow. Co., 1st & Ref. Mt.	5%	1956	19,750.00
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
100,000	Union Elec. Lt. & Pow. Co., 1st Mtge.	5%	1957	98,875.00
25,000	Utah Light & Trac. 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
130,000	Western Massachusetts Cos.	5%	1937	99,750.00
200,000	Western Union Tel. Co.	5%	1951	200,935.00
25,000	Wisconsin Minn. Lt. & Pow. Co. 1st Mt.	5%	1944	25,208.00
	Sold or matured during year			358,928.00
<u>\$8,816,750</u>	<u>Total Public Utility Bonds</u>			<u>\$8,808,192.81</u>

PUBLIC UTILITY STOCKS

		<i>Div.</i>	<i>Shares</i>	
\$338,400	American Tel. & Tel. Co., Capital . . .	9%	3384	\$390,081.92
*70,000	Brooklyn Union Gas Co., Capital . . .	5%	700	11,887.50
*50,000	Central Illinois Pub. Ser. Co., Pfd. . . .	..	500	42,937.50
*50,000	Commonwealth & Southern Corp. Pfd.	6%	500	51,625.00
*200,000	Consolidated Gas Co. of N. Y., Pfd. . .	5%	2000	194,975.00
20,000	Eastern Gas & Fuel Asso., Cum. Pref. . .	6%	200	18,232.13

*No par value.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$96,250.00	.....	\$4,500.00
.....	.....	46,750.00	.....	2,000.00
.....	\$118.00	97,117.00	.....	5,700.00
.....	.....	74,437.50	.....	3,000.00
.....	.....	97,294.72	.....	4,455.00
.....	.....	66,362.50	.....	2,800.00
.....	.....	47,625.00	.....	2,500.00
.....	.....	49,125.00	.....	2,500.00
.....	.....	97,218.75	.....	4,500.00
.....	.....	4,320.00	.....	270.00
.....	36.00	101,245.00	.....	5,000.00
.....	.....	44,875.00	.....	2,750.00
.....	67.00	30,999.00	.....	1,500.00
.....	60.00	100,357.00	.....	5,000.00
.....	.....	163,218.75	.....	8,250.00
.....	.....	89,250.00	.....	4,500.00
.....	292.00	54,666.00	.....	2,500.00
.....	26.00	50,489.00	.....	2,750.00
.....	.....	19,750.00	.....	1,000.00
.....	.....	46,625.00	.....	2,500.00
.....	.....	291,437.50	.....	15,000.00
.....	.....	98,875.00	.....	5,000.00
.....	.....	24,750.00	.....	1,250.00
.....	.....	47,625.00	.....	2,750.00
.....	.....	46,375.00	.....	2,500.00
.....	.....	93,482.50	.....	5,000.00
\$30,325.00	25.00	130,050.00	\$393.05	6,500.00
.....	57.00	200,878.00	.....	10,000.00
.....	21.00	25,187.00	.....	1,250.00
17,456.38	376,384.38	.....	.....	18,885.59
<u>\$184,879.03</u>	<u>\$382,200.88</u>	<u>\$8,610,870.96</u>	<u>\$1,618.00</u>	<u>\$451,884.34</u>
.....	.....	\$390,081.92	.....	\$30,456.00
\$33,983.09	.....	45,870.59	.....	2,290.00
.....	.....	42,937.50	.....	500.00
.....	.....	51,625.00	.....	3,000.00
.....	.....	194,975.00	.....	10,000.00
.....	.....	18,232.13	.....	1,200.00

Schedule H (Continued)

Par Value	Description of Securities	Div.	Shares	Balance June 30, 1935
PUBLIC UTILITY STOCKS (Continued)				
\$24,500	Eastern Gas & Fuel Assn., 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
*50,000	Stone & Webster, Inc., Capital . . . . .	..	500	27,680.74
*30,300	Tampa Elec. Co. Com.	2.24	303	7,726.50
62,000	West Penn. Pow. Co. Pfd.	6%	620	17,656.65
	Sold during year			103,583.00
\$1,244,700	Total Public Utility Stocks			\$1,214,973.91

RAILROAD BONDS

		Rate	Maturity	
\$335,000	Albany & Susquehanna R.R. 1st Mt. Reg.	3½%	1946	\$234,500.00
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	41,292.50
150,000	Boston & Maine R.R., 1st Mt. Gold No. 2	5%	1955	150,630.00
50,000	Boston & Maine R.R., 1st Mtge. "AC"	5%	1967	46,500.00
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	59,953.00
75,000	Central New England Rwys., 1st Mtge.	4%	1961	56,281.25
50,000	Gen. Pacific Ry. Co., Short Line Mtge.	4%	1954	40,918.75
51,000	Chicago, Burlington & Quincy, Mtge.	4%	1958	50,307.00
100,000	Chic., Burl. & Quincy, 1st Ref. 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
65,000	Chicago Union Station, 1st Mtge. "A"	4½%	1963	65,306.00
100,000	Chic. & N. W. Ry. Co., Gen. Mtge.	4%	1987	96,500.00
200,000	Chic. & N. W. Ry. Co., 1st & Ref. Mtge.	4½%	2037	189,500.00

*No par value

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$20,765.00	.....	\$1,102.50
.....	70,469.59	.....	3,450.00
.....	59,312.50	.....	3,250.00
.....
.....	49,375.00	.....	3,500.00
.....	148,665.88	.....	7,500.00
.....	27,680.74	.....	.....
.....	7,726.50	.....	678.72
\$42,236.00	59,892.65	.....	1,200.00
.....	\$103,583.00	.....	.....	163.95
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$76,219.09	\$103,583.00	\$1,187,610.00	.....	\$68,291.17
.....	\$234,500.00	.....	\$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	.....	2,075.00
.....	\$30.00	150,600.00	.....	7,500.00
.....	46,500.00	.....	2,500.00
.....	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	59,858.00	.....	2,950.00
.....	56,281.25	.....	3,000.00
.....	40,918.75	.....	2,000.00
.....	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
.....	11.00	65,295.00	.....	2,925.00
.....	96,500.00	.....	4,000.00
.....	189,500.00	.....	9,000.00

Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1933
RAILROAD BONDS (Continued)				
\$135,000	Chic. & N.W. Ry. Co., 20-Yr. Gold . .	4½%	1949	\$135,182.00
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.Union Terminal Co.,1st Mt."C"	5%	1957	77,373.00
100,000	Clev.,Cinn.,Chic.& St.Louis Ry. Co. .	4½%	1977	98,891.25
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	20,380.00
100,000	Hudson & Man.R.R.Co.,1st&Ref.Mt.	5%	1957	99,712.25
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 & Memphis Consol.	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%	5%	1934	34,225.00
125,000	Kansas City Terminal Co., 1st Mtge..	4%	1960	108,187.50
100,000	Long Island R. R. Co., Ref.	4%	1949	45,500.00
50,000	Long Island R.R. Co., Unified Mtge. .	4%	1949	48,068.75
50,000	Long Island R.R. Co., Un.Mtge.(Reg.)	4%	1949	48,068.75
75,000	Maine Central R.R.,1st & Ref. Mtge..	4½%	1935	73,500.00
25,000	Michigan Cent.R.R.Co.,Ref.&Imp."C"	4½%	1979	25,584.00
300,000	Minn., St. Paul & S.St.Marie Ry.Co. .	4%	1938	269,135.00
100,000	Missouri, Pacific R.R.,1st & Ref."F"	5%	1977	99,750.00
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
52,000	New York Cen.R.R.Co.,Cons.Mt."A"	4%	1998	46,046.65
69,000	N.Y.Central R.R.Co.10 yr.Conv."B"	6%	1944	.....

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$12.00	\$135,170.00	.....	\$6,412.50
.....	4,902.90	.....	250.00
.....	4,899.30	.....	250.00
.....	5,000.00	.....	250.00
.....	103.00	77,270.00	.....	3,750.00
.....	98,891.25	.....	4,500.00
.....	95,633.75	.....	.....
.....	34,825.00	.....	1,575.00
.....	99,495.70	.....	5,000.00
.....	144,344.25	.....	6,750.00
.....	10.00	20,370.00	.....	1,000.00
.....	99,712.25	.....	5,000.00
.....	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	.....	.....
.....	8,287.50	.....	340.00
.....	34,225.00	.....	1,850.00
.....	108,187.50	.....	5,000.00
\$50,250.00	95,750.00	\$300.00	2,000.00
.....	48,068.75	.....	2,000.00
.....	48,068.75	.....	2,000.00
.....	73,500.00	.....	3,375.00
.....	13.00	25,571.00	.....	1,125.00
.....	269,135.00	.....	12,000.00
.....	99,750.00	.....	.....
.....	8,536.50	.....	405.00
.....	24,702.50	.....	1,125.00
.....	46,046.65	.....	2,080.00
82,121.90	132.00	81,989.90	.....	.....

Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1933</i>
<u>RAILROAD BONDS (Continued)</u>				
\$100,000	N. Y., Chic. & St. Louis R.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
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	514,237.77
84,000	Oregon R.R. & Nav. Co., Cons. Mtge.	4%	1946	82,668.25
18,000	Pennsylvania R.R. Co., Cons. Mtge.	4½%	1960	18,390.00
100,000	Pennsylvania R.R. Co., Gen. Mtge.	4½%	1965	100,720.00
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. Oregon Lines, 1st Mt.	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., 1st Mt. (Reg.)	4%	1951	24,875.00
100,000	Term. R.R. Asso. of St. Louis, 1st Mtge.	4½%	1939	100,090.00
100,000	Term. R.R. Asso. of St. Louis, Gen. Mtg.	4%	1953	83,860.00
100,000	Un. Pac. R.R. Co., 1st Mtge. & L. Gr.	4%	1947	100,496.00
70,000	Union Pacific R.R. Co.	4½%	1967	58,200.00
100,000	Union Terminal Co. of Dallas, 1st Mt. S.F.	5%	1942	99,673.75
200,000	Virginian Ry. Co., 1st Mtge "A"	5%	1962	191,737.50
75,000	Washington Terminal Co.	3½%	1945	68,196.37
50,000	Winston Salem South. Ry. Co., Mtge.	4%	1960	43,875.00
	Sold or matured during year			707,741.78
<u>\$7,009,400</u>	<u>Total Railroad Bonds</u>			<u>\$7,199,441.38</u>

RAILROAD STOCKS

	<i>Div.</i>	<i>Shares</i>		
\$33,600	Atchison, Topeka & Santa Fe Co., Pref.	\$4.80	336	\$25,200.00
150,000	Atchison, Topeka & Santa Fe Co., Com.	..	1500	209,328.30
50,000	Atlanta, Birmingham & Coast R.R., Pfd.	5%	500	50,000.00
33,800	Bangor & Aroostook R.R. Com.	2½%	676	10,560.00
37,500	Chesapeake & Ohio Ry. Co., Com.	\$2.80	1500	.....
190,000	Chicago & Northwestern Ry., Com.	..	1900	110,475.00

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$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
.....	.....	67,875.00	.....	3,000.00
.....	\$286.00	513,951.77	.....	28,920.00
.....	.....	82,668.25	.....	3,360.00
.....	15.00	18,375.00	.....	810.00
.....	24.00	100,696.00	.....	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	.....	100.00
.....	.....	72,542.50	.....	1,660.00
.....	.....	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	100,075.00	.....	4,500.00
.....	.....	83,860.00	.....	4,000.00
.....	38.00	100,458.00	.....	4,000.00
\$10,300.00	.....	68,500.00	\$211.25	2,700.00
.....	.....	99,673.75	.....	5,000.00
.....	.....	191,737.50	.....	10,000.00
.....	.....	68,196.37	.....	2,625.00
.....	.....	43,875.00	.....	2,000.00
13,588.62	721,330.40	.....	.....	33,734.71
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$156,260.52	\$722,114.40	\$6,633,587.50	\$511.25	\$330,287.21
.....	.....	\$25,200.00	.....	\$1,612.80
.....	.....	209,328.30	.....	.....
.....	.....	50,000.00	.....	2,500.00
\$22,213.15	.....	32,773.15	.....	374.88
70,750.45	.....	70,750.45	.....	1,050.00
.....	.....	110,475.00	.....	.....

Schedule H (Continued)

<i>For Value</i>	<i>Description of Securities</i>	<i>Div.</i>	<i>Shares</i>	<i>Balance Shares</i>
<u>RAILROAD STOCKS (Continued)</u>				
103,200	Delaware & Hudson R.R., Cap.		1032	\$126,604.00
115,000	Louisville & Nashville R.R.	1½%	1150	99,251.04
33,500	Norfolk & Western Ry. Co., Com.	8%	335	38,860.00
100,000	Pennsylvania R.R. Co.	1%	2000	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
160,000	Union Pacific R.R., Common	6%	1600	142,573.13
	Sold during year			799,032.30
\$1,171,600	Total Railroad Stocks			\$1,880,288.17

<u>REAL ESTATE BONDS</u>		<i>Rate</i>	<i>Maturity</i>	
\$20,000	American Furn. Mart Bldg. Corp. 1st Mt.	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
383,000	Equitable Office Bldg. Corp., 35-Yr. Deb.	5%	1952	397,000.00
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., 1st Mtge.	5½%	1939	86,533.33
	Sold or matured during year			49,625.00
\$755,500	Total Real Estate Bonds			\$811,858.33

<u>REAL ESTATE STOCKS</u>		<i>Div.</i>	<i>Shares</i>	
\$58,800	Alaska Building Trust		588	\$58,251.22
68,000	Boston Real Estate Trust Capital	2%	680	71,661.64
	Sold during year			19,200.00
\$126,800	Total Real Estate Stocks			\$149,112.86

<u>BANK AND INSURANCE STOCKS</u>				
\$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
22,500	Guaranty Trust Co. of New York	20%	225	76,519.54
2,000	Methuen National Bank, Methuen		20	1,600.00
10,000	New England Trust Co., Boston	30%	100	40,000.00
10,000	Hartford Fire Insurance Co.	\$2.00	1000	.....
10,000	National Fire Insurance Co.	2.00	1000	.....
10,000	Phoenix Insurance Co.	2.00	1000	.....
	Sold during year			9,400.00
\$172,660	Total Bank and Insurance Stocks			\$550,750.30

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$126,604.00	.....	.....
.....	.....	99,251.04	.....	\$1,725.00
.....	.....	38,860.00	.....	3,350.00
\$14,143.13	.....	144,023.13	.....	1,000.00
.....	.....	80,024.40	.....	.....
.....	.....	53,500.00	.....	.....
71,101.17	.....	213,674.30	.....	8,700.00
2,671.11	\$801,703.41	.....	.....	5,334.90
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$180,879.01	\$801,703.41	\$1,259,463.77	.....	\$25,647.58
.....	.....	\$16,400.00	.....	\$300.00
.....	.....	3,970.00	.....	220.00
.....	.....	8,955.00	.....	495.00
.....	\$14,000.00	383,000.00	.....	19,850.00
.....	.....	199,500.00	.....	5,500.00
.....	.....	49,875.00	.....	2,750.00
.....	.....	86,533.33	.....	4,922.50
.....	49,625.00	.....	.....	3,333.33
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
.....	\$63,625.00	\$748,233.33	.....	\$37,370.83
.....	.....	\$58,251.22	.....	.....
.....	.....	71,661.64	.....	\$1360.00
.....	\$19,200.00	.....	.....	.....
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
.....	\$19,200.00	\$129,912.86	.....	\$1,360.00
.....	.....	\$318,902.76	.....	\$10,416.00
.....	\$807.40	103,520.60	.....	4,000.00
\$4,420.00	.....	80,939.54	.....	4,500.00
.....	.....	1,600.00	.....	.....
.....	.....	40,000.00	.....	3,000.00
54,200.00	.....	54,200.00	.....	.....
54,275.00	.....	54,275.00	.....	.....
62,124.50	.....	62,124.50	.....	.....
.....	9,400.00	.....	.....	47.00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$175,019.50	\$10,207.40	\$715,562.40	.....	\$21,963.00

Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1933
<u>MORTGAGE NOTES</u>				
\$6,000.00	Beta Nu House Corporation	5%	1937	\$6,500.00
4,500.00	E. V. and C. H. Bigelow	5%	....	4,500.00
40,392.40	F. J. Holderried	3%	1935	40,394.40
4,000.00	Nicola Lomuscio	5%	1938	4,000.00
60,000.00	Ella C. Martin	5%	1933	75,000.00
100,000.00	Old Colony Trust Co., Trustee u/w Henry L. Kincaide	6%	1938	.....
2,400.00	Edward & Alina Orlogski	5%	....	2,400.00
13,500.00	Phi Beta Epsilon Corp.	5%	1936	.....
13,000.00	Theta Chi	5%	1931	14,000.00
	Sold during year . . . . .		....	5,000.00
\$243,792.40	Total Mortgage Notes			\$151,794.40
<u>REAL ESTATE</u>				
\$205,632.55	Avon St. Land and Building (11-13)			\$205,632.55
385,364.53	Franklin St. Land and Building (64-70)			385,364.53
100.00	Dorchester Land			100.00
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
<u>MISCELLANEOUS</u>				
\$100,000.00	Aldred Investment Trust Deb.	4½%	1967	\$110,103.00
*	Aldred Investment Trust Common		1000†	.....
5,210.00	First Boston Corp.		521†	.....
5,000.00	Mass. Hospital Life Insurance Co.	3%	...	5,000.00
*60,000.00	Old Colony Trust Associates . . . . .	.60	600†	30,000.00
*550,000.00	State Street Investment Corp.	1.60	5500†	.....
	Sold during year			384,500.00
\$720,210.00	Total Miscellaneous			\$529,603.00
		Per cent of total 1934	Per cent of total 1933	
<u>RECAPITULATION, GENERAL INVESTMENTS</u>				
\$2,108,325.00	Government and Municipal Bonds	6.90	9.10	\$2,880,440.00
2,413,000.00	Industrial Bonds	7.30	7.70	2,412,578.38
7,058,830.00	Industrial Stocks	18.30	13.60	4,299,530.15
8,816,750.00	Public Utility Bonds	28.00	28.00	8,808,192.81
1,244,700.00	Public Utility Stocks	3.90	3.80	1,214,973.91
7,009,400.00	Railroad Bonds	21.60	22.80	7,199,441.38
1,171,600.00	Railroad Stocks	4.10	6.00	1,880,288.17
755,500.00	Real Estate Bonds	2.50	2.60	811,858.33
126,800.00	Real Estate Stocks	0.40	0.50	149,112.86
172,660.00	Bank and Insurance Stocks	2.30	1.70	550,750.30
243,792.40	Mortgage Notes	0.80	0.50	151,794.40
646,097.08	Real Estate	2.10	2.00	646,097.08
720,210.00	Miscellaneous	1.80	1.70	529,603.00
\$32,487,664.48	Total General Investments	100.00	100.00	\$31,534,660.77

*No par value.

†Shares.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$500.00	\$6,000.00	.....	\$327.70
.....	.....	4,500.00	.....	225.00
.....	2.00	40,392.40	.....	1,199.22
.....	.....	4,000.00	.....	200.00
.....	15,000.00	60,000.00	.....	2,214.58
\$100,000.00	.....	100,000.00	.....	3,000.00
.....	.....	2,400.00	.....	120.00
14,000.00	500.00	13,500.00	.....	350.00
.....	1,000.00	13,000.00	.....	675.00
.....	5,000.00	.....	.....	127.23
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$114,000.00	\$22,002.00	\$243,792.40	.....	\$8,438.73
.....	.....	\$205,632.55	\$3,698.97	\$7,756.00
.....	.....	385,364.53	12,255.90	13,124.06
.....	.....	100.00	85.28	.....
.....	.....	40,000.00	.....	.....
.....	.....	15,000.00	516.33	.....
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
.....	.....	\$646,097.08	\$16,556.48	\$20,880.06
.....	\$306.00	109,797.00	.....	\$4,500.00
\$9,378.10	.....	\$9,378.10	.....	.....
.....	.....	5,000.00	.....	150.00
.....	.....	30,000.00	.....	360.00
400,235.00	.....	400,235.00	.....	2,200.00
3,500.00	388,000.00	.....	.....	24,521.37
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$413,113.10	\$388,306.00	\$554,410.10	.....	\$31,731.37
\$170,291.41	\$956,879.88	\$2,093,851.53	.....	\$134,220.03
168,135.89	355,793.88	2,224,920.39	\$732.31	115,385.48
1,972,935.69	651,368.83	5,621,097.01	.....	162,372.60
184,879.03	382,200.88	8,610,870.96	1,618.00	451,884.34
76,219.09	103,583.00	1,187,610.00	.....	68,291.17
156,260.52	722,114.40	6,633,587.50	511.25	330,287.21
180,879.01	801,703.41	1,259,463.77	.....	25,647.58
.....	63,625.00	748,233.33	.....	37,370.83
.....	19,200.00	129,912.86	.....	1,360.00
175,019.50	10,207.40	715,562.40	.....	21,963.00
114,000.00	22,002.00	243,792.40	.....	8,438.73
.....	.....	646,097.08	16,556.48	20,880.06
413,113.10	388,306.00	554,410.10	.....	31,731.37
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$3,611,733.24	\$4,476,984.68	\$30,669,409.33	\$19,418.04	\$1,409,832.40

Schedule H (Continued)

<i>Par Value</i>	<i>Description of Securities</i>	<i>Rate</i>	<i>Maturity</i>	<i>Balance June 30, 1933</i>
<u>INVESTMENTS, MALCOLM COTTON BROWN FUND</u>				
\$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
<u>\$28,000</u>	<i>Total</i>			<u>\$13,635.00</u>
<u>INVESTMENTS, COFFIN MEMORIAL FUND</u>				
\$35,000	Light & Power Securities Co., Pref.	6%	350†	\$35,000.00
*1,000	United Gas & Imp. Co., Pref.	\$5.00	10†	973.04
<u>\$36,000</u>	<i>Total</i>			<u>\$35,973.04</u>
<u>INVESTMENTS, EBEN S. DRAPER FUND</u>				
\$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
5,000	North Boston Lighting Properties	5½%	1937	.....
14,000	Ohio Power Co., 1st & Ref. Mtge. Gold	4½%	1956	12,202.50
24,000	Indianapolis Un. Ry. Co., Gen. Mtge.	5%	1965	23,880.00
	Sold during year			20,314.00
<u>\$89,000</u>	<i>Total</i>			<u>\$101,551.50</u>
<u>INVESTMENTS, RICHARD LEE RUSSELL FELLOWSHIP FUND</u>				
\$3,000	Trinity Bldgs. Corp. of N.Y., 1st Mtge.	5½%	1939	\$3,000.00
<u>INVESTMENTS, SUSAN H. SWETT SCHOLARSHIP FUND</u>				
\$10,000	Mass. Hospital Life Insurance Co.	3%	...	\$10,000.00
2,000	Trinity Bldgs. Corp. of N.Y., 1st Mtge.	5½%	1939	2,000.00
<u>\$12,000</u>	<i>Total</i>			<u>\$12,000.00</u>
<u>INVESTMENTS, WILLIAM LYMAN UNDERWOOD FUND</u>				
\$4,000	Consolidated Gas of N. Y. Com.	2.00	40†	\$4,880.00
3,400	Boston Woven Hose & Rubber Co. Com.		34†	2,992.00
2,000	Boston Woven Hose & Rubber Co. Pfd.	6%	20†	2,000.00
<u>\$9,400</u>				<u>\$9,872.00</u>
<u>INVESTMENTS, FRANCES E. WESTON FUND</u>				
\$10,000	Mortgage Note, Anna C. Bartlett	4%	1936	\$10,000.00

*No par value.
†Shares.

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	\$6,750.00	.....	.....
.....	4,100.00	.....	.....
.....	990.00	.....	\$45.00
.....	1,795.00	.....	80.00
.....	<u>\$13,635.00</u>	.....	<u>\$125.00</u>
.....	\$35,000.00	.....	\$2,100.00
.....	973.04	.....	50.00
.....	<u>\$35,973.04</u>	.....	<u>\$2,150.00</u>
.....	\$21,890.00	.....	\$1,100.00
.....	3,870.00	.....	200.00
.....	19,395.00	.....	900.00
\$5,162.50	\$54.50	5,108.00	\$3.82	.....
.....	12,202.50	.....	630.00
.....	23,880.00	.....	1,200.00
.....	20,314.00	.....	.....	239.44
<u>\$5,162.50</u>	<u>\$20,368.50</u>	<u>\$86,345.50</u>	<u>\$3.82</u>	<u>\$4,269.44</u>
.....	\$3,000.00	.....	\$165.00
.....	\$10,000.00	.....	\$300.00
.....	2,000.00	.....	110.00
.....	<u>\$12,000.00</u>	.....	<u>\$410.00</u>
.....	\$4,880.00	.....	\$114.00
.....	2,992.00	.....	.....
.....	2,000.00	.....	120.00
.....	<u>\$9,872.00</u>	.....	<u>\$234.00</u>
.....	\$10,000.00	.....	\$400.00

Schedule H (Continued)

Par Value	Description of Securities	Rate	Maturity	Balance June 30, 1933
<u>INVESTMENTS, JONATHAN WHITNEY FUND</u>				
\$25,000	Montreal, City of, Canada	5%	1936	\$25,000.00
54,000	Canada, Dominion of, 10-Yr. Gold	4½%	1936	53,257.50
21,000	Standard Oil Co. of New York	4½%	1935	21,009.00
24,000	Swift & Co., 1st Sinking Fund	5%	1944	21,720.00
28,000	Western Electric Co., Deb.	5%	1944	27,720.00
27,000	Brooklyn Edison Co. Inc. Gen. "E".	5%	1952	26,122.50
25,000	Detroit Edison Co., Gen. & Ref. "E".	5%	1952	24,825.00
16,000	Memphis Pow.&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	35,165.00
25,000	Illinois Gen. R.R. Co., Sec. Gold	4%	1952	22,625.00
50,000	Kansas City Terminal Ry.Co.,1st Mt.	4%	1960	42,750.00
23,000	Long Island R.R. Ref.	4%	1949	.....
25,000	Maine Cen. R.R. Co., 1st & Ref. Mt.	4½%	1935	25,001.00
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
5,000	Union Pacific R.R.	4½%	1967	.....
150,000	Mortgage Note, M. I. T. Dormitory	5%	...	150,000.00
	Sold or matured during year			25,776.00
<u>\$623,000</u>	<i>Total</i>			<u>\$602,103.24</u>
<u>\$33,298,064.48</u>	<i>Grand Total, All Investments (Schedule D)</i>			<u>\$32,322,795.55</u>

RECAPITULATION, ALL INVESTMENTS

	Per cent of total 1934	Per cent of total 1933	Book Value
Government and Municipal Bonds	7.00	9.30	\$2,193,999.03
Industrial Bonds	7.30	7.70	2,295,360.39
Industrial Stocks	17.90	13.30	5,626,089.01
Public Utility Bonds	27.90	27.80	8,761,501.85
Public Utility Stocks	3.90	3.90	1,228,463.04
Railroad Bonds	21.80	22.80	6,866,854.22
Railroad Stocks	4.00	5.80	1,259,463.77
Real Estate Bonds	2.40	2.50	753,233.33
Real Estate Stocks . . . . .	.40	.50	129,912.86
Bank and Insurance Stocks	2.30	1.70	715,562.40
Mortgage Notes	1.30	1.00	403,792.40
Real Estate	2.00	2.00	646,097.08
Miscellaneous	1.80	1.70	564,410.10
	<u>100.00</u>	<u>100.00</u>	<u>\$31,444,739.48</u>

Schedule H (Continued)

<i>Purchases and Charges during the year</i>	<i>Sales and Credits during the year</i>	<i>Balance June 30, 1934</i>	<i>Accrued Interest, etc.</i>	<i>Income Received</i>
.....	.....	\$25,000.00	.....	\$1,250.00
.....	.....	53,257.50	.....	2,430.00
.....	\$9.00	21,000.00	.....	945.00
.....	.....	21,720.00	.....	1,200.00
.....	.....	27,720.00	.....	1,400.00
.....	.....	26,122.50	.....	1,350.00
.....	.....	24,825.00	.....	1,250.00
.....	.....	15,040.00	.....	800.00
.....	.....	24,150.39	.....	1,125.00
.....	.....	8,077.50	.....	450.00
.....	.....	24,381.25	.....	1,125.00
.....	6.00	35,159.00	.....	1,575.00
.....	.....	22,625.00	.....	1,000.00
.....	.....	42,750.00	.....	2,000.00
\$23,065.00	5.00	23,060.00	\$131.33	.....
.....	1.00	25,000.00	.....	1,125.00
.....	.....	7,000.00	.....	315.00
.....	.....	8,558.10	.....	405.00
.....	.....	4,950.00	.....	250.00
.....	.....	8,975.00	.....	400.00
5,138.37	5.00	5,133.37	101.88	.....
.....	.....	150,000.00	.....	7,500.00
.....	25,776.00	.....	.....	1,180.56
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$28,203.37	\$25,802.00	\$604,504.61	\$233.21	\$29,075.56
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
\$3,645,099.11	\$4,523,155.18	\$31,444,739.48	\$19,655.07	\$1,446,661.40

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, 1934 (Schedule D)	<u>\$15,703,258.55</u>

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 Pratt Fund, for School of Naval Architecture	215,000.00 675,150.00
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, 1934 (Schedule D)	<u>\$15,703,258.55</u>

SCHEDULE M
ENDOWMENT FUNDS FOR GENERAL PURPOSES

No.	Restricted Funds	Funds, June 30, 1933	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1934
101	George Robert Armstrong	\$5,250.00	\$226.50	.....	\$476.50	\$5,000.00
102	George Blackburn Mem.	895,203.61	40,905.90	\$10,896.15	41,174.70	905,830.96
103	Charles Choate	37,608.15	1,630.80	.....	3,380.80	35,858.15
104	Eben S. Draper	102,400.00	4,265.62	.....	15,087.91	91,577.71
105	Coleman du Pont	122,465.80	5,798.40	12,154.76	5,798.40	134,620.56
107	Eastman Contract	9,546,268.15	430,304.70	.....	477,703.30	9,498,869.55
108	George Eastman (Building)	1,422,901.42	57,802.80	.....	204,802.80	1,275,901.42
109	Charles W. Eaton	251,987.03	11,007.90	.....	19,657.90	243,337.03
112	Educational Endowment . .	7,960,264.60	343,102.20	.....	729,752.20	7,573,614.60
113	Martha Ann Edwards. . . .	31,500.00	1,359.00	.....	2,859.00	30,000.00
114	William Endicott	26,250.00	1,132.50	.....	2,382.50	25,000.00
117	Francis Appleton Foster. .	1,051,100.00	45,300.00	.....	96,400.00	1,000,000.00
118	Alexis H. French	5,000.00	226.50	.....	226.50	5,000.00
119	Jonathan French	26,462.48	1,132.50	.....	2,382.50	25,212.48
121	Henry C. Frick	1,853,513.69	82,808.40	.....	108,878.90	1,827,443.19
122	General Endowment	1,605,499.00	69,173.10	.....	147,223.10	1,527,449.00
123	James Fund	171,904.21	7,429.20	.....	15,679.20	163,654.21
125	Katherine B. Lowell	5,250.00	226.50	.....	476.50	5,000.00
126	Thomas McCammon	15,000.00	679.50	.....	679.50	15,000.00
127	M. I. T. Alumni (Fund Bal.)	1,672.68	72.48	.....	.....	1,745.16
128	Kate M. Morse	26,250.00	1,132.50	.....	2,382.50	25,000.00
129	Everett Morss . . . . .	.....	.....	25,000.00	.....	25,000.00
131	Richard Perkins	52,550.00	2,265.00	.....	4,815.00	50,000.00
132	J. W. and B. L. Randall . .	87,702.36	3,759.90	.....	8,009.90	83,452.36
135	Wm. Barton Rogers Mem.	262,975.00	11,325.00	.....	24,075.00	250,225.00
136	² Saltonstall Fund	61,240.30	2,672.70	.....	4,667.03	59,245.97
137	Samuel E. Sawyer	4,914.40	226.50	.....	376.50	4,764.40
139	Andrew Hastings Spring . .	52,550.00	2,265.00	.....	4,815.00	50,000.00
140	Seth K. Sweetser	26,311.62	1,132.50	.....	2,382.50	25,061.62
141	William J. Walker	24,763.59	1,087.20	.....	2,237.20	23,613.59
114	Horace Herbert Watson . . .	34,076.69	1,540.20	.....	1,540.20	34,076.69
145	Albion K. P. Welch.	5,250.00	226.50	.....	476.50	5,000.00
147	³ George Wigglesworth	25,178.90	1,132.50	.....	1,019.25	25,292.15
		<u>\$25,801,263.68</u>	<u>\$1,133,350.00</u>	<u>\$48,050.91</u>	<u>\$1,931,818.79</u>	<u>\$25,050,845.80</u>
	<i>Unrestricted Funds</i>					
151	Edmund D. Barbour	\$383,701.61	\$15,039.60	.....	\$66,719.79	\$332,021.42
152	Howard A. Carson	1,000.00	.....	.....	1,000.00	.....
153	Henrietta G. Fitz	10,000.00	453.00	.....	453.00	10,000.00
155	Esther A. Hilton	1,626.67	.....	.....	1,626.67	.....
157	Industrial Fund	86,830.36	3,171.00	\$10,271.68	24,494.27	75,778.77
158	Hiram H. Logan . . . . .	.....	679.50	17,000.00	679.50	17,000.00

¹ See alphabetical listing and description of Funds on pages 176-186.

² One-fourth of net income added to Fund.

³ Ten per cent of gross income added to Fund.

Schedule M (Continued)

	<i>Unrestricted Funds (Continued)</i>	<i>Funds, June 30, 1933</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended or Transferred</i>	<i>Funds, June 30, 1934</i>
159	Hiram F. Mills	\$10,675.00	\$453.00	.....	\$953.00	\$10,175.00
162	Moses W. Oliver	11,770.49	498.30	.....	1,048.30	11,220.49
163	Preston Player	20,000.00	906.00	.....	906.00	20,000.00
165	Robert E. Rogers	7,980.77	362.40	.....	662.40	7,680.77
168	Ellen V. Smith	25,000.00	1,132.50	.....	1,132.50	25,000.00
171	Horace W. Wadleigh	2,243.14	.....	.....	2,243.14	.....
173	Webster, Frank G.	25,000.00	1,132.50	.....	1,132.50	25,000.00
		<u>\$585,828.04</u>	<u>\$23,827.80</u>	<u>\$27,271.68</u>	<u>\$103,051.07</u>	<u>\$533,876.45</u>

SCHEDULE M

²ENDOWMENT FUNDS FOR DESIGNATED PURPOSES

<i>Special Deposit Funds</i>						
205	Endowment Reserve	\$491,921.78	.....	\$1,123,782.68	\$1,089,366.11	\$526,338.35
206	Endowment Reserve Income . . . . .	.....	\$14,420.06	.....	.....	14,420.06
207	Albert Fund	4,211.80	135.90	.....	2,108.00	2,239.70
209	¹ Anonymous (1924)	1,660.59	72.48	.....	.....	1,733.07
210	¹ 1923 Endowment	9,600.29	453.00	3,871.84	291.32	13,633.81
212	¹ 1924 Endowment	10,398.57	453.00	2,513.95	374.97	12,990.55
214	¹ 1925 Endowment	5,744.05	271.80	2,284.56	303.83	7,996.58
216	¹ 1926 Endowment Special	255.56	11.33	.....	.....	266.89
217	¹ 1926 Endowment	104.97	.....	910.60	1,381.05	*365.48
218	¹ 1927 Endowment	6,230.74	294.45	1,269.79	.....	7,794.98
220	¹ 1928 Endowment	8,609.44	407.70	1,535.67	.....	10,552.81
221	¹ 1929 Endowment	4,425.30	226.50	865.04	.....	5,516.84
222	¹ 1930 Endowment	501.90	27.18	199.31	.....	728.39
223	¹ 1934 Endowment . . . . .	.....	.....	225.00	.....	225.00
225	M.I.T. Teachers' Insurance	7,751.22	.....	26,162.46	29,760.52	4,153.16
226	¹ M.I.T. Teachers' Insurance (Special)	58,262.56	2,536.80	858.82	2,919.36	58,738.82
227	¹ M.I.T. Alumni Association Permanent Funds	49,535.57	2,265.00	.....	.....	51,800.57
229	¹ Class of '98 Loan	6,625.78	298.98	.....	6.66	†6,918.10
230	¹ Class of '74 . . . . .	.....	.....	180.97	.....	180.97
231	Professors' Fund	36,816.96	1,359.00	12,720.17	21,825.00	29,071.13
233	¹ Richards Portrait	566.25	27.18	.....	3.00	590.43
235	Rockefeller Found. Research	*6,603.00	.....	37,500.00	30,820.00	77.00
236	W. P. Ryan Special	3,000.00	135.90	.....	.....	3,135.90
237	Sedgwick Memorial Lecture Fund	6,901.12	317.10	340.01	231.65	7,326.58
239	¹ Elihu Thomson	6,205.76	271.80	.....	.....	6,477.56
243	¹ Undergraduate Dues, Res. Athletics	11,078.97	498.30	.....	.....	11,577.27
244	¹ Undergraduate Dues, Res. Contingent	10,544.33	498.30	1,000.00	.....	12,042.63
		<u>\$734,350.51</u>	<u>\$24,981.76</u>	<u>\$1,216,220.87</u>	<u>\$1,179,391.47</u>	<u>\$796,161.67</u>

¹ Income added to Fund.² See alphabetical listing and description of Funds on pages 176-186

* Overdraft.

† Exclusive of student notes receivable. (See Schedule P, page

***Schedule M (Continued)**

No.		Funds, June 30, 1953	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1954
	FUNDS FOR SALARIES					
251	Samuel C. Cobb					
	For General Salaries	\$38,351.31	\$1,676.10	.....	\$3,476.10	\$36,551.31
253	Sarah H. Forbes					
	For General Salaries	500.00	22.65	.....	22.65	500.00
255	George A. Gardner					
	For General Salaries	21,000.00	906.00	.....	1,906.00	20,000.00
259	James Hayward					
	Professorship of Engineering .	20,250.00	860.70	.....	2,310.70	18,800.00
261	William P. Mason					
	Professorship of Geology . . .	20,250.00	860.70	.....	2,310.70	18,800.00
263	Henry B. Rogers					
	For General Salaries	26,250.00	1,132.50	.....	2,382.50	25,000.00
265	Nathaniel Thayer					
	Professorship of Physics . . .	26,250.00	1,132.50	.....	2,382.50	25,000.00
266	Elihu Thomson					
	Professorship, Elec. Eng. . . .	1,479.60	249.15	\$4,760.00	249.15	6,239.60
		<u>\$154,330.91</u>	<u>\$6,840.30</u>	<u>\$4,760.00</u>	<u>\$15,040.30</u>	<u>\$150,890.91</u>
	FUNDS FOR LIBRARY, READING					
	ROOMS AND GYMNASIUM					
271	Walter S. Barker	\$11,069.03	\$498.30	.....	\$929.89	\$10,637.44
273	Ednah Dow Cheney	16,686.72	724.80	.....	2,139.81	15,271.71
274	Frank Harvey Cilley	82,138.68	3,714.60	.....	2,053.70	83,799.58
277	Charles Lewis Flint	5,594.19	226.50	.....	388.85	5,431.84
280	William Hall Kerr	3,281.00	135.90	.....	108.01	3,308.89
283	George A. Osborne	9,024.57	407.70	\$1,000.00	720.89	9,711.38
286	Arthur Rotch Arch	6,719.76	317.10	.....	343.60	6,693.26
288	Technology Matrons' Teas . . .	9,144.34	407.70	.....	390.72	9,161.32
289	John Hume Tod	2,942.85	135.90	.....	140.49	2,938.26
291	Theodore N. Vail.	41,420.40	1,812.00	.....	3,381.01	39,851.39
		<u>\$188,021.54</u>	<u>\$8,380.50</u>	<u>\$1,000.00</u>	<u>\$10,596.97</u>	<u>\$186,805.07</u>
	FUNDS FOR DEPARTMENTS					
301	William Parsons Atkinson . . .	\$13,732.20	\$588.90	.....	\$1,238.90	\$13,082.20
303	Frank Walter Boles Memorial .	27,596.74	1,268.40	.....	288.02	28,577.12
305	William E. Chamberlain.	7,659.77	317.10	.....	667.10	7,309.77
307	Chemical Engineering Practice	270,822.97	11,687.40	.....	24,737.40	257,772.97
309	Crosby Honorary Fund	1,642.30	72.48	.....	1.50	1,713.28
311	Susan E. Dorr	100,705.67	4,348.80	.....	9,098.80	95,955.67
312	George Eastman	420,400.00	18,120.00	.....	38,520.00	400,000.00
316	John Lawrence Mauran . . . . .	.....	135.90	\$10,000.00	135.90	10,000.00
317	George Henry May	5,250.00	226.50	.....	476.50	5,000.00
319	Susan Minns	40,000.00	.....	.....	.....	40,000.00
320	Forris Jewett Moore	30,361.19	1,313.70	.....	1,419.42	30,255.47
322	William E. Nickerson	34,499.17	1,313.70	.....	8,830.21	26,982.66
324	Edward D. Peters	5,866.02	271.80	.....	250.00	5,887.82
325	Pratt Naval Architectural . . .	412,399.95	17,757.60	.....	37,757.60	392,399.95
327	Arthur Rotch	26,250.00	1,132.50	.....	2,382.50	25,000.00
329	W. T. Sedgwick	93,512.24	4,122.30	.....	5,020.03	92,614.51
331	¹ Edmund K. Turner	259,016.66	11,279.70	.....	20,479.30	249,817.06
333	William Lyman Underwood . . .	12,391.00	234.00	.....	.....	12,625.00
		<u>\$1,762,105.88</u>	<u>\$74,190.78</u>	<u>\$10,000.00</u>	<u>\$151,303.18</u>	<u>\$1,694,993.48</u>

¹ One-fourth of net income added to Fund.² See alphabetical listing and description of Funds on pages 176-186.

Schedule M (Continued)

No.		Funds, June 30, 1933	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1934
FUNDS FOR RESEARCH						
343	Samuel Cabot	\$54,698.31	\$2,310.30	.....	\$3,550.00	\$53,458.61
344	Crane Automotive Research	5,879.09	226.50	.....	1,000.00	5,105.59
347	Daniel Guggenheim	1,839.13	.....	.....	1,839.13	.....
349	Ellen H. Richards	21,767.50	951.30	.....	1,616.24	21,102.56
351	Charlotte B. Richardson	46,594.83	2,038.50	.....	1,800.00	46,833.33
354	Technology Plan Research	1,694.67	77.01	.....	1,771.68	.....
356	Textile Research Fund	30,792.38	1,041.90	.....	13,426.24	18,408.04
358	Edward Whitney	59,376.10	2,446.20	.....	11,770.35	50,051.95
		<u>\$222,642.01</u>	<u>\$9,091.71</u>	<u>.....</u>	<u>\$36,773.64</u>	<u>\$194,960.08</u>
FUNDS FOR FELLOWSHIPS						
361	Arkwright Club	\$2,019.41	.....	.....	\$1,050.00	\$969.41
363	William Sumner Bolles	28,368.49	\$1,223.10	.....	2,300.00	27,291.59
364	Malcolm Cotton Brown	12,865.34	125.00	.....	.....	12,990.34
366	Collamore	15,010.71	634.20	.....	1,300.00	14,344.91
368	Dalton Graduate Chemical	7,691.56	317.10	.....	600.00	7,408.66
369	DuPont	26.50	.....	.....	26.50	.....
372	Daniel Guggenheim	80.00	.....	.....	80.00	.....
374	Rebecca R. Joslin	2,515.12	113.25	\$101.41	100.00	†2,629.78
376	Wilfred Lewis	5,238.80	226.50	.....	200.00	5,265.30
378	Moore	30,361.46	1,313.70	.....	2,300.00	29,375.16
380	Willard B. Perkins	7,885.44	317.10	.....	400.00	7,802.54
382	Proctor	1,000.00	.....	210.00	1,210.00	.....
384	Proprietors Locks and Canals	3,474.62	135.90	.....	50.00	3,560.52
386	Henry Bromfield Rogers	26,787.41	1,132.50	.....	2,250.00	25,669.91
388	Richard Lee Russell	3,189.07	165.00	.....	.....	3,354.07
390	Henry Saltonstall	11,378.55	498.30	.....	950.00	10,926.85
392	James Savage	12,836.12	543.60	.....	1,100.00	12,279.72
393	Sloan . . . . .	.....	.....	.....	1,000.00	*1,000.00
395	Susan H. Swett	12,200.45	410.00	.....	500.00	12,110.45
396	Gerard Swope	138.75	.....	.....	.....	138.75
397	Frank Hall Thorp	10,564.69	498.30	.....	500.00	10,562.99
398	Louis Francisco Verges	11,084.60	498.30	.....	1,000.00	10,582.90
		<u>\$204,717.09</u>	<u>\$8,151.85</u>	<u>\$311.41</u>	<u>\$16,916.50</u>	<u>\$196,263.85</u>
FUNDS FOR SCHOLARSHIPS						
401	Elisha Atkins	\$5,529.97	\$226.50	.....	\$500.00	\$5,256.47
403	Billings Student	53,429.24	2,310.30	.....	4,710.00	51,029.54
404	Jonathan Bourne	11,203.16	498.30	.....	900.00	10,801.46
405	Albert G. Boyden	563,895.91	25,594.50	\$3,150.21	17,076.00	575,564.62
406	Harriet L. Brown	7,805.24	362.40	.....	650.00	7,517.64
408	Nino Teshar Catlin	1,103.64	45.30	.....	100.00	1,048.94
411	Lucius Clapp	5,356.97	226.50	.....	450.00	5,133.47
413	Class of 1896	6,213.75	271.80	.....	400.00	6,085.55
415	Lucretia Crocker	81,078.16	3,488.10	.....	7,325.00	77,241.26
417	Isaac W. Danforth	5,652.41	226.50	.....	500.00	5,378.91

† See alphabetical listing and description of Funds on pages 176-186.

* Overdraft.

† Exclusive of student notes receivable. (See Schedule P, page 170.)

Schedule M (Continued)

No.		Funds, June 30, 1933	Investment Income	Other Income	Expended or Transferred	Funds, June 30, 1934
420	Ann White Dickinson	\$44,103.83	\$1,902.60	.....	\$3,910.00	\$42,096.43
421	Thomas M. Drown	52,094.19	2,355.60	.....	2,100.00	52,349.79
424	Farnsworth	5,809.64	226.50	.....	500.00	5,536.14
426	Charles Lewis Flint	5,807.66	271.80	.....	510.00	5,569.46
427	Sarah S. Forbes	3,778.39	181.20	.....	250.00	3,709.59
429	Fuel and Gas Scholarship	350.00	.....	.....	.....	350.00
431	George Hollingsworth	5,402.73	226.50	.....	450.00	5,179.23
433	T. Sterry Hunt	3,421.62	135.90	.....	280.00	3,277.52
434	William F. Huntington	5,646.42	226.50	.....	510.00	5,362.92
436	Joy Scholarships	17,257.61	770.10	.....	650.00	17,377.71
438	William Litchfield	5,720.68	226.50	.....	500.00	5,447.18
439	Elisha T. Loring	5,730.47	226.50	.....	500.00	5,456.97
441	Lowell Inst. Scholarship	2,697.45	135.90	.....	150.00	2,683.35
442	Rupert A. Marden . . . . .	.....	45.30	\$2,000.00	.....	2,045.30
443	George Henry May	7,863.74	362.40	131.25	500.00	†7,857.39
445	James H. Mirrlees	2,690.60	135.90	.....	150.00	2,676.50
447	Nichols Scholarship	5,656.15	226.50	300.00	480.00	5,702.65
448	Charles C. Nichols	5,720.97	226.50	.....	500.00	5,447.47
450	John Felt Osgood	5,620.00	226.50	.....	500.00	5,346.50
451	George L. Parmelee	19,652.01	860.70	.....	1,700.00	18,812.71
453	Richard Perkins	56,245.47	2,446.20	.....	5,050.00	53,641.67
455	John P. Schenkl	46,392.23	2,038.50	.....	1,890.00	46,540.73
456	Thomas Sherwin	5,698.63	226.50	.....	480.00	5,445.13
458	Horace T. Smith	33,359.23	1,494.90	.....	1,300.00	33,554.13
459	Sons and Daughters New England Colony	629.54	27.18	.....	30.00	626.72
460	Samuel E. Tinkham	2,527.33	135.90	.....	200.00	2,463.23
462	F. B. Tough	35.30	.....	.....	.....	†35.30
463	Susan Upham	1,243.18	45.30	.....	100.00	1,188.48
465	Vermont Scholarship	8,394.93	362.40	.....	550.00	8,207.33
467	Ann White Vose	64,933.79	2,808.60	.....	5,710.00	62,032.39
469	Arthur M. Waitt	10,856.44	453.00	.....	930.00	10,379.44
471	Louis Weissbein	4,526.43	181.20	.....	350.00	4,357.63
473	Frances Erving Weston	6,624.28	200.00	.....	300.00	6,524.28
474	Samuel Martin Weston	5,422.54	200.00	.....	200.00	5,422.54
476	Amasa J. Whiting	4,901.81	226.50	.....	350.00	4,778.31
		<u>\$1,198,083.74</u>	<u>\$53,065.78</u>	<u>\$5,581.46</u>	<u>\$64,191.00</u>	<u>\$1,192,539.98</u>

FUNDS FOR PRIZES

481	Robert A. Boit	\$5,455.87	\$226.50	.....	\$495.00	\$5,187.37
483	Class of 1904	560.45	22.65	.....	10.00	573.10
485	Roger Defriez Hunneman	1,077.14	45.30	.....	100.00	1,022.44
487	James Means	3,309.10	135.90	.....	212.50	3,232.50
489	Arthur Rotch	6,952.80	317.10	.....	300.00	6,969.90
491	Arthur Rotch, Special.	9,552.90	453.00	.....	650.00	9,355.90
493	Samuel W. Stratton	1,697.76	100.00	\$100.00	101.25	1,796.51
		<u>\$28,606.02</u>	<u>\$1,300.45</u>	<u>\$100.00</u>	<u>\$1,868.75</u>	<u>\$28,137.72</u>

¹ See alphabetical listing and description of Funds on pages 176-186.

† Exclusive of student notes receivable. (See Schedule P, page 170.)

²Schedule M (Continued)

No.		<i>Funds, June 30, 1933</i>	<i>Investment Income</i>	<i>Other Income</i>	<i>Expended or Transferred</i>	<i>Funds, June 30, 1934</i>
FUNDS FOR RELIEF						
501	Edward Austin	\$459,041.18	\$19,796.10	.....	\$42,500.00	\$436,337.28
503	Thomas Wendell Bailey	2,697.38	135.90	.....	200.00	2,633.28
504	¹ Charles Tidd Baker	29,394.96	1,268.40	\$81.87	1,800.00	28,945.23
506	Levi Boles	11,373.33	498.30	.....	925.00	10,946.63
508	Bursar's Fund	8,356.67	398.30	2,805.64	2,475.00	†9,085.61
510	Mabel Blake Case	28,046.69	1,223.10	.....	2,450.00	26,819.79
511	Chandler	3,895.45	181.20	.....	150.00	3,926.65
512	Fred L. and Florence L. Coburn	5,090.14	226.50	.....	200.00	5,116.64
514	Coffin Memorial	41,958.50	2,150.00	.....	2,121.00	41,987.50
516	Dean's Fund	3,717.15	181.20	602.54	575.00	†3,925.89
518	Carl P. Dennett	332.85	.....	248.36	.....	†581.21
520	Dormitory Fund	4,043.26	181.20	.....	300.00	3,924.46
521	Frances and William Emerson	100,167.10	4,530.00	175.00	4,108.50	†100,763.60
523	Norman H. George	97,969.35	4,212.90	40.00	8,650.00	93,572.25
525	John A. Grimmons	6,703.16	362.40	3,346.90	.....	†10,412.46
527	James H. Haste	176,579.33	8,018.10	.....	6,952.00	177,645.43
529	David L. Jewell	25,723.88	1,177.80	.....	1,020.00	25,881.68
531	William B. Rogers	22,767.48	1,041.90	3,175.24	3,128.50	†23,856.12
532	Summer Surveying Camp	368.13	22.65	897.32	150.00	†1,138.10
534	Teachers' Fund	140,051.62	6,070.20	.....	11,404.74	134,717.08
536	Samson R. Urbino	1,120.64	45.30	.....	100.00	1,065.94
537	Jonathan Whitney	606,821.61	28,842.35	.....	27,681.00	607,982.96
539	Morrill Wyman	75,063.31	3,261.60	.....	6,550.00	71,774.91
		<u>\$1,851,283.17</u>	<u>\$83,825.40</u>	<u>\$11,372.87</u>	<u>\$123,440.74</u>	<u>\$1,823,040.70</u>

RECAPITULATION OF FUNDS

FOR GENERAL PURPOSES

Restricted	\$25,801,263.68	\$1,133,350.00	\$48,050.91	\$1,931,818.79	\$25,050,845.80
Unrestricted	585,828.04	23,827.80	27,271.68	103,051.07	533,876.45

FOR DESIGNATED PURPOSES

Special Deposit Funds	734,350.51	24,981.76	1,216,220.87	1,179,391.47	796,161.67
Salaries	154,330.91	6,840.30	4,760.00	15,040.30	150,890.91
Libraries, etc.	188,021.54	8,380.50	1,000.00	10,596.97	186,805.07
Departments	1,762,105.88	74,190.78	10,000.00	151,303.18	1,694,993.48
Research	222,642.01	9,091.71	.....	36,773.64	194,960.08
Fellowships	204,717.09	8,151.85	311.41	16,916.50	196,263.85
Scholarships	1,198,083.74	53,065.78	5,581.46	64,191.00	1,192,539.98
Prizes	28,606.02	1,300.45	100.00	1,868.75	28,137.72
Relief	1,851,283.17	83,825.40	11,372.87	123,440.74	1,823,040.70

Total (Schedule D)	<u>\$32,731,232.59</u>	<u>\$1,427,006.33</u>	<u>\$1,324,669.20</u>	<u>\$3,634,392.41</u>	<u>\$31,848,515.71</u>
		(Schedule B)			(Schedule D)

¹ One-half of the income added to the principal.

² See alphabetical listing and description of Funds on pages 176-186.

† Exclusive of student notes receivable. (See Schedule P, page 170.)

SCHEDULE P
STUDENT NOTES RECEIVABLE

<i>Fund</i>	<i>Notes Receivable June 30, 1933</i>	<i>Loans Made 1933-1934</i>	<i>Loans Paid 1933-1934</i>	<i>Notes Receivable June 30, 1934</i>	<i>Interest Paid 1933-1934</i>
Technology Loan Fund . . .	\$418,592.01	\$202,835.00*	\$35,166.22	\$586,260.79	\$9,191.73
Bursar's Fund	13,685.49	2,225.00	2,620.94	13,289.55	164.70
Rogers Fund	15,534.10	3,128.50	†3,154.26	15,508.34	170.98
Dean's Fund	2,898.58	475.00	572.50	2,801.08	30.04
C. E. Summer Camp Fund. .	1,305.00	150.00	790.00	665.00	32.32
Grimmons Sch. Loan Fund. .	2,455.00	.....	245.00	2,210.00	68.88
Dennett Fund	980.00	.....	220.00	760.00	28.36
Dean's Special Fund	95.00	.....	.....	95.00	.....
R. R. Joslin Fund	100.00	.....	100.00	.....	1.41
G. H. May Sch. Fund	2,540.00	300.00	131.25	2,708.75	.....
F. B. Tough Fund	500.00	.....	.....	500.00	.....
Hygiene Special Fund	2,494.52	.....	89.29	2,405.23	.....
Class of 1898 Fund	500.00	.....	.....	500.00	.....
Emerson Fund	775.00	.....	175.00	600.00	.....
Austin Fund . . . . .	.....	250.00	.....	250.00	.....
C. W. Eaton Fund . . . . .	.....	600.00	.....	600.00	.....
Total	\$462,454.70	\$209,963.50	\$43,264.46	\$629,153.74	\$9,688.42

Schedule D

* Includes \$1,050.00 written off — two deceased borrowers.

† Includes \$150 written off — deceased borrower.

SCHEDULE R

MINOR FUNDS

Name	Balance June 30, 1933	Income	Other Increases	Salaries and Expenses	Balance June 30, 1934
Additional Group Ins. Fund	\$12.67	\$4,690.95	.....	\$4,680.62	\$23.00
Aeronautical Engineering					
Balloon Fund . . . . .	.....	2,731.52	.....	2,721.52	10.00
Design	578.80	100.00	.....	817.57	*138.77
Coasting Expts.	107.86	.....	‡\$17.57	125.43	.....
Wind Tunnels	1,134.54	1,869.00	.....	628.65	2,374.89
Wing Flutter Acct.	115.64	.....	.....	.....	115.64
No. 640	2,206.83	.....	.....	252.75	1,954.08
No. 868.	226.58	.....	.....	162.56	64.02
No. 881.	*2,946.06	7,150.00	‡1,839.13	8,493.40	*2,450.33
No. 902.	594.11	.....	‡67.88	661.99	.....
No. 915.	209.09	.....	.....	457.06	*247.97
No. 927.	2,000.00	.....	.....	1,747.77	252.23
No. 945.	830.21	.....	.....	830.21	.....
No. 1014 . . . . .	.....	.....	‡600.00	300.00	300.00
No. 1015 . . . . .	.....	.....	‡1,119.83	147.75	972.08
Aldred Lecture Fund . . . . .	.....	100.00	.....	719.44	*619.44
American Assoc. for the Advance- ment of Science —					
Pittsburg Meeting . . . . .	.....	1,707.89	‡900.00	1,857.89	750.00
Architecture:					
Travel Scholarship	90	.....	‡1,500.00	1,500.90	.....
Special No. 995 Resch. Fund . . . . .	.....	290.75	‡205.22	495.97	.....
Special Scholarship . . . . .	.....	200.00	.....	200.00	.....
Biology — Food Research					
Colgate Reseach	3,681.34	9,000.00	.....	12,681.34	.....
Biocinema Research	2,670.57	.....	.....	1,000.00	1,670.57
Coffee Research	571.83	.....	.....	50.37	521.46
Frigidaire Research.	1,590.36	.....	.....	1,590.36	.....
Health Education	221.35	8.00	1,‡1,400.00	1,323.99	305.36
Special Research . . . . .	.....	.....	‡10,219.49	307.20	9,912.29
General Sea Foods	3,365.33	4,000.00	.....	7,365.33	.....
Gelatin Research.	184.83	.....	.....	184.83	.....
Rockefeller Research	5,664.56	.....	‡3,010.00	5,906.07	2,768.49
Merck Research	*9.38	.....	‡9.38	.....	.....
Blue Print Service	134.88	4,040.05	‡500.00	4,625.35	49.58
Boat House Equipment	1,063.77	1,239.45	‡521.26	1,374.42	1,450.06
Building Key Account	2,672.75	859.75	.....	823.85	2,708.65
Bus. and Eng. Administration:					
XV Fund	85.89	.....	.....	85.89	.....
No. 736	74.31	.....	.....	74.31	.....
Graduate Fellowship Fund	368.10	.....	‡464.35	454.01	378.44
No. 785	95.07	45.00	‡68.31	45.10	163.28
No. 791	293.47	.....	.....	293.47	.....

* Overdraft.

‡ Appropriation from Current Funds.

‡ By Transfer.

Name	Schedule R (Continued)		Other Increases	Salaries and Expenses	Balance June 30, 1934
	Balance June 30, 1933	Income			
Bus. and Eng. Administration (Cont.):					
J. R. Macomber Fund	\$279.40	\$500.00	.....	\$256.10	\$523.30
No. 847.	14.35	.....	.....	14.35	.....
No. 972.	2,000.00	.....	.....	2,000.00	.....
Carnegie Corp. Account . . . . .	.....	4,000.00	.....	.....	4,000.00
Chemical Eng. Practice, Special	1,311.54	.....	.....	1,311.54	.....
Chemistry:					
Rockefeller Research	4,314.68	.....	‡\$11,600.00	10,568.56	5,346.12
Res. Lab. App. Chemistry. . . . .	.....	1,529.90	‡8,450.22	9,980.12	.....
Res. Lab. Phys. Chem. Royalties	605.23	.....	.....	10.30	594.93
Civil Engineering — Special Res. . . . .	.....	.....	1200.00	198.80	1.20
Soil Mech., No. 632	117.88	.....	1,2500.00	423.68	194.20
Spec. Fund	75.00	.....	.....	75.00	.....
Masonry Mat. Res. Fund . . . . .	.....	1,433.00	.....	1,384.00	49.00
Nat. Res. Council Grant	109.00	.....	.....	109.00	.....
Special Structural Lab. . . . .	.....	.....	‡500.00	313.04	186.96
No. 1024 C. E. Camp . . . . .	.....	.....	‡1,325.00	.....	1,325.00
No. 734.	33.22	.....	.....	33.22	.....
No. 913.	3,870.53	.....	‡33.22	394.52	3,509.23
Crafts Library Fund . . . . .	.....	1,000.00	‡1,000.00	1,801.32	198.68
Dean's Special Fund	‡160.27	.....	.....	145.00	15.27
Dining Service Reserve	6,678.08	.....	.....	2,386.58	4,291.50
Div. of Indus. Co-operation . . . . .	.....	36,947.10	‡24,444.25	61,391.35	.....
Dormitory Tax	121.43	1,628.75	.....	1,741.00	9.18
Curtain and Rug Account . . . . .	.....	573.43	.....	573.43	.....
Laundry Account . . . . .	.....	1,174.59	.....	1,174.59	.....
Graduate House Equip.	9,837.44	.....	‡5,137.31	14,974.75	.....
Electrical Engineering:					
No. 710.	4.94	.....	.....	4.94	.....
Rumford Grant	65.08	.....	.....	65.08	.....
VI-A Fund	355.87	.....	‡300.00	506.71	149.16
Fog Research . . . . .	.....	2,000.00	.....	52.00	1,948.00
Network Analyzer	1,573.21	.....	.....	334.87	1,238.34
Rockefeller Research . . . . .	.....	.....	‡1,000.00	465.64	534.36
Boston Police Dept. Survey	36.78	.....	.....	36.78	.....
Round Hill	11,657.82	11,250.00	‡2,635.34	28,243.94	‡2,700.78
Nat. Elec. Light Assoc.	1,109.12	150.00	.....	1,184.67	74.45
Machine Transients	114.99	.....	.....	114.99	.....
Account 4133	3,950.00	5,000.00	.....	3,742.25	5,207.75
Nat. Research Council Grant	395.00	.....	.....	395.00	.....
Differential Analyzer	2,700.00	.....	‡2,000.00	2,673.91	2,026.09
Special Research—Sinclair	.....	1,800.00	.....	.....	1,800.00

* Overdraft.

‡ Appropriation from Current Funds.

‡ By Transfer.

† Exclusive of student notes receivable. (See Schedule P, page 170.)

Schedule R (Continued)

Name	Balance June 30, 1933	Income	Other Increases	Salaries and Expenses	Balance June 30, 1934
Emergency Employment Fund	\$51.40	.....	.....	\$51.40	.....
Employees Health and Acc. Ins. . . . .	.....	\$5,159.00	.....	5,159.00	.....
Engineering Research	5,000.00	.....	¹ \$5,000.00	5,000.00	\$5,000.00
Eng. Research special—Lamar . . . . .	.....	.....	² \$300.00	143.73	156.27
Eng. Research special—Wilbur . . . . .	.....	.....	² \$200.00	200.00	.....
Freeman Translation Fund	344.62	.....	.....	.....	344.62
Fuel and Gas, Contractors' Acct.	3,455.22	2,668.78	.....	2,875.12	3,248.88
F. E. R. A. . . . .	.....	3,339.10	.....	3,343.60	*4.50
Geology, Rockefeller Research	2,062.89	.....	² \$5,085.00	4,242.73	2,905.16
Geology—No. 913	2,869.79	.....	.....	1,931.52	938.27
Geology, Special No. 1021 . . . . .	.....	.....	¹ \$2,000.00	808.70	1,191.30
Graphic Arts Acct.	14.97	.....	.....	.....	14.97
Historic Memorials	499.96	.....	.....	75.25	424.71
Historic Tablets No. 723	239.00	.....	.....	239.00	.....
High Volt. Power Project Fund . . . . .	.....	.....	¹ \$1,395.11	1,395.11	.....
Hayden Perpetual Challenge Cup . . . . .	.....	800.00	.....	800.00	.....
Hygiene Department Special	†2,854.60	89.29	.....	44.00	2,899.89
Journal of Math. and Physics	2,968.10	240.79	¹ \$2,000.00	875.14	4,338.75
Letter Shop	101.82	20,919.26	.....	21,773.66	*752.58
Library, Special No. 1 . . . . .	.....	526.75	.....	231.76	294.99
Building 6 Equip. Acct.	1,882.60	.....	.....	937.48	945.12
No. 1011 . . . . .	.....	.....	¹ \$300.00	133.46	166.54
Mechanical Engineering—No. 482	779.00	.....	.....	294.00	485.00
Shop Account	80.40	.....	² \$243.53	323.93	.....
No. 781	70.75	.....	.....	70.75	.....
No. 873	12.23	.....	.....	12.23	.....
No. 917	24.28	.....	.....	24.28	.....
Mining Engineering:					
Ore Dressing	103.25	.....	² \$258.05	.....	361.30
Welding Research	*384.36	500.00	.....	115.64	.....
Special Travel Fund	500.00	.....	.....	300.00	200.00
Nuclear Research . . . . .	.....	.....	¹ \$14,000.00	8,708.04	5,291.96
Placement Committee Fund . . . . .	.....	.....	¹ \$400.00	360.84	39.16
Patent Committee Fund . . . . .	.....	2,500.00	.....	840.10	1,659.90
Photographic Service	147.46	12,216.59	² \$500.00	12,642.47	221.58
Photostat Service	240.35	6,639.92	.....	6,669.76	210.51
Photostat—Reserve	2,000.00	.....	.....	1,000.00	1,000.00
Physics Department, Special	471.15	.....	.....	152.26	318.89
Roentgen Ray	1,883.42	.....	.....	.....	1,883.42
Hale Spectroscopic Fund	1,486.20	.....	.....	.....	1,486.20
Carnegie Spectroscopy Fund . . . . .	.....	385.00	.....	385.00	.....
Rockefeller Research Fund	4,535.32	.....	² \$10,125.00	13,250.00	1,410.32
Permanent Science Fund . . . . .	.....	500.00	.....	.....	500.00
Rumford Grant, A. A. of A. & S.	278.62	.....	.....	.....	278.62
Rumford Grant, Hardy	211.99	.....	.....	.....	211.99
Rumford Grant, S.	472.18	.....	.....	489.60	*17.42
Rumford Grant, O.	5.98	.....	.....	5.98	.....
Rumford Grant, Harrison . . . . .	.....	400.00	.....	136.30	263.70

* Overdraft.

¹ Appropriation from Current Funds.² By Transfer.

† Exclusive of student notes receivable. (See Schedule P, page 170.)

Name	Schedule R (Continued)		Other Increases	Salaries and Expenses	Balance June 30, 1934
	Balance June 30, 1933	Income			
Physics Department, Special (Cont.):					
Salary Account	\$2,000.00	\$1,260.00	.....	\$2,000.00	\$1,260.00
No. 916	194.68	.....	.....	33.08	161.60
No. 1023 . . . . .	.....	.....	\$1,500.00	403.00	1,097.00
Poughkeepsie Race Account . . .	521.26	.....	.....	521.26	.....
President's Special Fund . . . . .	.....	5,750.00	.....	4,432.07	1,317.93
President's Fund . . . . .	.....	.....	12,000.00	850.00	1,150.00
R. O. T. C. Uniform and Sub- sistance Accounts	649.58	12,817.87	.....	12,751.63	715.82
Safe Harbor Hydraulic Account . .	*145.44	7,870.34	.....	7,773.33	*48.43
Salaries Reserve Fund	69,073.52	27,487.01	.....	96,560.53	.....
Special Publication Acct., No. 954	75.00	.....	.....	75.00	.....
Special, No. 998 and 1017 — Open House . . . . .	.....	90.00	11,193.38	1,283.38	.....
Special, No. 952 (Tech. Movie) . .	.....	.....	1647.09	647.09	.....
Special, No. 968	2,319.35	.....	215.16	2,534.51	.....
Special, No. 1002 — Undergrad- uate Bulletin . . . . .	.....	.....	1,211,309.43	11,309.43	.....
Special, No. 1028 — Century of Progress . . . . .	.....	.....	4,000.00	1,917.97	2,082.03
Special, No. 1034 — Space Allo- cation . . . . .	.....	.....	16,000.00	73.98	5,926.02
Special — Dormitories	2,200.00	.....	.....	2,200.00	.....
Special — Publication Account . .	.....	2,500.00	275.00	2,500.00	75.00
Special — Repairs	5,000.00	.....	1,355.75	6,355.75	.....
Special — Rogers Bldg.	4,500.00	.....	.....	4,500.00	.....
Special — Salary Account No. 1 . .	1,145.97	.....	.....	1,145.97	.....
Special — Salary Account No. 2 . .	25.00	.....	.....	25.00	.....
Special — Power Plant No. 1026 . .	.....	.....	5,445.00	.....	5,445.00
Suspense Accounts	1,778.50	14,341.06	.....	16,933.60	*814.04
Suspense Account — Special . . . .	.....	2,450.00	.....	32.30	2,417.70
Tech Loan Fund Committee . . . . .	.....	169,190.05	233,644.95	202,835.00	.....
Tech Loan Fund — Interest	1,005.60	9,191.73	.....	8,275.87	1,921.46
Tech Loan Fund — Principal	4,921.99	34,116.22	.....	25,369.08	13,669.13
Technology Press	123.81	.....	.....	.....	123.81
Technology Press — Special . . . . .	.....	.....	6,500.00	5,171.51	1,328.49
Textile Research Fund . . . . .	.....	.....	213,462.75	13,431.01	31.74
U. S. Gov. Torpedo Research. . . .	.....	2,500.00	.....	2,500.00	.....
Walker Memorial Library	264.25	.....	1,994.25	2,258.47	.03
Wyman Fund . . . . .	.....	500.00	.....	500.00	.....
Buildings and Grounds Accounts . .	6,466.64	.....	1575.05	7,041.69	.....
Totals	†\$219,692.77	\$453,967.89	\$214,492.26	\$755,360.16	\$132,792.76
		(Schedule B)		(Schedule C)	(Schedule D)

*Overdraft.

† Appropriation from Current Funds.

‡ By Transfer.

† Including Building No. 6 Library and Graduate House Equipment accounts.

SCHEDULE S

CURRENT DEFICIT

Deficit, June 30, 1933	\$35,426.95
Net Decrease (Schedule A)	5,548.31
	<hr/>
Deficit, June 30, 1934 (Schedule D)	<u>\$29,878.64</u>

DETAIL OF PROFIT AND LOSS ACCOUNT

GAINS AND CREDITS:

Premium Refund Account Employees' Insurance	\$440.81
Tax Abatements 1931, 1932	7,781.45
Miscellaneous Credits	1,928.46
	<hr/>
Total Gains	<u>\$10,150.72</u>

LOSSES AND CHARGES:

Students' Accounts (previous years), charged off	\$495.77
Expenses Account of Tax Abatements, 1931, 1932	2,999.46
Miscellaneous Charges	1,774.18
	<hr/>
Total Losses	\$5,269.41
	<hr/>
Profit and Loss. Net Profit (Schedule A).	<u>\$4,881.31</u>

THE ENDOWMENT FUNDS OF THE INSTITUTE

(Alphabetically listed — see pages 164-169 with corresponding reference numbers, showing transactions during the year and balances as of June 30, 1934.)

- 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
- 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.
- 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.
- 230 CLASS OF 1874 FUND, 1934, \$180. Held subject to use by Class of 1874.
- 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.
- 229 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.
- 483 CLASS OF 1904 FUND, 1925, \$392. Contributions received by Professor Gardner for Architectural Department prizes.

210, 212, 214, 216, 217, 218, 220, 221, 222, 223.

CLASS ENDOWMENT 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.

From certain of these, a portion 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.

- 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. Created and otherwise increased by gains from sales or maturities of investments and decreased by premium amortization of bonds and losses and charges from sales or maturities. Belongs to all funds sharing general investments.
- 206 ENDOWMENT RESERVE INCOME FUND, 1934, \$14,400. Excess income over total allotted to funds participating in income from General Investments for year 1933-1934. Held for later allotment.
- 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, Trustee. 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. Income and part of principal now used in support of Division of Industrial Cooperation.
- 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.
- 158 HIRAM H. LOGAN FUND, 1933, \$17,000. Bequest. Principal and income for general purposes of M. I. T.
- 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.
- 442 RUPERT A. MARDEN FUND, 1933, \$2,000. Gift (anonymous). Income to aid worthy student — Protestant and of American origin — preference to student taking Coöperative Course in Electrical Engineering (Course VI-A).
- 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.
- 316 JOHN LAWRENCE MAURAN FUND, 1934, \$10,000. Bequest. Principal and income may be used for benefit of Department of Architecture.
- 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.
- 128 KATE M. MORSE FUND, 1925, \$25,000. Bequest. Income for general purposes of M. I. T.
- 129 EVERETT MORSS FUND, 1934, \$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 Humanities.
- 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 annually 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. Plan suspended July 1. 1934.

- 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 Cooperation 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, ATHLETICS, 1924. Transferred from Undergraduate Dues (current operating account) to secure investment income.
- 244 UNDERGRADUATE DUES RESERVE FUND, CONTINGENT, 1924. Transferred from Undergraduate Dues (current operating account) 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 Bursar of the Massachusetts Institute of Technology for the year ended June 30, 1934, 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, in our opinion, the accompanying Balance Sheet and Statements of Income and Expenditures correctly set forth, respectively, on the basis indicated, the financial condition of the Institute at June 30, 1934, 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 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 10, 1934.

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, 1934, and their certificate dated August 10, 1934 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,

ALEXANDER MACOMBER,
Chairman Auditing Committee.

September 10, 1934.

PERIODICAL PUBLICATIONS, BOOKS AND REVIEWS BY MEMBERS OF THE STAFF

DEPARTMENT OF AERONAUTICAL ENGINEERING

1. DRAPER, CHARLES S. and SPILHAUS, A. F. *Power Supplies for Suction-Driven Gyroscopic Instruments.* (A. S. M. E., 56, pp. 289-294, May 1934.)
2. DRAPER, CHARLES S. and LUCK, D. G. C. *A Fast and Economical Type of Photographic Oscillograph.* (Rev. Sci. Inst., 4, pp. 440-443, August 1933.)
3. NEWELL, JOSEPH S. *Several Papers in the Japanese language.*
4. OBER, SHATSWELL. *Calculation of Horsepower Available.* (Nat. Adv. Com. for Aero. Technical Note, 446 (Appendix), June 1934.)
5. SMITH, RICHARD H. and WHIPPLE, J. Van H. *Air Force Measurements on Bodies Moving Through Still Air.* (J. Ae. S., 1, p. 21, January 1934.)
6. TAYLOR, EDWARD S. *Radial Engines, Their Power and Frontal Area.* (Aviation, 34, p. 59, July 1933.)
7. TAYLOR, EDWARD S. and WOLFF, O. E. *Unconventional Rear Suspension Promises Better Riding and Smoother Performance.* (Auto. Ind., 70, p. 188, February 1934.)
8. WILLETT, HURD C. *North American Air Mass Properties.* (J. Ae. S., 1, p. 78, April 1934.)

DEPARTMENT OF ARCHITECTURE

9. ADAMS, FREDERICK J. *Housing in Relation to Planning.* (Bull. Mass. Fed. Planning Boards, No. 30, p. 40, October 1933.)
10. AUSTIN, WILLIAM D. *Shakespeare, an Economist.* (The Harvard Crimson, 105, pp. 4 and 6, March 1934.)

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH

11. BATES, PHILIP K. and HIGHLANDS, MATTHEW E. *The Determination of Storage Conditions.* (Refrig. Eng., 27, p. 299, June 1934.)
12. BELDING, DAVID L. *A Manual of Human Parasitology.* (Spaulding-Moss Co., Boston. October 1933.)
13. BELDING, DAVID L. *Comparison of Sigma, Kalin and Hulton Tests.* (Am. J. of Syph., 17, p. 539, October 1933.)
14. BELDING, DAVID L. *Technical Problems in Establishing Standards of Fertility in the Male.* (Am. J. Obst. & Gyn., 26, p. 868, December 1933.)
15. BELDING, DAVID L. *Technic of the Spermatozoa Count.* (Am. J. Obst. & Gyn., 27, p. 25, January 1934.)
16. HARRIS, ROBERT S. *Variability in the Corn Component of a Rachtogen Diet.* (J. Lab. and Clin. Medicine, 19, p. 390, January 1934.)
17. HORWOOD, MURRAY P., GOULD, B. S. and SCHWACHMAN, H. *The Number of Types of Bacteria Surviving in Household Dusts after Storage in Sealed Containers for Two Years.* (J. Bacteriology, 27, p. 46, January 1934.)
18. HORWOOD, MURRAY P. and HEIFETZ, ARTHUR. *A Comparative Study of Certain Presumptive Test Media.* (J. Bacteriology, 27, p. 37, January 1934.)
19. JENNISON, MARSHALL W. *A Rapid and Accurate Semi-automatic Delivery Pipette.* (Am. J. Pub. Health, 24, p. 59, January 1934.)

20. PRINDLE, BRYCE. *Microbiology of Textile Fibres. I. Cotton fibre.* (Textile Res., 4, 1934.)
21. RICKARDS, BURT R. *News Values in Health Statistics.* (Am. J. Pub. Health 24, p. 334, April 1934.)
22. RICKARDS, BURT R. *Various Articles.* (Health News, 1933-1934.)
23. RICKARDS, BURT R. *Annual Report.* (N. Y. State Department of Health, 1934.)
24. TOBEY, JAMES A. *Milk. The Indispensable Food.* (Olsen Publishing Co. Milwaukee, July 1933.)
25. TURNER, CLAIR E. and TURNER, NAOMI C. *Objective Tests for Cleanliness and Health.* (Privately printed, June 1934.)
26. TURNER, CLAIR E. and LYTLE, ELLEN L. *The Nature of Bacteria.* (Welfare Division, Metropolitan Life Ins. Co., November 1933.)
27. TURNER, CLAIR E. *Evaluating Present Practices in Health Education — Appraising a City Program.* (Advances in Health Education. A special report of the American Child Health Assn., pp. 73-76, 1934.)
28. TURNER, CLAIR E. *The Road Ahead.* (Advances in Health Education. A special report of the Amer. Child Health Assn., pp. 273-280, 1934.)
29. TURNER, CLAIR E. *Growth and Health.* (Education, 54, December 1933.)
30. WESTON, ROBERT S. *Stream Pollution and Waste Disposal.* (J. Am. Inst. Chem. Eng. Silver Anniversary Volume, pp. 317-328, 1933.)
31. WESTON, ROBERT S. *Wakefield Water Supply.* (J. N. E. W. W. Assoc., 67, pp. 239-247, September 1933.)
32. WILINSKY, CHARLES F. *Health and Hospital Survey of St. Louis.* (May 1934.)
33. WILINSKY, CHARLES F. *Health Centers.* (Social Work Year Book — by Russell Sage Foundation, 1933.)
34. WILINSKY, CHARLES F. *Responsibility for the Health Program.* (Am. J. of Public Health, 24, pp. 43-45, January 1934.)
35. WILINSKY, CHARLES F. *Health Work Under Jewish Auspices.* (Proc. Nat. Conf. of Jewish Soc. Service, 1934.)
36. WILINSKY, CHARLES F. *The Health Units of Boston.* (City of Boston Printing Dept. 1933.)
37. WILLIAMS, JOHN W. *Scalp Products and Hair as a Culture Medium for Certain Pathogenic Fungi.* (Proc. Soc. Exp. Biol. and Med., 31, p. 586, 1934.)
38. WILLIAMS, JOHN W. *Scalp Products and Hair Before Puberty as Culture Medium for Certain Pathogenic Fungi.* (Proc. Soc. Exp. Biol. and Med., 31, p. 944, 1934.)
39. WILLIAMS, JOHN W. *The Habitat of Trichophyton Interdigitale Outside the Body.* (Proc. Soc. Exp. Biol. and Med., 31, p. 984, 1934.)
40. WILLIAMS, JOHN W. *Effect of Glycerine on the Growth of Certain Pathogenic Fungi.* (Proc. Soc. Exp. Biol. and Med., 31, p. 986, 1934.)
41. WILLIAMS, JOHN W. *I. Effect of Dyes on Colonies of Certain Pathogenic Fungi.* (Proc. Soc. Exp. Biol. and Med., 31, p. 1173, 1934.)
42. WILLIAMS, JOHN W. *II. Effect of Dyes on Colonies of Certain Pathogenic Fungi.* (Proc. Soc. Exp. Biol. and Med., 31, p. 1174, 1934.)
43. WILLIAMS, JOHN W. *Growth of Certain Pathogenic Fungi on Asparagin Medium.* (Proc. Soc. Exp. Biol. and Med., 31, p. 1176, 1934.)

DEPARTMENT OF BUSINESS AND ENGINEERING ADMINISTRATION

44. FERNSTROM, KARL D., ELDER, ROBERT F., FISKE, WYMAN P., SCHAEFER, ALBERT A., and THRESHER, B. ALDEN. *Elements of Business Management.* (Privately printed for use at Massachusetts Institute of Technology, January 1934.)

45. FISKE, WYMAN P. *Amortization, Depreciation, Obsolescence and Replacement*. (Proc. Amer. Inst. Chem. Eng., December 1933.)
46. FISKE, WYMAN P. *New Deal in Amortization, Depreciation and Obsolescence*. (Chem. Met. Eng., 41, p. 26, January 1934.)
47. FISKE, WYMAN P. *Economic Considerations Govern Equipment Replacement*. Chem. Met. Eng., 41, p. 69, February 1934.)
48. PORTER, CHARLES H. and FISKE, WYMAN P. *Basic Accounting Principles*. (Textbook privately printed, January 1934.)
49. SCHELL, ERWIN H. *Advance Through Adversity*. (Privately printed October 1933.)
50. SCHELL, ERWIN H. *New Practices in the Technique of Executive Control*. (Office Management Series, American Management Association, O. M. 62, February 1934.)

DEPARTMENT OF CHEMICAL ENGINEERING

51. ADAMS, FREDERICK W. *The Rate of Drying of News Print*. (Paper Trade J., January 1934.)
52. ADAMS, FREDERICK W. *Scientific Control as an Aid to the Art of Paper Making*. (The Paper Mill and Wood Pulp News, June 1934.)
53. COOPER, CHARLES M., DREW, THOMAS B. and McADAMS, WILLIAM H. *Isothermal Flow of Liquid Layers*. (Ind. Eng. Chem., 26, p. 428, April 1934.)
54. DREW, THOMAS B., GENEREUX, R. P. and PERRY, J. H. *Flow of Fluids*. (Chem. Engineers' Handbook, McGraw-Hill Book Co., January 1934.)
55. GILLILAND, EDWIN R. and SHERWOOD, THOMAS K. *The Drying of Solids VI*. (Ind. Eng. Chem., 25, p. 1134, October 1933.)
56. GILLILAND, EDWIN R. and SHERWOOD, THOMAS K. *Diffusion of Vapors into Air Streams*. (Ind. Eng. Chem., 26, p. 516, May 1934.)
57. GILLILAND, EDWIN R. *Diffusion Coefficient in Gaseous Systems*. (Ind. Eng. Chem., 26, p. 681, June 1934.)
58. HOTTEL, HOYT C. *Heat Transfer by Radiation*. (Chem. Met. Eng., 41, p. 317, June 1934.)
59. LEWIS, WARREN K. *The Evaporation of a Liquid into a Gas — A Correction*. (Mech. Eng., 55, p. 567, September 1933.)
60. LEWIS, WARREN K. *Properties of Hydrocarbon Mixtures as Related to Production Engineering*. (Oil and Gas J., 32, p. 14, 1933.)
61. LEWIS, WARREN K. *Application of Data on Hydrocarbon Mixtures to Typical Problems*. (Oil and Gas J., 32, p. 18, 1933.)
62. LEWIS, WARREN K. *Physical Laws of Perfect Solution*. (Oil and Gas J., 32, p. 20, 1933.)
63. LEWIS, WARREN K. and LUKE, CHARLES D. *Vapor-Liquid Equilibria of Hydrocarbons at High Pressures*. (Ind. Eng. Chem., 25, p. 725, 1933.)
64. LEWIS, WARREN K., BROWN, G. G. and WEBER, HAROLD C. *Physical Factors Governing Cracking Operations*. (Ind. Eng. Chem., 26, p. 325, 1934.)
65. McADAMS, WILLIAM H. *Heat Transmission*. (Chem. Engineers' Handbook, pp. 823-874, McGraw Hill Book Co., January 1934.)
66. McADAMS, WILLIAM H. *Convection between Fluids and Solids*. (Chem. Met. Eng., 4, p. 232, 1934.)
67. MAREK, LEROY F. and PAUL, R. E. *Velocity Constants for the Primary Thermal Dissociation of Propane, n-Butane, and Isobutane*. (Ind. Eng. Chem., 26, p. 454, April 1934.)
68. SHERWOOD, THOMAS K. and COMINGS, EDWARD W. *An Experimental Study of the Wet Bulb Hygrometer*. (Trans. Am. Inst. Chem. Eng., 28, p. 88, 1932.)

69. SHERWOOD, THOMAS K. *Heat Transfer in a Stainless Steel Milk Heater* (Heating, Piping, Air Cond., 6, p. 62, February 1934.)

70. SHERWOOD, THOMAS K. *Drying*. (Chem. Engineers' Handbook, pp. 1219-1264, McGraw Hill Book Co., 1934.)

DEPARTMENT OF CHEMISTRY

71. BLANCHARD, ARTHUR A., RAFTER, J. R. and ADAMS, W. B., JR. *Formation of Carbonyls and Related Compounds*. (J. Am. Chem. Soc., 56, p. 16, January 1934.)

72. BLANCHARD, ARTHUR A. and WINDSOR, MANLY M. *The Significance of the Hydrides of the Carbonyls of Iron and Cobalt*. (J. Am. Chem. Soc., 56, p. 826, April 1934.)

73. DAVIS, ARTHUR R. *Outline of Course in Inorganic Chemistry*. (Privately printed for use in the first year course at Massachusetts Institute of Technology.)

74. DAVIS, TENNEY L. *Chemistry at Tech*. (The Chemist, 10, pp. 211-219, September 1933.)

75. DAVIS, TENNEY L. and HARRINGTON, VALENTINE. *The Pseudo-Quinoid Character of Tribromoresorcinol*. (J. Am. Chem. Soc., 56, pp. 129-132, January 1934.)

76. DAVIS, TENNEY L. *What a Student of the History of Chemistry May See and Do in Paris*. (J. Chem. Education, 11, pp. 211-216, April 1934.)

77. DAVIS, TENNEY L. and FARNUM, JAMES McC. *Relative Velocities of Reaction of Alcohols with Phenylisocyanate*. (J. Am. Chem. Soc., 56, pp. 883-885, April 1934.)

78. DAVIS, TENNEY L. and EBERSOLE, FRED. *Relative Velocities of Reaction of Amines with Phenylisocyanate*. (J. Am. Chem. Soc., 56, pp. 885-886, April 1934.)

79. DAVIS, TENNEY L. *American Contemporaries — Samuel Parsons Mulliken*. (Ind. Eng. Chem., 12, pp. 197-198, May 1934.)

80. DAVIS, TENNEY L. and OU, CHIA W. *The Dissociation Pressures of Certain Metal Pyridine Cyanates*. (J. Am. Chem. Soc., 56, pp. 1061-1063, May 1934.)

81. DAVIS, TENNEY L. and OU, CHIA W. *Certain Metal Pyridine Methylnitramine Complexes*. (J. Am. Chem. Soc., 56, pp. 1064-1065, May 1934.)

82. GERRY, HAROLD T. *The Vapor Pressure of Water*. (Proc. Am. Acad. Arts and Sci., 69, p. 137, January 1934.)

83. HARRIS, LOUIS, JOST, W. and PEARSE, R. W. R. *Separation of Hydrogen Isotopes by Diffusion through Palladium*. (Proc. Nat. Acad. Sci., 19, p. 991, December 1933.)

84. HARRIS, LOUIS and KING, GILBERT W. *The Infrared Absorption Spectra of Nitrogen Dioxide and Tetroxide*. (J. Chem. Phys., 2, p. 51, February 1934.)

85. HARRIS, LOUIS and JOHNSON, ELLIS A. *The Production of Strong Cellulose Acetate Films*. (Rev. Sci. Inst., 4, p. 454, August 1933.)

86. HARRIS, LOUIS and JOHNSON, ELLIS A. *Thermoelectric Force of Thin Films*. (Phys. Rev., 44, p. 944, December 1933.)

87. HARRIS, LOUIS. *Thermocouples for the Measurement of Small Intensities of Radiations*. (Phys. Rev., 45, p. 635, May 1934.)

88. HARRIS, LOUIS and LUHR, OVERTON. *Mass-Spectrograph Determination of the Relative Abundance of Heavy Hydrogen in a Sample*. (Phys. Rev., 45, p. 843, June 1934.)

89. HUNTRESS, ERNEST H. and HERSHBERG, EMANUEL B. *Automatic Pressure Regulators for Vacuum Distillation. II. Sulfuric Acid as a Manostat Fluid*. (Ind. Eng. Chem., Anal. Ed., 5, pp. 344-346, September 1933.)

90. HUNTRESS, ERNEST H., CLIFF, IVAN S. and ATKINSON, EDWARD R. *The Occurrence of a New Case of Isomerism in the Fluorenone-carboxylic Acid Series: Isomeric Products from the Action of Sulfuric Acid upon 3,3'-Dichlorodiphenic Acid*. (J. Am. Chem. Soc., 55, pp. 4262-4271, October 1933.)

91. HUNTRESS, ERNEST H., STANLEY, LESTER N. and PARKER, ALMON S. *The Preparation of 3-Aminophthalhydrazide for use in the Demonstration of Demiluminescence.* (J. Am. Chem. Soc., 56, pp. 241-242, January 1934.)
92. HUNTRESS, ERNEST H., STANLEY, LESTER N. and PARKER, ALMON S. *The Oxidation of 3-Aminophthalhydrazide as a Lecture Demonstration of Demiluminescence.* (J. Chem. Education, 2, pp. 142-145, March 1934.)
93. KEYES, FREDERICK G. and SMITH, LEIGHTON B. *The Present State of Psychrometric Data.* (Refrig. Eng., 27, p. 127, March 1934.)
94. KEYES, FREDERICK G. *Methods and Procedure Used in the M. I. T. Program of Investigation of the Pressures and Volumes of Water to 460° C. Part I.* (Proc. Am. Acad. Arts and Sci., 68, p. 505, November 1933.)
95. KEYES, FREDERICK G. and SMITH, LEIGHTON B. *The Compressibility of Mercury from 30° to 300° C. Part III A.* (Proc. Am. Acad. Arts and Sci., 69, p. 313, April 1934.)
96. KEYES, FREDERICK G., SMITH, LEIGHTON B. and GERRY, HAROLD T. I. *A Comparison of Derived and Observed Quantities by Means of an Equation of State for Steam Based on the New M. I. T. Volume Data.* (Mech. Eng., 56, p. 87, February 1934.)
97. KEYES, FREDERICK G. and SMITH, LEIGHTON B. *The Volumes of Unit Mass of Liquid Water and Their Correlation as a Function of Pressure and Temperature. Part III.* (Proc. Am. Acad. Arts and Sci., 69, p. 285, April 1934.)
98. MILAS, NICHOLAS A. *Auto-Oxidation and Ionization Potentials of Molecules.* (J. Am. Chem. Soc., 56, p. 486, February 1934.)
99. MILAS, NICHOLAS A. *Studies in Auto-Oxidation Reactions. VII. The Dative or Coördination Peroxide Theory of Auto-Oxidation.* (J. Phys. Chem., 38 p. 411, April 1934.)
100. MILAS, NICHOLAS A. and MCALEVY, AMBROSE. *Studies in Organic Peroxides. III. Peroxides in the Furan Series.* (J. Am. Chem. Soc., 56, p. 1219, May 1934.)
101. MILAS, NICHOLAS A. and MCALEVY, AMBROSE. *Studies in Organic Peroxides. IV. The Spontaneous Decomposition of Europeracid.* (J. Am. Chem. Soc., 56, p. 1221, May 1934.)
102. MILLARD, EARL B. "Falling Apples." (Tech. Rev., 36, p. 1, October 1933.)
103. MORTON, AVERY A. *Removal of Impurities from Methanol. Use of Nessler's Reagent.* (Ind. Eng. Chem., Anal. Ed., 6, p. 151, March 1933.)
104. NORRIS, JAMES F. *Arthur M. Comey.* (Proc. Am. Acad. Arts and Sci., 68, p. 618, 1933.)
105. NORRIS, JAMES F. *Ira Remsen.* (Proc. Am. Acad. Arts and Sci., 68, p. 662, 1933.)
106. NORRIS, JAMES F. *The Reactivity of Atoms and Groups in Organic Compounds. XIV. The Influence of Substituents on the Thermal Stability of Certain Derivatives of Malonic Acid.* (J. Am. Chem. Soc., 55, p. 4697, November 1933.)
107. NORRIS, JAMES F. *The Rates of the Thermal Decomposition of Certain Triphenylmethyl Alkyl Ethers.* (J. Am. Chem. Soc., 55, p. 4946, December 1933.)
108. NORRIS, JAMES F. *The Reactivity of Atoms and Groups in Organic Compounds. XIII. The Influence of Structure on the Pyrolysis of Esters of Triphenylacetic Acid.* (J. Am. Chem. Soc., 56, p. 423, February 1934.)
109. SCATCHARD, GEORGE. *The Coming of Age of the Interionic-Attraction Theory.* (Chem. Rev., 13, p. 7, August 1933.)
110. SCATCHARD, GEORGE and PRENTISS, SPENCER S. *An Objective Study of Dilute Aqueous Solutions of Uni-univalent Electrolytes.* (Chem. Rev., 13, p. 139, August 1933.)
111. SCATCHARD, GEORGE. *Non-Electrolyte Solutions.* (J. Am. Chem. Soc., 56, p. 995, April 1934.)

112. SCATCHARD, GEORGE and PRENTISS, SPENCER S. *The Freezing Points of Aqueous Solutions. IV. Potassium, Sodium and Lithium Chlorides and Bromides.* (J. Am. Chem. Soc., 55, p. 4355, November 1933.)
113. SCATCHARD, GEORGE, PRENTISS, SPENCER S. and JONES, P. T. *The Freezing Points of Aqueous Solutions. V. Potassium, Sodium and Lithium Chlorates and Perchlorates.* (J. Am. Chem. Soc., 56, p. 805, April 1934.)
114. SCATCHARD, GEORGE and PRENTISS, SPENCER S. *The Freezing Points of Aqueous Solutions. VI. Potassium, Sodium and Lithium Formates.* (J. Am. Chem. Soc., 56, p. 807, April 1934.)
115. SCHUMB, WALTER C. and BICKFORD, FRED A. *The Vapor Pressure of Silicobromoform.* (J. Am. Chem. Soc., 56, p. 852, 1934.)
116. SCHUMB, WALTER C. and GOLDMAN, LOUIS. *The Synthesis of Ammonia in the Electrodeless Discharge.* (Proc. Am. Acad. Arts and Sci., 69, p. 169, January 1934.)
117. SHERRILL, MILES S. *A Course of Study in Chemical Principles. Parts I, II.* (The Macmillan Co., New York, September 1933.)
118. SMITH, LEIGHTON B. and KEYES, FREDERICK G. *An Equation for the Volume of Liquid Water.* (Mech. Eng., 56, p. 92, February 1934.)
119. SMITH, LEIGHTON B., KEYES, FREDERICK G. and GERRY, HAROLD T. *The Vapor Pressure of Water.* (Proc. Am. Acad. Arts and Sci., 69, p. 137, January 1934.)
120. URRY, WILLIAM D. *Further Studies in the Rare Gases. II.* (J. Am. Chem. Soc., 55, p. 3242, August 1933.)
121. URRY, WILLIAM D. *Helium and the Problem of Geological Time.* (Chem. Rev., 13, p. 305, October 1933.)
122. WINDSOR, MANLY M. and BLANCHARD, ARTHUR A. *The Vapor Pressure and Molecular Weight of Chromium Carbonyl.* (J. Am. Chem. Soc., 56, p. 823, April 1934.)

DEPARTMENT OF CIVIL AND SANITARY ENGINEERING

123. BABCOCK, JOHN B., 3d. *Civil Engineering Handbook.* (Section on Railway and Highway Eng., McGraw-Hill Book Co., 1934.)
124. BARROWS, HAROLD K. *Public Supervision of Dams — A Symposium Discussion.* (Trans. Am. Soc. C. E., 98, pp. 872-873, 1933.)
125. BARROWS, HAROLD K. *Memoir of Arthur C. Eaton.* (Trans. Am. Soc. C. E., 1934.)
126. BARROWS, HAROLD K. *William Gibbs McNeill.* (Dict. of Am. Biog., 12, pp. 152-153, 1933.)
127. BARROWS, HAROLD K. *Forests and Stream Flow — Discussion.* (Trans. Am. Soc. C. E., 99, pp. 57-58, 1934.)
128. BREED, CHARLES B. *Report upon Cost of Roads Required for Heavy Motor Vehicles Compared with Roads Adequate for Passenger Automobiles and Light Trucks.* (Assoc. Railroads of Pennsylvania, November 1933.)
129. BREED, CHARLES B. *Analysis of Road Cost on the State Highways of Worcester County, Massachusetts.* (Proc. of 13th Annual Meeting of the Highway Research Board. Part I. Reports of Research Committees and Papers, pp. 79-110, 1934.)
130. BREED, CHARLES B. and HOSMER, GEORGE L. *The Principles and Practice of Surveying.* (Vol. II, Higher Surveying, 4th edition, John Wiley & Sons, Inc., 1934.)
131. REYNOLDS, KENNETH C. *Discussion of Paper "Practical River Laboratory Hydraulics."* (Proc. Am. Soc. C. E., 60, p. 417, March 1934.)
132. REYNOLDS, KENNETH C. *Model Studies of Dike for Protection of Hartford South Meadows.* (J. Boston Soc. C. E., 20, pp. 222-231, November 1933.)
133. SPOFFORD, CHARLES M. *Long Span Bridges.* (The Tech Eng. News, 14, p. 107 et seq.)

134. TUCKER, ROSS F. *Cities Fit to Live In—A Planning Authority and What It Might Do.* (Tech. Rev., 36, October 1933.)
135. WILBUR, JOHN B. *A New Method for Analyzing Stresses Due to Lateral Forces in Building Frames.* (J. Boston Soc. C. E., 21, pp. 45-56, January 1934.)

DEPARTMENT OF ELECTRICAL ENGINEERING

136. BALSBAUGH, JAYSON C. *Oil Cells for Power-Factor Measurements of Small Samples and Useful Applications of a Power-Factor Bridge.* (Report of Com. on Elec. Insulation, Nat. Res. Council, p. 12, 1933.)
137. BALSBAUGH, JAYSON C. *Discussion of paper by C. F. Hill, T. R. Watts and G. A. Burr, Portable Schering Bridge for Field Tests.* (Elec. Eng., 53, p. 478, March 1934.)
138. BARROW, WILMER L. *On the Oscillations of a Circuit having a Periodically Varying Capacitance.* (Proc. Inst. Radio Eng., 22, pp. 201-212, February 1934.)
139. BARROW, WILMER L. *Frequency Modulation.* (R/9, 53, pp. 27-29, April 1934.)
140. BARROW, WILMER L. *Frequency Modulation and the Effects of a Periodic Capacity Variation in a Nondissipative Oscillatory Circuit.* (Proc. Inst. Radio Eng., 21, pp. 1182-1202, August 1933.)
141. BENNETT, RALPH D. *Incipient Arcs in Ionization Chambers.* (Phys. Rev., 45, p. 491, April 1934.)
142. BENNETT, RALPH D., COMPTON, A. H., WOLLAN, E. O. and SIMON, A. W. *A Precision Recording Cosmic-Ray Meter.* (Phys. Rev., 45, p. 758, April 1934.)
143. CALDWELL, SAMUEL H. and REID, W. D. *Research in Electrocardiography.* (Annals of Internal Medicine, 7, pp. 369-380, September 1933.)
144. DAHL, GUSTAV C. *Discussion of paper by Edith Clark and R. G. Lorraine. Power Limits of Synchronous Machines.* (Elec. Eng., 53, p. 476, March 1934.)
145. DAHL, GUSTAV C. *Discussion of paper by S. B. Cray, L. A. March and L. P. Schildneck. Equivalent Reactance of Synchronous Machines.* (Elec. Eng., 53, p. 604, April 1934.)
146. DWIGHT, HERBERT B. and CHEN, S. H. *An Extension of a Maxwell Mutual-Inductance Formula to Apply to Thick Solenoids.* (Physics, 4, pp. 323-326, September 1933.)
147. DWIGHT, HERBERT B. *Skin Effect in Conductors of Given Shape.* (Letter to Editor.) (Elec. Eng., 52, p. 724, October 1933.)
148. DWIGHT, HERBERT B. *Tables of Integrals and Other Mathematical Data.* (The Macmillan Company, January 1934.)
149. DWIGHT, HERBERT B. *Discussion of paper by S. B. Cray, L. A. March and L. P. Schildneck. Equivalent Reactance of Synchronous Machines.* (Elec. Eng., 53, p. 484, March 1934.)
150. DWIGHT, HERBERT B. *A Graphical Solution of Steady-State Stability.* (Elec. Eng., 53, p. 566, April 1934.)
151. EDGERTON, HAROLD E. and GERMESHAUSEN, K. J. *The Stroboscope and High-Speed Motion Picture Camera as Research Instruments.* (Pre-print, Am. Inst. Chem. Eng., May 15, 1934.)
152. FAY, RICHARD D. and HALL, WILLIAM M. *The Determination of the Acoustical Output of a Telephone Receiver from Input Measurements.* (J. Acoustical Soc. of Amer., 5, p. 46, July 1933.)
153. FRAZIER, RICHARD H. *Contributions to "Electrical Engineering Laboratory Experiments" by Ricker and Tucker.* (McGraw-Hill Book Co., Inc., Ch. I, pp. 1-3, 19-20, 33-35, Experiments 1-7 incl., 9-15 incl., 65, February 1934.)
154. FRAZIER, RICHARD H. *An Experiment in the Honors Treatment of Students in Electrical Engineering.* (School and Society, 39, pp. 271-272, March 3, 1934.)

155. HAZEN, HAROLD L. *Discussions of papers by S. B. Crary on Steady State Stability of Composite Systems, and Edith Clark and R. G. Lorraine on Power Limits of Synchronous Machines.* (Elec. Eng., 53, p. 477, March 1934.)

156. HORTON, JOSEPH W. *The Use of a Vacuum-Tube as a Plate-Feed Impedance.* (J. Franklin Inst., 216, pp. 749-762, December 1933.)

157. HOUGHTON, HENRY G. *A Study of the Evaporation of Small Water Drops.* (Physics, 4, p. 419, December 1933.)

158. JACKSON, DUGALD C. *Intellectual Interchange Among Faculties of Engineering Schools.* (Science, 78, pp. 291-296, October 6, 1933.)

159. JACKSON, DUGALD C. *The Origins of Engineering.* (Science, 78, pp. 589-596, December 29, 1933.)

160. JACKSON, DUGALD C. *Presentation of the Edison Medal of Professor Kennelly.* (The Scientific Monthly, pp. 287-288, March 1934.)

161. JACKSON, DUGALD C. *Function of the Administrative Officer with Reference to Graduate Work.* (The Soc. Promotion of Eng. Education, Board of Investigation and Coördination — Selected Papers of the Conference of Administrative Officers of Engineering Colleges, pp. 43-50, March 1934.)

162. JACKSON, DUGALD C. *Electrical Engineering Education.* (Elec. Eng., Fiftieth Anniversary, 53, pp. 770-776, May 1934.)

163. JACKSON, DUGALD C. *Charles Proteus Steinmetz and the American Institute of Electrical Engineers.* (Science, 79, pp. 511-515, June 8, 1934.)

164. JOHNSON, ELLIS A. and HARRIS, L. *The Technique of Sputtering Sensitive Thermocouples.* (Rev. Sci. Inst., 5, pp. 153-158, April 1934.)

165. JOHNSON, ELLIS A. and HARRIS, L. *Disintegration of Sputtered Deposits.* (Phys. Rev., 45, pp. 630-634, May 1, 1934.)

166. JOHNSON, ELLIS A. *The Measurement of Temperature of Sound Fields.* (Phys. Rev., 45, pp. 641-645, May 1, 1934.)

167. JOHNSON, ELLIS A. and NEITZERT, CARL. *The Measurement of Small Voltages at Audio Frequencies.* (Rev. Sci. Inst., 5, pp. 196-200, May 1934.)

168. KINGSLEY, CHARLES, JR. *Discussion of Paper by S. B. Crary, L. A. March and L. P. Schildneck. Equivalent Reactance of Synchronous Machines.* (Elec. Eng., 53, p. 603, April 1934.)

169. MOON, PARY H. and NORCROSS, A. S. *Gibt es ein Zwischengebiet zwischen dem Wärmedurchschlag und dem rein elektrischen Durchschlag?* (Archiv. f. Elek., 27, p. 827, December 1933.)

170. NORCROSS, AUSTIN S. *A New Method of Eliminating Edge Effect in Dielectric Breakdown.* (Rev. Sci. Inst., 4, August 1933.)

171. TIMBIE, WILLIAM H. *What Correlation is There Between Education and Vocation?* (The Tech Eng. News, April 1934.) (Modified for School and Society, June 1934.)

172. TIMBIE, WILLIAM H. *Discussion of paper by Prof. Dyche and R. E. Hellmund, The Pitt-Westinghouse Graduate Program.* (Elec. Eng., 53, pp. 447-448, March 1934.)

173. TUCKER, CARLTON E. and RICKER, C. W. *Electrical Engineering Laboratory Experiments.* (Third Edition, 404 pages, McGraw-Hill Book Co., February 1934.)

174. TUCKER, CARLTON E. *The Advantages of Paper-Insulated Lead-Covered, Cable for Municipal Police Communications Systems.* (The Municipal Signaling Journal 2, pp. 4-11, January 1934.)

175. TUCKER, CARLTON E. *Municipal Police Communications.* (The Tech Eng. News, 15, p. 3, March 1934.)

176. WILDES, KARL L. *Employment for the Class of 1934.* (The Tech Eng. News, 15, pp. 46-47, 59-60, May 1934.)

177. WILDES, KARL L. *Testing Course VI-A.* (Sparks, May 1934.)

178. WOODRUFF, LOUIS F. *A New Deal — in Cards.* (Tech. Rev., 36, p. 132, January 1934.)

179. WOODRUFF, LOUIS F. and MULLIGAN, JAMES E. *Transfer Feeder Faults to One Breaker*. (Elec. World, 103, p. 464, March 31, 1934.)

180. WOODRUFF, LOUIS F. and MULLIGAN, JAMES E. *Tests on a Fault-Transfer Switch*. (Letter to Editor) (Elec. World, 104, p. 90, July 21, 1934.)

DEPARTMENT OF GEOLOGY

181. BUERGER, MARTIN J. *The Optical Properties of Ideal Solution Immersion Liquids*. (Am. Mineralogist, 18, pp. 325-334, August 1933.)

182. BUERGER, MARTIN J. *The Pyrite-Marcasite Relation*. (Am. Mineralogist, 19, pp. 37-61, February 1934.)

183. BUTLER, ROBERT D. *Immersion Liquids of Intermediate Refraction (1.450-1.630)*. (Am. Mineralogist, 18, pp. 386-401, September 1933.)

184. LINDGREN, WALDEMAR. *Annotated Bibliography of Economic Geology*. (Auspices of Nat. Res. Council, W. Lindgren, Chairman, 5(2), 200 pp., July 1933.)

185. LINDGREN, WALDEMAR. *Annotated Bibliography of Economic Geology*. (Auspices of Nat. Res. Council, W. Lindgren, Chairman, 6(1), 165 pp., January 1934.)

186. LINDGREN, WALDEMAR. *Coronodite "Redivivus."* (Am. Mineralogist, 18, pp. 548-550, December 1933.)

187. NEWHOUSE, WALTER H. *Mercury in Native Silver*. (Am. Mineralogist, 18, pp. 295-299, July 1933.)

188. NEWHOUSE, WALTER H. *Mineral Zoning in the New Jersey-Pennsylvania-Virginia Triassic Area*. (Econ. Geol., 28, pp. 613-633, November 1933.)

189. NEWHOUSE, WALTER H. *The Temperature of Formation of the Mississippi Valley Lead-Zinc Deposits*. (Econ. Geol., 28, pp. 744-750, December 1933.)

190. NEWHOUSE, W. H. *The Source of Vanadium, Molybdenum, Tungsten, and Chromium in Oxidized Lead Deposits*. (Am. Mineralogist, 19, pp. 209-220, May 1934.)

191. PEKERIS, CHAIM L. *On the Interpretation of the Umkehr effect in Atmospheric Ozone Measurements*. (Proc. Norwegian Acad. of Sci., Oslo, January 1934.)

192. PEKERIS, CHAIM L. *The Rotation-Vibration Coupling in Diatomic Molecules*. (Phys. Rev., 45, p. 98, January 1934.)

193. PEKERIS, CHAIM L. *On the Interpretation of Atmospheric Ozone Measurements*. (Gerlands Beitrage zur Geophysik, 41, p. 192, March 1934.)

194. PEKERIS, CHAIM L. *Note on Brunl's Formula for Nocturnal Radiation of the Atmosphere*. (Astrophysical J., 79, p. 441, May 1934.)

195. SHIMER, HERVEY W. *An Introduction to the Study of Fossils*. (The Macmillan Co., pp. 496, figs. 207, September 1933.)

196. SLICHTER, LOUIS B. *Interpretation of the Resistivity Prospecting Method*. (Physics, 4, pp. 307-322, September 1933.)

197. SLICHTER, LOUIS B. *An Inverse Boundary Value Problem in Electrodynamics*. (Physics, 4, pp. 411-418, December 1933.)

198. STEVENSON, JOHN S. *Vein-like Masses of Pyrrhotite in Chalcopyrite from the Waite-Ackerman-Montgomery Mine, Quebec*. (Am. Mineralogist, 18, pp. 445-449, October, 1933.)

199. ZULOAGA, GUILLERMO. *The Geology of the Iron Deposits of the Sierra de Imataca, Venezuela*. (Tech. Pub., Am. Inst. Min. & Met. Eng., 36 pp., December 1933.)

HUMANITIES

200. MAGOUN, F. ALEXANDER. *Training for Leadership*. (Tech. Rev., 36, p. 50, November 1933.)

201. MAGOUN, F. ALEXANDER. *Dipping Into the Future*. (The Tech Eng. News, 15, p. 70, June 1934.)

DEPARTMENT OF MATHEMATICS

202. DOUGLAS, JESSE. *A Jordan space curve no arc of which can form part of a contour which bounds a finite area.* (Annals of Math., 35, pp. 100-103, January 1934.)
203. ESTES, JAMES G. *Formulae Giving the Change in Green's Function and in the Conjugate Function.* (J. Math. & Phys., 13, May 1934.)
204. FRANKLIN, PHILIP. *Regions of Positive and Negative Curvature on Closed Surfaces.* (J. Math. & Phys., 13, pp. 253-260, May 1934.)
205. HOPF, EBERHARD. *On Causality, Statistics and Probability.* (J. Math. & Phys., 13, pp. 51-102, 1934.)
206. HOPF, EBERHARD. *Mathematical Problems of Radiative Equilibrium.* (Cambridge University Press, 1934.)
207. PHILLIPS, HENRY B. *Differential Equations.* (Third Edition, John Wiley & Sons, Inc., March 1934.)
208. RUTLEDGE, GEORGE and DOUGLASS, RAYMOND D. *Evaluation of $\int_0^1 \frac{\log u}{u} \log^2(1+u) du$ and Related Definite Integrals.* (Am. Math. Monthly, 41, p. 29, January 1934.)
209. SZASZ, OTTO. *Zur Konvergenz Theorie d. Fourierschen Reimen.* (Acta Mathematica, 61, pp. 185-201, 1933.)

DEPARTMENT OF MECHANICAL ENGINEERING

210. JAMES, WALTER H. and SLOANE, ALVIN. *Kinematic Notes and Problems.* (New Edition, M. I. T. Student Notes, May 1934.)
211. MOORE, H. CARLTON. *Discussion of Gages for Inspection of P. D. Fuzes.* (Course for Reserve Officers attached to Boston District Ordnance Office, November 1933.)
212. PRAETZ, JOHN G. *Figures and Diagrams for Class Use. (Refrigeration.)* (Mass. Univ. Extension Div. November 1933.)
213. SCHWARZ, EDWARD R. *Textiles as They Are.* (Rayon and Synthetic Yarn J., 14, Nos. 11 and 12, November and December 1933.)
214. SCHWARZ, EDWARD R. *Textile Microscopy Advances.* (Am. Dyestuff Reporter, 23, pp. 141-144, March 1934.)
215. SCHWARZ, EDWARD R. *Abstract Section.* (Textile Res., 3, Nos. 9 and 10, 1933; 4, Nos. 1-8, 1934.)
216. SCHWARZ, EDWARD R. *Romancing with the Microscope. A Study of Textile Technology.* (The Tech Eng. News, 15, pp. 6-7 and 19, March 1934.)
217. SCHWARZ, EDWARD R. *Textiles and the Microscope.* (McGraw-Hill Book Co., January 1934.)
218. TAFT, THEODORE H. *Elementary Engineering Thermodynamics.* (John Wiley & Sons, Inc., November 1933.)
219. TAYLOR, CHARLES F. "*Historique et Aspect du Problème de la Detonation aux Etats-Unis.*" (Revue Générale de l'Aéronautique, 17, p. 5, 1934.)
220. TAYLOR, CHARLES F. *Power Plants in 1933.* (Aviation, 33, p. 19, January 1934.)
221. TAYLOR, CHARLES F. *Aircraft Engine Developments.* (Trans. Am. S. M. E. (AER-55-1), 1933.)
222. TAYLOR, CHARLES F., DRAPER, C. S., TAYLOR, E. S., WILLIAMS, G. L. *A New Instrument Devised for the Study of Combustion.* (J.S.A.E., 34, p. 59, February 1934.)
223. VOSE, ROBERT W. *Characteristics of the Huggenberger Tensometer.* (Proc. Am. Soc. Test. Mat., 34, 1934.)

DEPARTMENT OF MILITARY SCIENCE AND TACTICS

224. ARTHUR, ROBERT. *Military History — A Definition*. (Coast Artillery J., 77 p. 112, March-April, 1934.)

DEPARTMENT OF MINING AND METALLURGY

225. BUGBEE, EDWARD E. *Textbook of Fire Assaying, Second Edition, Revised and Enlarged*. (John Wiley & Sons, Inc., July 1933.)

226. HAYWARD, CARLE R. *The Metallurgy of Copper in 1932*. (Min. Ind., 41, p. 141, October 1933.)

227. LOCKE, CHARLES E. and RICHARDS, ROBERT H. *Progress in Ore Dressing and Coal Preparation in 1932*. (The Min. Ind. During 1932, 41, pp. 577-618, 1933.)

228. LOCKE, CHARLES E. *Ore Dressing Developments*. (Min. and Met., 15, pp. 27-29, January 1934.)

229. LOCKE, CHARLES E. *Mining and Metallurgy at M. I. T. A History Since 1865*. (Tech. Rev., 36, pp. 135-137, 152-156, January 1934.)

230. LOCKE, CHARLES E. *Report of Milling Methods*. (Min. and Met., 15, p. 144, March 1934.)

231. LOCKE, CHARLES E. *Mining and Ore Dressing*. (The American Year Book, Record for the Year 1933, pp. 482-485, 1934.)

232. NORTON, FREDERICK H. *Cements, Coatings and Plasters*. (Fuels and Furnaces, 11, July-August 1933.)

233. NORTON, FREDERICK H. *Refractory Shapes for Industrial Furnaces*. (Fuels and Furnaces, 11, September-October 1933.)

234. NORTON, FREDERICK H. *The Elimination of Load Failures in Refractories*. (Fuels and Furnaces, 11, p. 206, November-December 1933.)

235. NORTON, FREDERICK H. *Furnace Construction to Reduce Slag Action*. (Fuels and Furnaces, 12, p. 206, January-February 1934.)

236. NORTON, FREDERICK H. and FELLOWS, JOHN A. *A New Device for Creep Testing*. (Metal Progress, 94, pp. 41-43, October 1933.)

237. NORTON, FREDERICK H. *Creep Strength of 18-8 after Four Years Service*. (Metal Progress, 25, p. 50, June 1934.)

238. ZAVARINE, IGOR N. *Magnetic Transformation in Carbon Steels During Quenching*. (Trans. Am. Inst. Min. & Met. Eng. 1934.)

DEPARTMENT OF NAVAL ARCHITECTURE
AND MARINE ENGINEERING

239. CHAPMAN, LAWRENCE B. *Technical Training for the Steamship Business*. (Maersk Fleet News, January 1934.)

240. ROSSELL, HENRY E. *The Development of the Modern Cruiser*. (The Tech. Eng. News, 14, p. 92, October 1933; Scientific American, 150, p. 18, January 1934.)

DEPARTMENT OF PHYSICS

241. ALBERTSON, WALTER E. *The Arc Spectrum of Osmium*. (Phys. Rev., 45, p. 304, March 1934.)

242. ALBERTSON, WALTER E. *The Spectrum of Singly Ionized Europium*. (Phys. Rev., 45, p. 499, April 1934.)

243. FRANK, NATHANIEL H. and SLATER, JOHN C. *Introduction to Theoretical Physics*. (McGraw-Hill Book Co., October, 1933.)

244. FRANK, NATHANIEL H. *Elementary Physics at Massachusetts Institute of Technology*. (School Sci. and Math., 34, p. 649, June 1934.)

245. HARRISON, GEORGE R. *Improved Design of the Mechanical Interval Sorter and Its Application to the Analysis of Complex Spectra.* (Rev. Sci. Inst., 4, p. 581, November 1933.)
246. HARRISON, GEORGE R. *Improvements in the 21-Foot Normal Incidence Vacuum Spectrograph.* (Rev. Sci. Inst., 4, p. 651, December 1933.)
247. HARRISON, GEORGE R. *Spectroscopy at the Massachusetts Institute of Technology.* (Am. Phys. Teacher, 1, p. 109, December 1933.)
248. HARRISON, GEORGE R. *Current Advances in Photographic Photometry.* (J. Opt. Soc. Am., 24, p. 59, March 1934.)
249. HARRISON, GEORGE R. *Simply Constructed Ultraviolet Monochromators for Large Area Illumination.* (Rev. Sci. Inst., 5, p. 149, April 1934.)
250. NOTTINGHAM, WAYNE B. and JOHNSON, RALPH P. *Simple Constant-Level Suspension.* (Rev. Sci. Inst., 5, p. 191, May 1934.)
251. MACADAM, DAVID L. and REYNOLDS, J. B. *A Mathematical Theory for Auto-frettagged Cylinders.* (Tohoku Math. J., 38, p. 162, November 1933.)
252. MACADAM, DAVID L. and LIPMAN, M. REVEL. *The Distribution of Cosmic Ray Paths in a Vertical Cylinder.* (J. Franklin Inst., 216, p. 583, November 1933.)
253. MORSE, PHILIP M. and ALLIS, WILLIAM P. *The Effect of Exchange on the Scattering of Slow Electrons.* (Phys. Rev., 44, p. 269, August 1933.)
254. MORSE, PHILIP M. *Electrons, Photons and Waves.* (School Sci. & Math., 34, p. 200, February 1934.)
255. MUELLER, HANS. *The Theory of the Diffuse Double Layer.* (Cold Spring Harbor Symposia on Quantitative Biology, 1, p. 1, January 1934.)
256. MUELLER, HANS. *Theory of Cataphoretic Migration.* (Symposia on Quantitative Biology, 1, p. 9, January 1934.)
257. MUELLER, HANS and ABRAMSON, H. A. *The Influence of Salts on the Electric Charge of Surfaces in Liquids.* (Symposia on Quantitative Biology, 1, p. 29, January 1934.)
258. MUELLER, HANS. *The Theory of Ionic Adsorption.* (Symposia on Quantitative Biology, 1, p. 34, January 1934.)
259. MUELLER, HANS. *Stability of Colloids and Theory of Rapid Coagulation.* (Symposia on Quantitative Biology, 1, p. 60, January 1934.)
260. MUELLER, HANS. *Properties of Rochelle Salt.* (Phys. Rev., 44, p. 854, November 1933.)
261. RUDBERG, ERIC G. *Moll-Rudberg: Laerobok i fysik III.* (Svenska Bokfoerlaget, Stockholm, Sweden, May 1934.)
262. SEARS, FRANCIS W. *An Introduction to Optics.* (Privately printed, March 1934.)
263. STOCKBARGER, DONALD C. and BURNS, LAURENCE. *Line Shape as a Function of the Mode of Spectrograph Slit Irradiation.* (J. Opt. Soc. Am., 23, p. 379, November 1933.)
264. THOMPSON, M. DEKAY and FLEMING, D. M. *The Hydrogen Overvoltages of Iron-Chromium Alloys in Potassium Hydroxide Solutions.* (Trans. Electrochem. Soc., 65, p. 222, April 1934.)
265. WARREN, BERTRAM E. *Role of Silicon and Aluminum in Complex Silicates.* (J. Am. Ceramic Soc., 16, p. 412, September 1933.)
266. WARREN, BERTRAM E. *Structure of Euclase $H\text{BeAlSiO}_6$.* (Zeit. für Krist., 86, p. 292, September 1933.)
267. WARREN, BERTRAM E. *The Physics of Solids.* (Rev. Sci. Inst., 4, p. 520, October 1933.)
268. WARREN, BERTRAM E. *X-Ray Diffraction in Vitreous Silica.* (Zeit. für Krist., 86, p. 349, November 1933.)
269. WARREN, BERTRAM E. *X-Ray Diffraction in Long Chain Liquids.* (Phys. Rev., 44, p. 969, December 1933.)

270. WARREN, BERTRAM E. *Identification of Crystalline Substances by Means of X-Rays*. (J. Am. Ceramic Soc., 17, p. 73, April 1934.)

271. WARREN, BERTRAM E. *Diffraction of X-Rays in Glass*. (Phys. Rev., 45, p. 657, May 1934.)

272. WILKES, GORDON B. *Heat Transfer — Thermal Conductivity*. (Chem. Met. Eng., 41, p. 232, May 1934.)

273. WILKES, GORDON B. *The Thermal Conductivity of Refractories*. (J. Am. Ceramic Soc., 17, p. 173, June 1934.)

274. YOUNG, RALPH C. *Some Reactions of Anhydrous Thorium Tetrabromide with Organic Liquids*. (J. Am. Chem. Soc., 56, p. 29, January 1934.)

275. WULFF, JOHN C. G. *Reflectivity in Heat Systems*. (J. Am. Opt. Soc., 24, p. 223, August 1934.)

276. WULFF, JOHN C. G. *Hyperfinestructure of Gold*. (Phys. Rev., 44, p. 512, September 1933.)

DIVISION OF INDUSTRIAL COÖPERATION

277. NALLE, JOHN M. *After Commencement*. (The Tech Eng. News, 15, p. 67, June 1934.)

ADMINISTRATION

278. BUSH, VANNEVAR. *Structural Analysis by Electric Circuit Analogies*. (J. Franklin Inst., 217, pp. 289-329, March 1934.)

279. BUSH, VANNEVAR. *The New Deal in Science and Research*. (N. E. Gas News, pp. 76-81, March 1934.)

280. BUSH, VANNEVAR. *Recent Progress in Analyzing Machines*. (Proc. Fourth Int. Cong. for App. Mech., July 1934.)

281. COMPTON, KARL T. and LAMAR, EDWARD S. *A Test of the Classical "Momentum Transfer" Theory of Accommodation Coefficients of Ions at Cathodes*. (Phys. Rev., 44, p. 338, September 1933.)

282. COMPTON, KARL T. *Science Makes Jobs*. (Sci. Monthly, p. 297, April 1934.)

283. COMPTON, KARL T. and BOYCE, JOSEPH C. *A Broad Range Vacuum Spectrograph for the Extreme Ultraviolet*. (Rev. Sci. Inst., 5, p. 218, June 1934.)

284. FORD, HORACE S. *Financially Speaking*. (Tech. Rev., 36, p. 62, November 1933.)

285. FORD, HORACE S. *Annual Report of Association of College and University Business Officers of Eastern States*. (January 1934.)

286. GOODWIN, HARRY M. *The Graduate-School of Massachusetts Institute of Technology*. (Proc. Assoc. Land Grant Colleges and Universities Forty-Seventh Convention, November 1933, p. 206, March 1934.)

THESES PRESENTED FOR DOCTORS' DEGREES

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH

Doctor of Philosophy

287. AYERS, GILBERT BALLOU. *The Kinetics of Peptic Hydrolysis*. (June 1934.)
288. DUNN, CECIL GORDON. *A Biochemical Investigation of the Metabolic Activities of Bacillus technicus*. (June 1934.)
289. TOBIE, WALTER CARY. *The Pigment of Bacillus Violaceus*. (December 1933.)

DEPARTMENT OF CHEMICAL ENGINEERING

Doctor of Science

290. COMINGS, EDWARD WALTER. *The Drying of Solids*. (June 1934.)
291. DAVIS, HYMEN. *The Kinetics of the Combustion of Solid Carbon*. (December 1933.)
292. GILLILAND, EDWIN RICHARD. *Diffusion of Vapors into Air Streams*. (December 1933.)
293. LUKE, CHARLES DANIEL. *Vapor-Liquid Equilibria in Complex Hydrocarbon Mixtures at High Pressures*. (June 1934.)
294. MAJEWSKI, FRANK MICHAEL. *The Hydration of Propylene under Pressure*. (June 1934.)

DEPARTMENT OF CHEMISTRY

Doctor of Philosophy

295. CLIFF, IVAN SPAULDING. *The Structure of Certain Derivatives of Fluorenone*. (December 1933.)
296. FORT, MARRON WILLIAM. *Heat of Dilution of Hydrochloric Acid by Continuous Flow Calorimetry*. (December 1933.)
297. FRASER, LEWIS HASSELMAN DAVIS. *The Normal Vapor Pressure of Crystalline Iodine*. (June 1934.)
298. HADLOCK, CANFIELD. *The Compressibility of Ethane*. (December 1933.)
299. HAMBLET, CLEMENT HUTTON. *The Thermal Decomposition of Thionyl Chloride*. (June 1934.)
300. HARTFORD, WINSLOW HOPPER. *Condensed Compounds of Boric Acid*. (December 1933.)
301. HERSHBERG, EMANUEL BENJAMIN. *Systematic Studies in Organic Qualitative Analysis: I. Detection of the Elements. II. Identification of the Chlorinated Fatty Acids. III. Certain Studies of Order 3 (Chlorine Compounds)*. (December 1933.)
302. HESS, LEWIS. *Optical Studies upon the Rare Earth Nitrates*. (June 1934.)
303. HIGBEE, WILLIAM EDWARD, JR. *A Study of the Reaction between Acyl Chlorides and Olefines in the Presence of Aluminium Chloride*. (December 1933.)
304. McALEVY, AMBROSE. *Part I: Peroxides in the Furane Series. Part II: Synthesis of a Polyene Structurally Related to Vitamin A*. (June 1934.)
305. MARK, JACOB GREENWOOD. *The Action of Copper and Other Metals on Benzyl Benzoate*. (June 1934.)
306. POFFENBERGER, NOLAND. *The Compressibility of Propane*. (June 1934.)

307. RUBENSTEIN, DAVID. *The Friedel-Crafts Reaction from the Standpoint of Mechanism and Orientation*. (June 1934.)
308. SIMPSON, STEPHEN GERSHOM. *The Selenious Acid Method for the Determination of Zirconium*. (December 1933.)
309. SUMNER, JOHN KEMP. *The Action of Tertiary Butyl Hypochlorite on Several Organic Compounds*. (June 1934.)

Doctor of Science

310. CONSTAN, NICHOLAS D. *Studies in the Urea Series: Nitration of Mono-Alkyl Ureas, Di-Alkyl Ureas, and Substituted Biurets; and Their Application in Synthesis*. (December 1933.)

DEPARTMENT OF ELECTRICAL ENGINEERING

Doctor of Science

311. TRUMP, JOHN GEORGE. *Vacuum Electrostatic Engineering*. (December 1933.)
312. PRITCHARD, EDWARD MILLER. *The Extinction of a Grid-Controlled Arc, with Particular Emphasis on the Problem of Recontrol*. (June 1934.)

DEPARTMENT OF GEOLOGY

Doctor of Philosophy

313. HORWOOD, HERWARD CLARENCE. *The Cross Lake Map Area, Manitoba*. (June 1934.)
314. STEVENSON, JOHN SINCLAIR. *Mineralization at the Eustis Mine, Eustis, Quebec*. (June 1934.)

Doctor of Science

315. ILSEY, RALPH. *The Structural Geology of Eastern Massachusetts*. (June 1934.)

DEPARTMENT OF MATHEMATICS

Doctor of Philosophy

316. GIDDINGS, HORACE ALPHEUS. *On the Extension of the Notion of Developable Surfaces to V_2 and V_3 in R_4* . (June 1934.)
317. KAPLAN, NATHAN. *A Study of Three-Dimensional Riemann Surfaces in Six-Dimensional Euclidean Space*. (June 1934.)

DEPARTMENT OF MECHANICAL ENGINEERING

Doctor of Science

318. BERESTNEFF, ALEXIS ALEXANDER. *The Completion of the i - c Chart for Design of the NH_3 - H_2O Absorption Refrigeration System*. (June 1934.)
319. KING, HENRY FRANCIS. *A Piezo Electric Method of Measuring Periodic Pressure Variations*. (June 1934.)
320. SMITH, EASTMAN. *Design of Portable Vibration Instruments*. (June 1934.)

METEOROLOGY

Doctor of Science

321. PEKERIS, CHAIM LEIB. *The Development and Present Status of the Theory of the Heat Balance in the Atmosphere*. (June 1934.)

DEPARTMENT OF MINING AND METALLURGY**Doctor of Science****METALLURGY**

322. ALEXANDER, PETEE POPOW. *The Preparation of Pure Chromium.* (December 1933.)

323. EDLUND, DANIEL LEONARD. *The Magnetic Transformation in Iron-Vanadium Alloys.* (June 1934.)

324. MILLER, JOHN WESLEY. *A Study of Nitrogen in Metallic Arc Weld Metal.* (December 1933.)

325. MILLER, RICHARD FRANKLIN. *The Influence of a Grain Boundary on Simple Glide in Single Crystals of Zinc.* (June 1934.)

326. NORTON, JOHN TORREY. *The Influence of Aluminum on the Iron-Nitrogen Phase Diagram.* (December 1933.)

DEPARTMENT OF PHYSICS**Doctor of Philosophy**

327. MANNING, MILLARD FULLER. *Exact Solutions of the Schrödinger Equation.* (June 1934.)

INDEX OF AUTHORS

(Members of the Staff)

<i>Name of Author</i>	<i>Number of Paper</i>	<i>Name of Author</i>	<i>Number of Paper</i>
*Abramson, H. A.	257	*Farnum, J. M.	77
Adams, F. J.	9	Fay, R. D.	152
Adams, F. W.	51, 52	Fellows, J. A.	236
*Adams, W. B., Jr.	71	Fernstrom, K. D.	44
Albertson, W. E.	241, 242	Fiske, W. P.	44, 45, 46, 47, 48
Allis, W. P.	253	*Fleming, D. M.	264
Arthur, R.	224	Ford, H. S.	284, 285
Atkinson, E. R.	90	Frank, N. H.	243, 244
Austin, W. D.	10	Franklin, P.	204
		Frazier, R. H.	153, 154
Babcock, J. B.	123		
Balsbaugh, J. C.	136, 137	*Genereaux, R. P.	54
Barrow, W. L.	138, 139, 140	Germeshausen, K. J.	151
Barrows, H. K.	124, 125, 126, 127	Gerry, H. T.	82, 96, 119
Bates, P. K.	11	Gilliland, E. R.	55, 56, 57
Belding, D. L.	12, 13, 14, 15	*Goldman, L.	116
Bennett, Ralph D.	141, 142	Goodwin, H. M.	286
Bickford, F. A.	115	*Gould, B. S.	17
Blanchard, A. A.	71, 72, 122		
Boyce, J. C.	283	Hall, W. M.	152
Breed, C. B.	128, 129, 130	Harrington, V.	75
*Brown, G. G.	64	Harris, L.	83, 84, 85, 86, 87, 88, 164, 165
Buerger, M. J.	181, 182	Harris, R. S.	16
Bugbee, E. E.	225	Harrison, G. R.	245, 246, 247, 248, 249
*Burns, L.	263	Hayward, C. R.	226
Bush, V.	278, 279, 280	Hazen, H. L.	155
Butler, R. D.	183	*Heiftz, A.	18
		Hershberg, E. B.	89
Caldwell, S. H.	143	Highlands, M. C.	11
Chapman, L. B.	239	Hopf, E.	205, 206
*Chen, S. H.	146	Horton, J. W.	156
*Cliff, I. S.	90	Horwood, M. P.	17, 18
*Comings, E. W.	68	Hosmer, G. L.	130
*Compton, A. H.	142	Hottel, H. C.	58
Compton, K. T.	281, 282, 283	Houghton, H. G., Jr.	157
Cooper, C. M.	53	Huntress, E. H.	89, 90, 91, 92
Dahl, G. C.	144, 145	Jackson, D. C.	158, 159, 160, 161, 162, 163
Davis, A. R.	73	James, W. H.	210
Davis, T. L.	74, 75, 76, 77, 78, 79, 80, 81	Jennison, M. W.	19
Douglas, J.	202	Johnson, E. A.	85, 86, 164, 165, 166, 197
Douglass, R. D.	208	Johnson, R. P.	250
Draper, C. S.	1, 2, 222	*Jones, P. T.	113
Drew, T. B.	53, 54	Jost, W.	83
Dwight, H. B.	146, 147, 148, 149		
		Keyes, F. G.	93, 94, 95, 96, 97, 118, 119
*Ebersole, F.	78	King, G. W.	84
Edgerton, H. E.	151	Kingsley, C., Jr.	168
Elder, R. F.	44		
Estes, J. G.	203		

* Not on Institute Staff 1933-34.

<i>Name of Author</i>	<i>Number of Paper</i>	<i>Name of Author</i>	<i>Number of Paper</i>
Lamar, E. S.	281	Schell, E. H.	49, 50
Lewis, W. K.	59, 60, 61, 62, 63, 64	Schumb, W. C.	115, 116
Lindgren, W.	184, 185, 186	Schwarz, E. R.	213, 214, 215, 216, 217
*Lipman, M. R.	252	Sears, F. W.	262
Locke, C. E.	227, 228, 229, 230, 231	Sherrill, M. S.	117
Luck, D. G. C.	2	Sherwood, T. K.	55, 56, 68, 69, 70
Luhr, O.	88	Shimer, H. W.	195
*Luke, C. D.	63	*Shwachman, H.	17
*Lytle, E. L.	26	*Simon, A. W.	142
MacAdam, D. L.	251, 252	Slater, J. C.	243
McAdams, W. H.	53, 65, 66	Slichter, L. B.	196, 197
McAlevy, A.	100, 101	Sloane, A.	210
Magoun, F. A.	200, 201	Smith, L. B.	93, 95, 96, 97, 118, 119
Marek, L. F.	67	Smith, R. H.	5
Milas, N. A.	98, 99, 100, 101	Spilhaus, A. F.	1
Millard, E. B.	102	Spofford, C. M.	133
Moon, P. H.	169	Stanley, L. N.	91, 92
Moore, H. C.	211	Stevenson, J. S.	198
Morse, P. M.	253, 254	Stockbarger, D. C.	263
Morton, A. A.	103	Szasz, O.	209
Mueller, H.	255, 256, 257, 258, 259, 260	Taft, T. H.	218
Mulligan, J. E.	179, 180	Taylor, C. F.	219, 220, 221, 222
Nalle, J. M.	277	Taylor, E. S.	6, 7, 222
Neitzert, C.	197	Thompson, M. deK.	264
Newell, J. S.	3	Thresher, B. A.	44
Newhouse, W. H.	187, 188, 189, 190	Timbie, W. H.	171, 172
Norcross, A. S.	169, 170	Tobey, J. A.	24
Norris, J. F.	104, 105, 106, 107, 108	Tucker, C. E.	173, 174, 175
Norton, F. H.	232, 233, 234, 235, 236, 237	Tucker, R. F.	134
Nottingham, W. B.	250	Turner, C. E.	25, 26, 27, 28, 29
Ober, S.	4	*Turner, N. C.	25
*Ou, C. W.	80, 81	Urry, W. D.	120, 121
*Parker, A. S.	91, 92	Vose, R. W.	223
*Paul, R. E.	67	Warren, B. E.	265, 266, 267, 268, 269, 270, 271
*Pearse, R. W. B.	83	Weber, H. C.	64
Pekeris, C. L.	191, 192, 193, 194	Weston, R. S.	30, 31
*Perry, J. H.	54	Whipple, J. V. H.	5
Phillips, H. B.	207	Wilbur, J. B.	135
Porter, C. H.	48	Wildes, K. L.	176, 177
Praetz, J. G.	212	Wilinsky, C. F.	32, 33, 34, 35, 36
Prentiss, S. S.	110, 112, 113, 114	Wilkes, G. B.	272, 273
Prindle, B.	20	Willett, H. C.	8
*Raftar, J. R.	71	Williams, G. L.	222
*Reid, W. D.	143	Williams, J. W.	37, 38, 39, 40, 41, 42, 43
*Reynolds, J. B.	251	Windsor, M. M.	72, 122
Reynolds, K. C.	131, 132	*Wolff, O. E.	7
Richards, R. H.	227	*Wollan, E. O.	142
Rickards, B. R.	21, 22, 23	Woodruff, L. F.	178, 179, 180
*Ricker, C. W.	173	Wulff, J. C. G.	275, 276
Rossell, H. E.	240	Young, R. C.	274
Rudberg, E. G.	261	Zavarine, I. N.	238
Rutledge, G.	208	*Zuloaga, G.	199
Scatchard, G.	109, 110, 111, 112, 113, 114		
Schaefer, A. A.	44		

*Not on Institute Staff 1933-34.

INDEX OF AUTHORS

(Theses presented for Doctors' Degrees)

<i>Name of Author</i>	<i>Number of Paper</i>	<i>Name of Author</i>	<i>Number of Paper</i>
Alexander, P. P.....	322	Kaplan, N.....	317
Ayers, G. B.....	287	King, H. F.....	319
Berestneff, A. A.....	318	Luke, C. D.....	293
Cliff, I. S.....	295	McAlevy, A.....	304
Comings, E. W.....	290	Majewski, F. M.....	294
Constan, N. D.....	310	Manning, M. F.....	327
Davis, H.....	291	Mark, J. G.....	305
Dunn, C. G.....	288	Miller, J. W.....	324
Edlund, D. L.....	323	Miller, R. F.....	325
Fort, M. W.....	296	Norton, J. T.....	326
Fraser, L. H. D.....	297	Pekeris, C. L.....	321
Giddings, H. A.....	316	Poffenberger, N.....	306
Gilliland, E. R.....	292	Pritchard, E. M.....	312
Hadlock, C.....	298	Rubenstein, D.....	307
Hamblet, C. H.....	299	Simpson, S. G.....	308
Hartford, W. H.....	300	Smith, E.....	320
Hershberg, E. B.....	301	Stevenson, J. S.....	314
Hess, L.....	302	Sumner, J. K.....	309
Higbee, W. E., Jr.....	303	Tobie, W. C.....	289
Horwood, H. C.....	313	Trump, J. G.....	311
Ilsey, R.....	315		