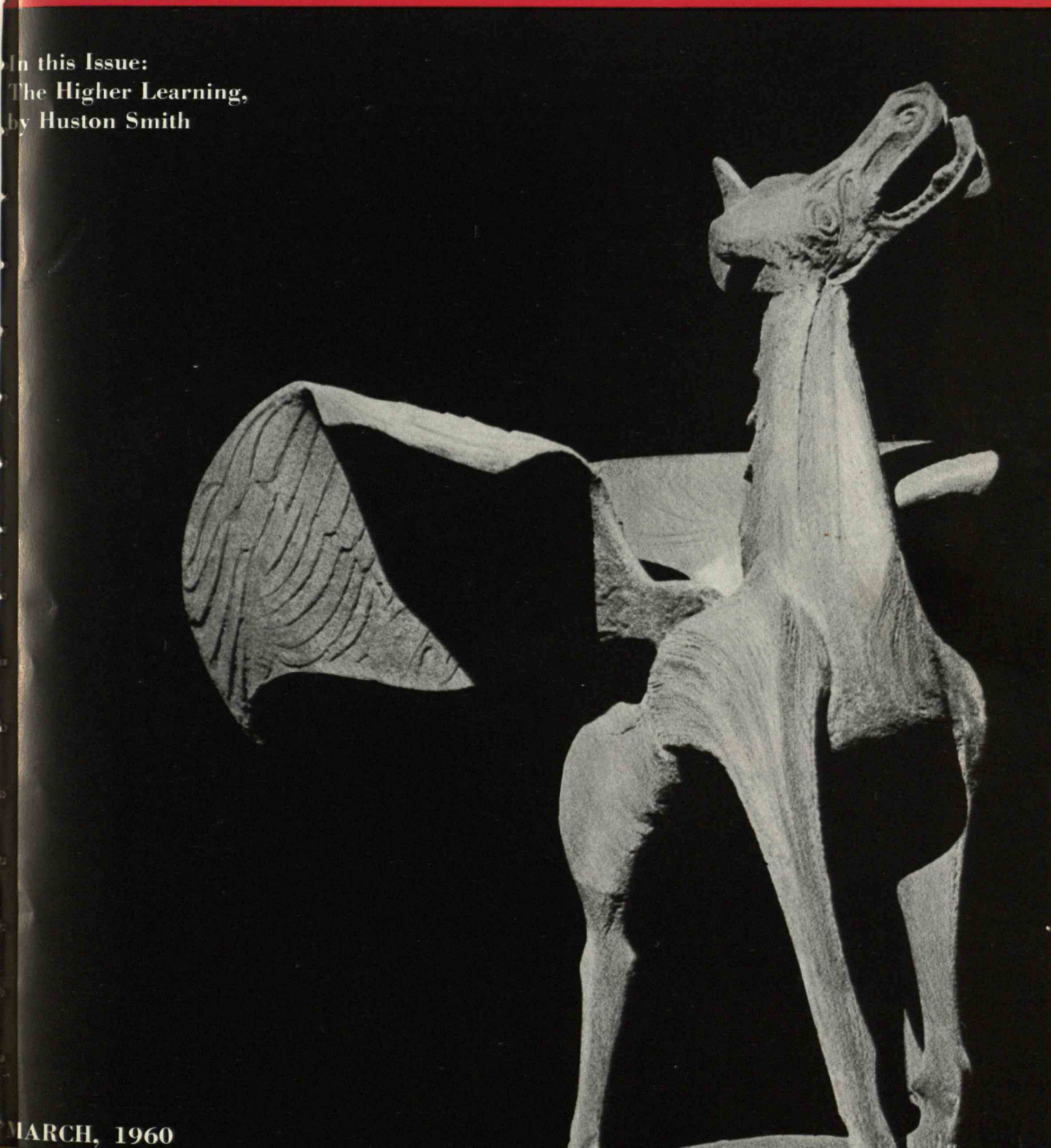
Technology Review

In this Issue:
The Higher Learning,
by Huston Smith



MARCH, 1960

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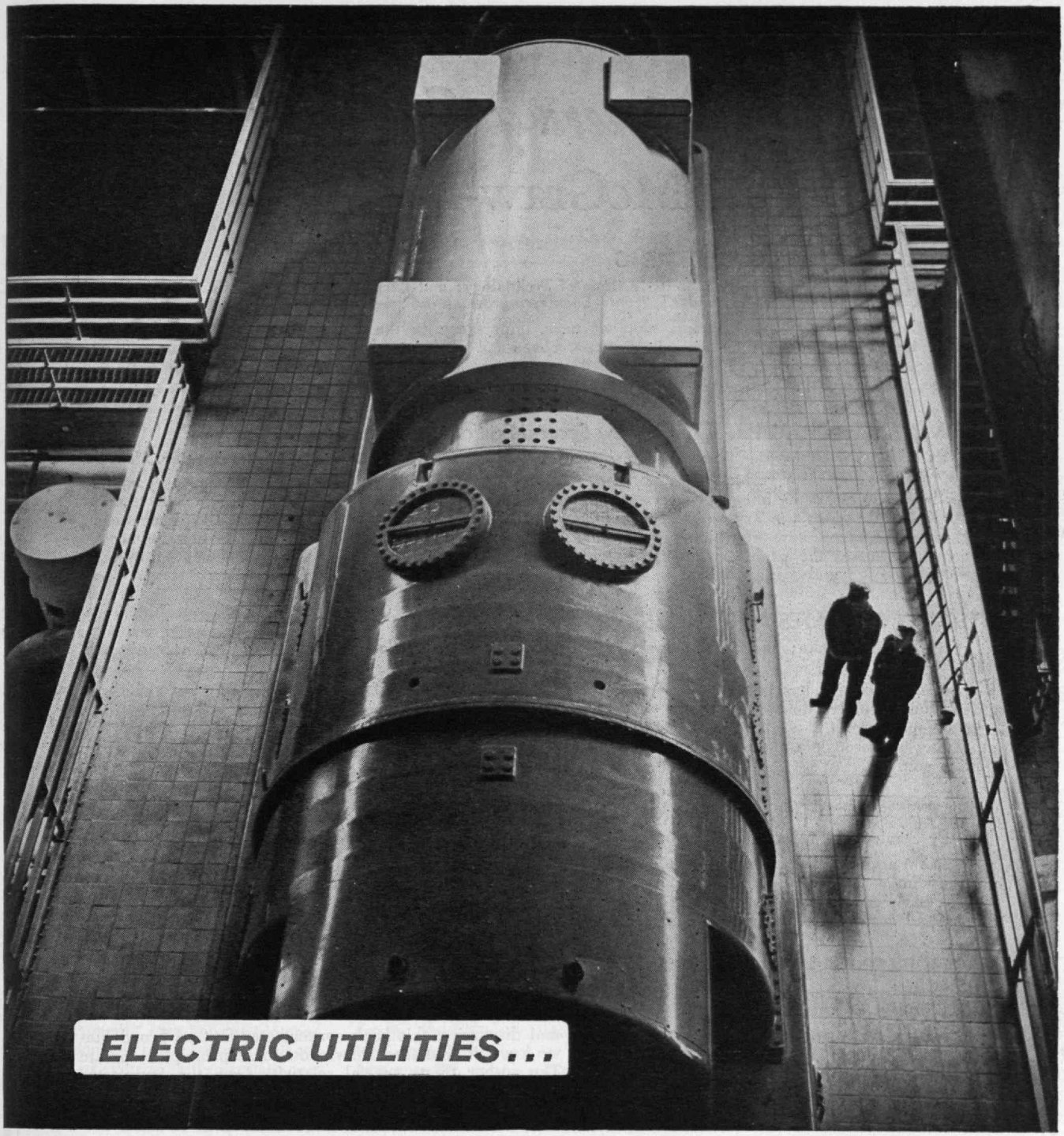

Where the Engineer Designs His Own Career

Here's an industry that started big after the war . . . surged ahead in every direction . . . keeps on growing today when others are tapering off . . . and still has its biggest years ahead. The electric utilities business is basically an engineering business. Many of its top executives come from engineering ranks; from systems planning, design, operations, research, or sales; and with backgrounds ranging from electronics and nucleonics to older branches of scientific learning. If you want a career in an *expanding* industry that is based on engineering look to our electric public utilities. We know you'll like working with them. We have been doing it for many years in supplying this great industry with Kerite quality insulated wire and cable. See your placement officer, or write us at 30 Church Street, New York 7, N. Y.

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Technology Review

Reg. U.S. Pat. Off.

Volume 62 Number 5 *Edited at the Massachusetts Institute of Technology* *March, 1960*

Feedback

Pupil's Re-creation Or Teacher's Recreation

FROM PHILIP FRANKLIN:

In the last few years, there has developed widespread awareness of the importance of an early study of mathematics in the training of engineers and physical scientists. This has caused several groups to re-evaluate the high school curriculum in mathematics, and to implement many of their ideas through institutes for teachers such as those of the National Science Foundation. An effort of this kind at the Junior High School or even the primary grades level, the Madison Project, was described by Professor Robert B. Davis in a recent article in The Technology Review (Dec., 1959, pp. 28-30).

The objective of these efforts is laudable — to improve and modernize the teaching of the traditional high school mathematics subjects. But some of the apparently demonstrated conclusions about learning mathematics can easily be carried too far, and it is this caution that the writer would like to emphasize.

That the small number of "low-I.Q." students per teacher helped maintain interest was to be expected. And that, when the teachers felt the zeal of a new "educational experiment," they imparted interest to the students is quite believable. However, this last effect is hard to sustain over a period of years.

But that changes in language and notation had much virtue seems doubtful. An example was the use of the relatively vague words "general mathematics" and "condition" for the much more precise terms "algebra" and "equation." And compare the Project's formulation:

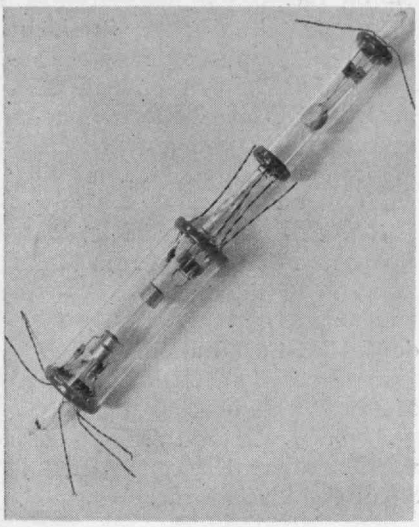
If $3 + \square = 5$, what goes in the box?

with the traditional formulation:

Solve $3 + x = 5$.

The "new" notation is costlier to print, but is it new? It is strongly reminiscent of the formulations of Diophantos of Alexandria (c. 350 A.D.). The full appreciation by mathematicians of the notation $ax + b = c$, with any of the letters positive or negative, dates from the "Geometry" of Descartes in 1637. Present-day engineering students are still a little incredulous the first time they encounter

(Continued on page 49)



THIS VACUUM TUBE was made from a kit of parts that is now being evaluated in the schools. How it was assembled is described in the article on page 40.

The Cover

Pegasus posed in the center of the Kresge Auditorium, facing the organ, for The Review's cover. The sculpture is described in the article on pages 21 and 22.

EDITOR: Volta Torrey; BUSINESS MANAGER: R. T. Jope,'28; CIRCULATION MANAGER: D. P. Severance,'38; EDITORIAL ASSOCIATES: J. J. Rowlands, Francis E. Wylie, John I. Mattill; EDITORIAL STAFF: Ruth King, Diana de Filippi; BUSINESS STAFF: Madeline R. McCormick, Louise E. Ryan; PUBLISHER: H. E. Lobdell,'17.

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This Month

Individuals Noteworthy

New Advisory Council

ANOTHER LINK between the business world and M.I.T. was formed this winter when Dean Howard W. Johnson of the School of Industrial Management announced the formation of a new Advisory Council under the chairmanship of Alfred P. Sloan, Jr., '95, Honorary Chairman of the General Motors Corporation and President of the Alfred P. Sloan Foundation which established the school.

"Our council members will serve the school," said Dean Johnson, "by providing advice and counsel on its various study and research programs, and by acting as a sounding board for new ideas."

Council members, who will serve for three years, are:

Albert Bradley, Director and Former Chairman of the Board, General Motors Corporation, and Chairman, Alfred P. Sloan Foundation, Inc.

Russell DeYoung, '40, President, Goodyear Tire and Rubber Co.

Bradley Dewey, '09, Former President, Dewey & Almy Chemical Division, (W. R. Grace & Co.)

Cecil H. Green, '23, Honorary Chairman of the Board, Geophysical Service Inc.

Robert T. Haslam, '11, Consultant and Director, W. R. Grace & Co.

Wayne J. Holman, Jr., '39, Chairman of the Board, Chicopee Manufacturing Corporation.

Theodore V. Houser, Former Chairman of the Board, Sears, Roebuck & Company.

George M. Humphrey, Chairman of the Board, National Steel Corporation.

Devereux C. Josephs, Chairman of the Board, New York Life Insurance Company.

Frederick R. Kappel, President, American Telephone & Telegraph Company.

Semon E. Knudsen, '36, General Manager, Pontiac Motor Division, General Motors Corporation.

George J. Leness, '26, Chairman of the Executive Committee, Merrill, Lynch, Pierce, Fenner and Smith, Inc.

William B. Murphy, President, Campbell Soup Company.

Alfred C. Neal, President, Committee for Economic Development.

Robert C. Sprague, '23, Chairman and Treasurer, Sprague Electric Company.

John C. Virden, Chairman of the Board and President, Eaton Manufacturing Company.

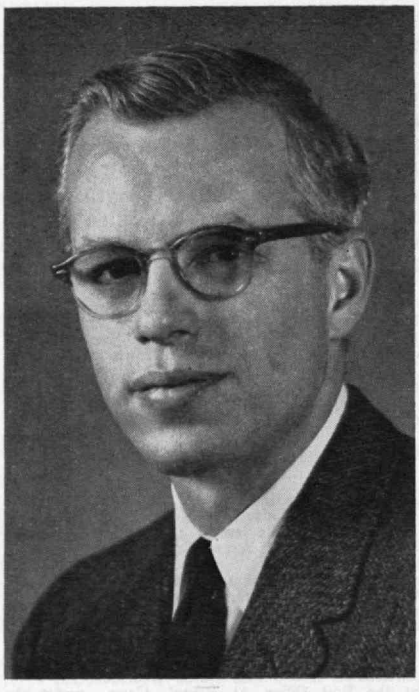
Thomas J. Watson, Jr., President, IBM Corporation.

James E. Webb, Director, Kerr-McGee Oil Industries, Inc.

Arnold J. Zurcher, Vice-president and Executive Director, Alfred P. Sloan Foundation, Inc.

To Resume Teaching

ONE of the foremost authorities in the communications-systems field, Wilbur B. Davenport, Jr., '43, will resume teaching next fall as professor of electrical engineering at M.I.T. after nine years on the staff of Lincoln Laboratory.



Wilbur B. Davenport, Jr., '43

PAUL A. SAMUELSON, Professor of Economics at M.I.T., was elected First Vice-president of the American Economic Association at its recent meeting in Washington. His textbook on economics is used in many schools.

Dr. Davenport was a teaching assistant in the Department of Electrical Engineering from 1941 to 1943. He then served for three years as a fire-control radar officer in the United States Navy. After more years on the M.I.T. Faculty, he went to Lincoln, where he has served in the Communications and Components Division and, since 1958, as head of the Information Processing Division.

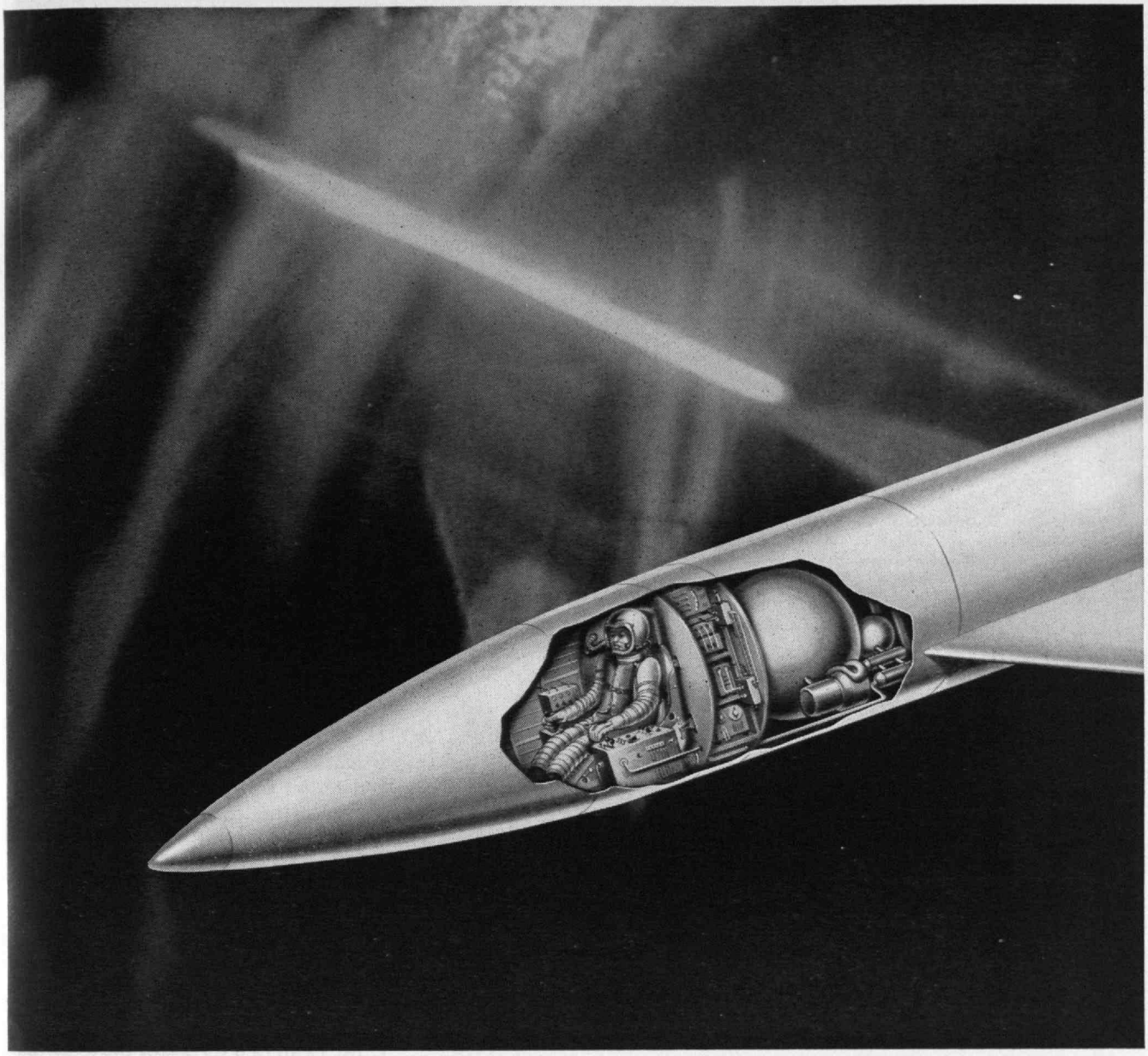
He is a consultant to the Director of Defense Research and Engineering, the National Security Agency and the U.S. Navy Special Projects Office. He was co-author with William L. Root, '43, of *An Introduction to the Theory of Random Signals and Noise* in 1958, and is a fellow of the Institute of Radio Engineers.

"Dr. Davenport is an unusual combination of skillful teacher, keen research man, and bold leader of advanced engineering work," says Jerome B. Wiesner, Acting Head of the Electrical Engineering Department. "He will be able to contribute very substantially to the work on engineering education and on communication sciences that we have planned for the next decade."

(Continued on page 6)

NO. 31 IN A SERIES

OUT OF THE LABORATORY



Forthcoming space exploration will require exotic fuels and new concepts in energy conversion to keep men alive and equipment operating for long periods of time beyond the earth's atmosphere. Advanced hydrogen systems recently developed by The Garrett Corporation have solved this problem of providing the electrical, hydraulic and pneumatic power, plus cooling and heating required aboard a satellite or space capsule during launching, outer space flight and re-entry... another contribution by Garrett to man's conquest of space.

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Individuals Noteworthy

(Continued from page 4)

Warren J. Mead: 1883–1960

PROFESSOR EMERITUS of Geology Warren Judson Mead died on January 16 at his home in Belmont. Dr. Mead headed the M.I.T. Department of Geology from 1934 until he retired in 1949.

Born in Plymouth, Wis., in 1883, Dr. Mead was graduated from the University of Wisconsin in 1906, where he received his master's in 1908 and his doctorate in 1926. He was a member of the Wisconsin faculty from 1906 until 1934. He wrote numerous geological papers and collaborated with C. K. Leith in producing the volume entitled *Metamorphic Geology* (1915). His nonacademic work included consulting for the Panama Canal Commission, the Corps of Engineers, the Colorado River Board to determine the feasibility of Boulder Dam, the Aluminum Company of America, and the Reynolds Metal Company. He also investigated iron and coal resources of South Manchuria.

Dr. Mead was a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences and the Geological Society of America.

He is survived by his wife, Bertha Taylor Mead, and three sons, Warren, of Waterloo, Iowa; Judson, of Bloomington, Ind.; and Jeremiah, of Waban, Mass.

Gerald Putnam: 1902–1960

IN JANUARY Gerald Putnam, '23, Assistant Professor of Engineering Graphics in the Department of Mechanical Engineering, died in a Cambridge hospital.

Professor Putnam was born on November 27, 1902, in Clinton, Mass. He worked with water power engineering companies in Albany before joining the Institute Faculty in 1933, and held positions in the Departments of Civil Engineering, Drawing and Graphics before joining the Mechanical Engineering Department. He also served as lecturer in mathematics at Tufts University and Northeastern University.

He is survived by his wife, Dorothy Valentine Putnam.

(Continued on page 12)

. . . a hand in things to come

Shaping another sun

7000 degrees . . . an inferno approaching that of the sun's surface has been created by the scientists of Union Carbide. The energy comes from the intensely hot carbon arc. Through the use of mirrors, the heat is reflected to form a single burning image of the electric arc at a convenient point. Called the arc-image furnace, it extends the limits of high-temperature research on new materials for the space age.

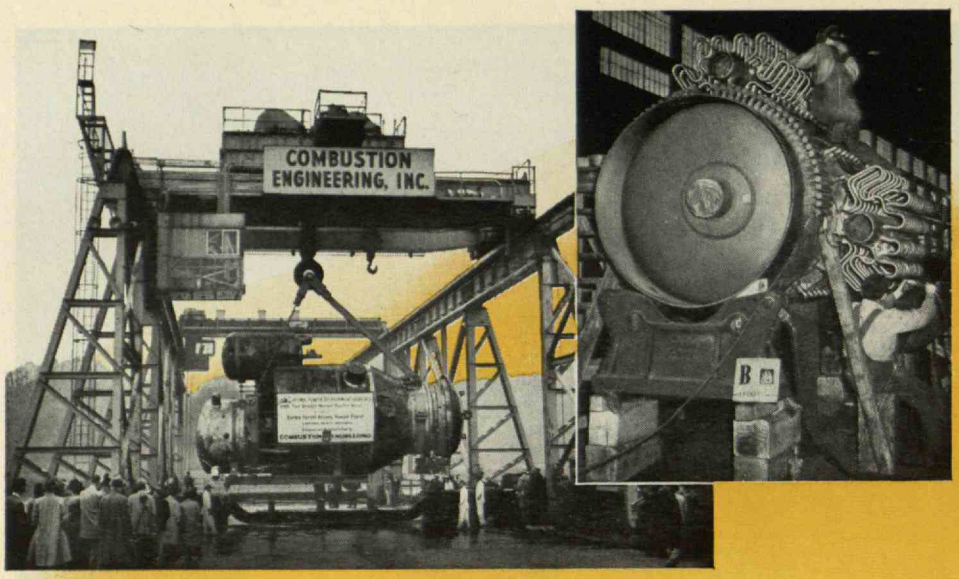
For years, mammoth carbon and graphite electrodes have fired blazing electric furnaces to capture many of today's metals from their ores and to produce the finest steels. But, in addition to extreme heat, the carbon arc produces a dazzling light that rivals the sun. In motion picture projectors, its brilliant beam floods panoramic movie screens with every vivid detail from a film no larger than a postage stamp.

The carbon arc is only one of many useful things made from the basic element, carbon. The people of Union Carbide will carry on their research to develop even better ways for carbon to serve everyone.

Learn about the exciting work going on now in carbons, chemicals, gases, metals, plastics, and nuclear energy. Write for "Products and Processes" Booklet I, Union Carbide Corporation, 30 E. 42nd St., New York 17, N. Y. In Canada, Union Carbide Canada Limited, Toronto.

UNION CARBIDE

...a hand in things to come

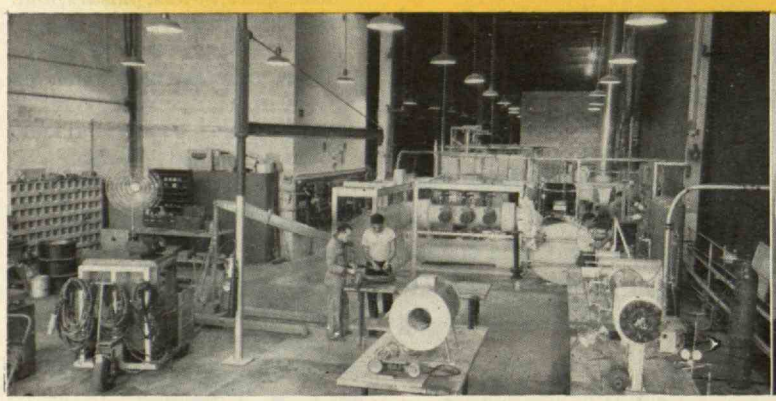


(Left) The huge riverside crane at Combustion's Chattanooga Division easily lifts this 92-ton stainless steel reactor vessel — the most complex reactor vessel built to date — into a barge for shipment to the Enrico Fermi Power Station, Lagoona Beach, Michigan.
(Right) Stainless steel sodium heat exchanger consisting of a series of tubes within tubes, encased in a pressure vessel.

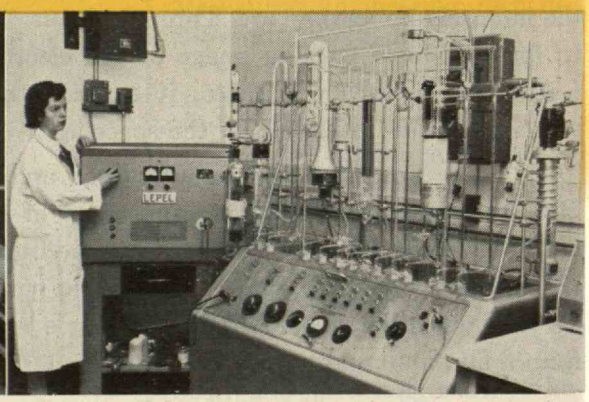
What C-E is doing to advance

The strange and wondrous world of the atom has been examined and surveyed by C-E scientists and engineers since 1946. The object—to put the controlled energy of the atom to productive use for the generation of power. The result—a wealth of knowledge and experience in the application, design and manufacture of nuclear power equipment. Backed by specially designed laboratories and manufacturing facilities, this knowledge and experience—greatly augmented and enriched by the acquisition of the General Nuclear Engineering Corporation early **last** year—has enabled C-E to undertake many kinds of nuclear work.

Notable C-E and General Nuclear projects are outlined on the opposite page. Virtually all of them are *current*, and many have a significant relationship to the vital task of making nuclear power competitive with conventional power. Collectively, these projects will contribute importantly to the Company's objective of achieving the same position of leadership in the atomic world of tomorrow which it has long since achieved in present-day methods of power generation.



Partial view of laboratory of General Nuclear Engineering Corporation at Dunedin, Florida, showing equipment used for the study of a high-pressure, high-temperature gas coolant system.



Portion of a laboratory at C-E's Nuclear Division, Windsor, Connecticut, showing gas analysis equipment used for detecting the presence of small quantities of gases in reactor materials.