

The November TECHNOLOGY REVIEW



George A. Waters.

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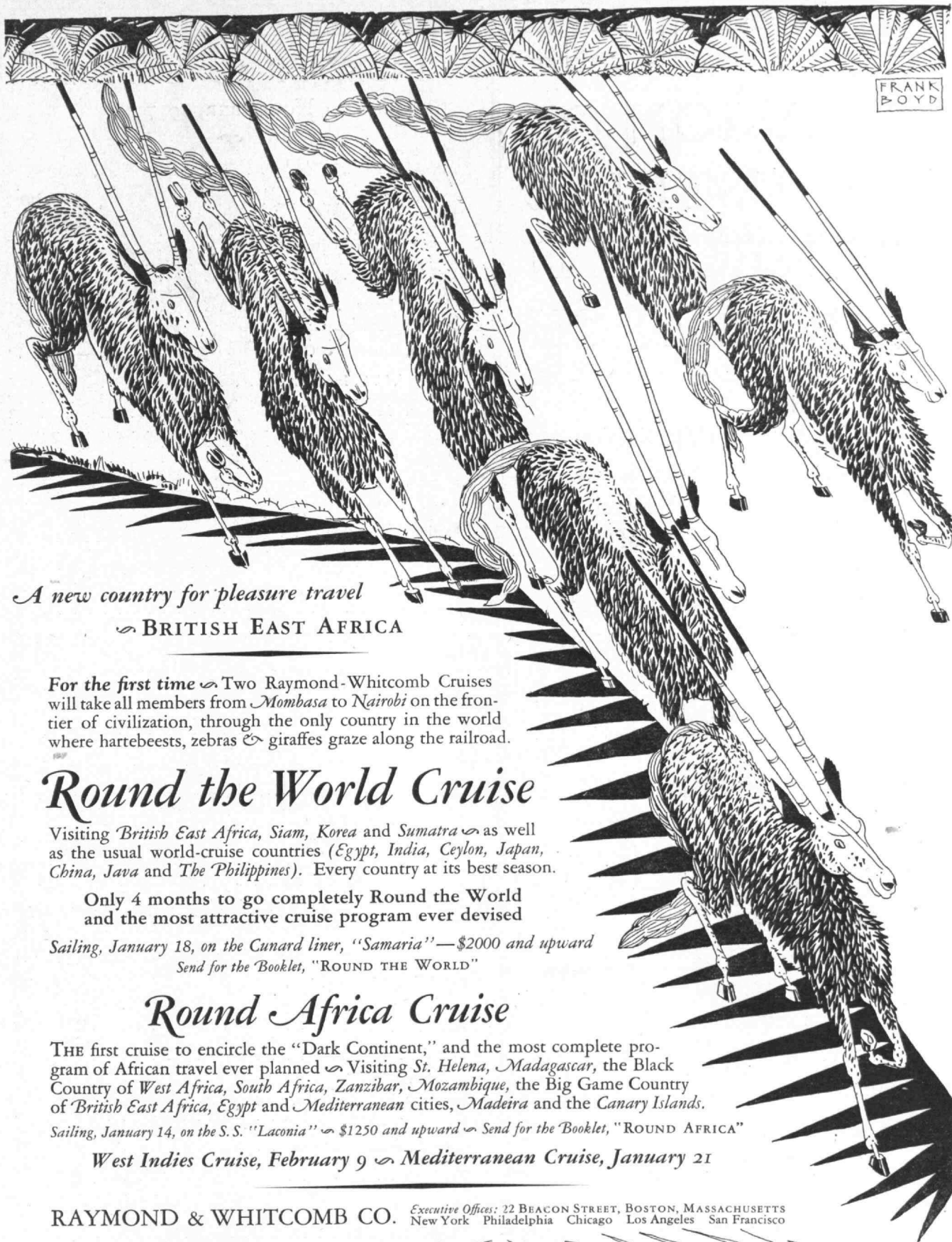
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The TECHNOLOGY REVIEW

Relating to the Massachusetts Institute of Technology

VOLUME XXX

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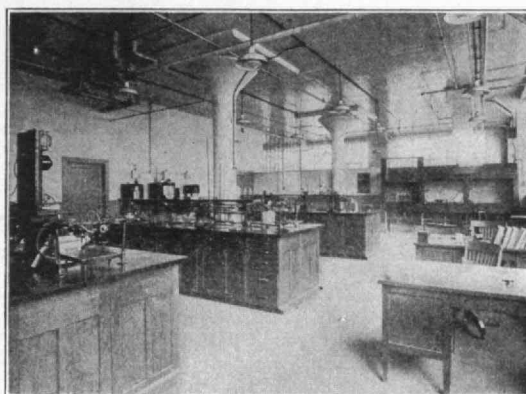
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READ ITEM

*"Of Interest to
Technology Men"*

ON PAGE 68 OF THIS ISSUE

SIMPLEX CABLES

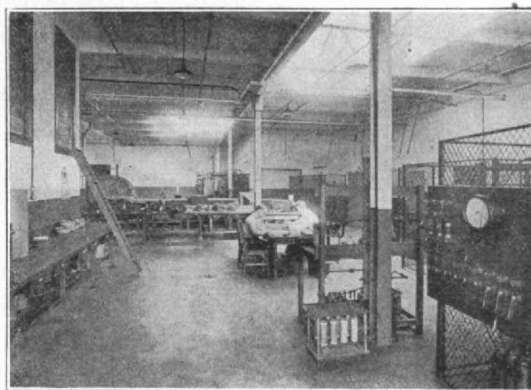


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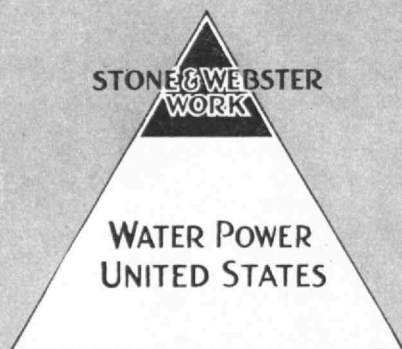
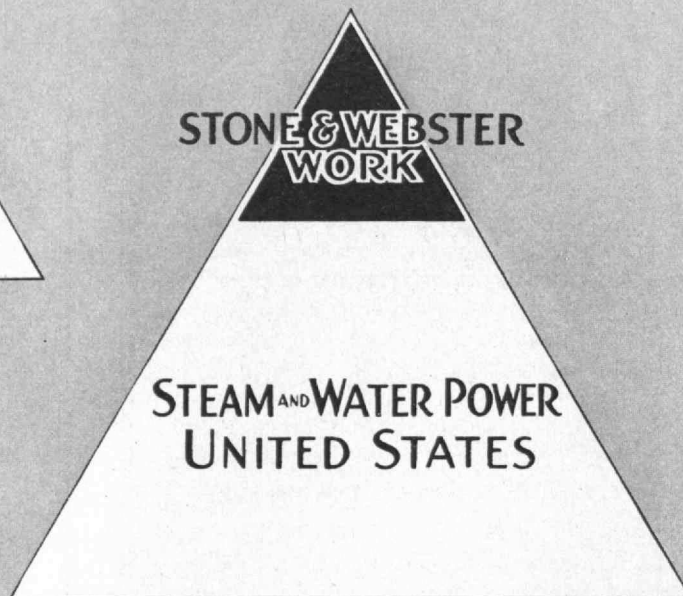
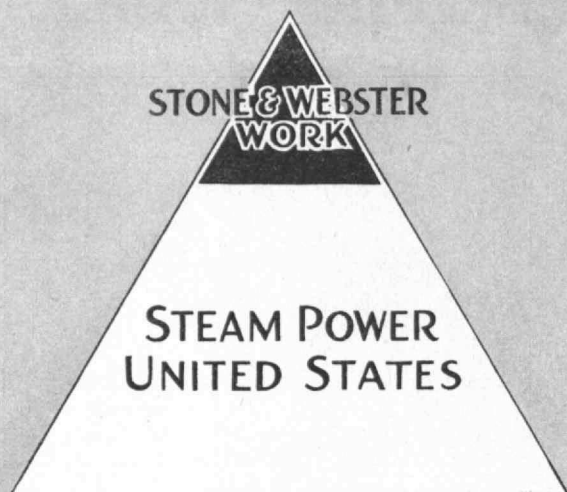
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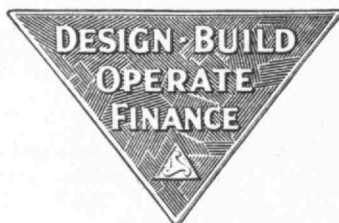
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The TECHNOLOGY REVIEW

VOLUME 30

NOVEMBER, 1927

NUMBER I

The Trend of Affairs

FIVE successive autumns, since the post-war peak of 1921, have witnessed a decline in the Institute's registration, but the present enrollment of 2,672 is 49 greater than that of a twelvemonth ago. Most encouraging is the increase of 88 or 17.35 per cent in the freshman class. These 88, together with 7 more sophomores and 28 more graduate students, offset 14 fewer juniors, 56 fewer seniors and 4 fewer unclassified students, leaving the favorable balance of 49. The numbers in each grouping are: freshmen, 595; sophomores, 542; juniors, 589; seniors, 573; graduate students, 347; unclassified, 26.

The newly created Course in Building Construction, numerically known as "XVII," which as yet has no senior class, has 64 registered in its first three undergraduate years. Aëronautical Engineering, now in its second year, has 60 freshmen, 45 sophomores, 33 juniors, 12 seniors, and 13 graduate students, or 163 in all against 70 a year ago. It shows both numerically and on a percentage basis the greatest gain and is now the seventh largest Course, being exceeded only by Electrical Engineering with 550, Engineering Administration with 306, Mechanical Engineering with 302, Chemical Engineering with 296, Civil Engineering with 232, and Architecture with 179.

The five courses showing greatest gains over 1926-27, in addition to Aëronautical Engineering, are: Architecture, 37 students or 26 per cent; Biology and Public Health, 20 or 64.5 per cent; Chemical Engineering, 17 or 6.1 per cent; Physics, 12 or 42.9 per cent. The five courses

showing greatest losses are: Electrical Engineering, 73 students or 11.7 per cent; Civil Engineering, 45 or 16.25 per cent; Mechanical Engineering, 24 or 7.4 per cent; Architectural Engineering, 21 or 19.1 per cent; General Engineering, 15 or 34.2 per cent.

The Dormitory Campaign

DEAN Alfred E. Burton again gives encouraging news of the progress of the Dormitory Fund Campaign directed by him. Notable among contributions to date are three, one each from the Classes of 1868, 1875 and 1877 providing for single rooms. That these early classes of such small membership and so far removed in years from Institute life should thus set an example for other classes bodes well.

Dr. Burton also announces that eight other classes have definite campaigns on to raise funds for an entire floor, or a room apiece. In addition several alumni clubs and groups of clubs are raising money. So the campaign moves apace toward the goal of a complete quadrangle of dormitories.

Changes

PROFESSOR Charles L. Norton, '93, Head of the Department of Physics and Director of the Division of Industrial Coöperation and Research, became Chairman of the Faculty as of July 1. He succeeded his classmate, Professor Charles M. Spofford, who was Chairman during 1925-26 and 1926-27. Professor Allyne L.



From a dry-brush drawing by Kenneth Reid, '18
LT. ALBERT F. HEGENBERGER, '17

As senior officer and aviator he flew with Lt. Lester J. Maitland on the first non-stop flight to Hawaii. See his article describing the flight on page 19

Merrill, '85, was again chosen Secretary of the Faculty, his twenty-first reelection to that office, he likewise taking office as of July 1.

Charles L. Porter, '02, from 1904 until 1909 Assistant under Professor Harry E. Clifford, '86, in the Institute's Department of Electrical Engineering, returns this fall as Associate Professor of Accounting in the Department of Economics and Statistics. Professor Porter was graduated from Brown University in 1900 and two years later from Technology. He served as Comptroller of the McElwain Shoe Company and, more recently, of the Cambridge Gas Company.

Major Robert C. Eddy, C. A. C., has been assigned to the Institute as Executive Officer of the Department of Military Science and Statistics with the rank of Assistant Professor. He was graduated successively from the United States Military Academy in 1905, from the Coast Artillery School in 1911, from the Command and Staff School at Ft. Leavenworth, Kans., in 1923, and from the Army War College in 1926.

One promotion in the Faculty has been announced: Edward L. Bowles, S. M. '22, since 1925 Assistant Professor of Electrical Communications, has been advanced to the grade of Associate Professor.

Flights over the briny deep is the lure held out by the Institute's new Naval Reserve Officers' Training Corps. Under agreement with the Navy Department this opportunity is to be open only to students in the Course in Aëronautical Engineering who have had the necessary preliminary military training, rank academically in the upper half of their class and are physically fit.

Students selected for flight training will be enlisted as seamen and sent to the Naval Reserve Training

Station at Squantum, Mass., for a period of forty-five days during the summer vacation following their sophomore year. Lieutenant Walter F. Eade, U. S. N. R., a Research Associate in the Course in Aëronautical Engineering, will supervise this new Naval R. O. T. C.

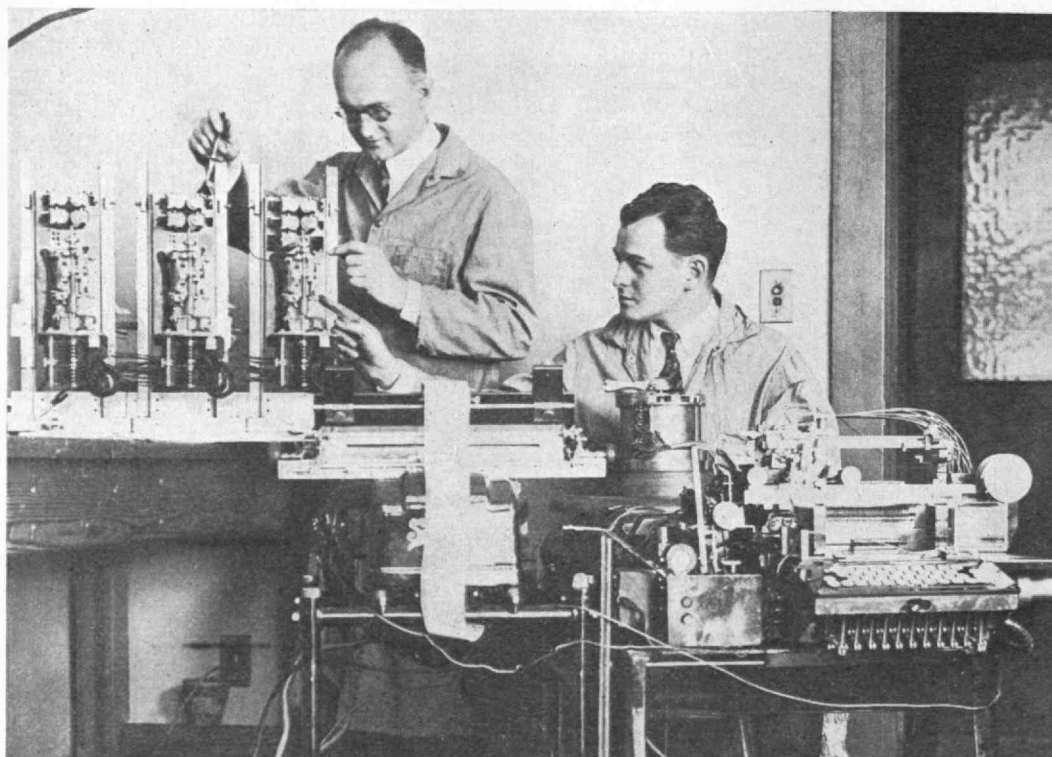
Electric Mathematician

EVEN as intricate mechanical devices make easy arithmetical computations for the abacist, a new instrument integrates or solves complicated differential equations for the mathematician which heretofore were either unsolvable or, at best, necessarily attacked by arduous cut-and-try methods. Problems in civil, mechanical, aëronautical and electrical engineering have been solved with good engineering accuracy by the "Product Integrator." It has been under development for the last few years in the Institute's Research Laboratory of Electrical Engineering by Professor Vannevar Bush, '16; Frank G. Kear, G; Harold L. Hazen, '24; Herbert R. Stewart, '24, and Francis D. Gage, '22.

Integration is a mathematical summing-up process, the household watt-hourmeter invented by Elihu Thomson being a simple example. Were the power consumer to record, at frequent intervals throughout the month, the number of burning lights, plot these data on paper, and submit the graph to the Integrator, he would receive, as a solution, another graph showing him how much he owed for electricity as the month advanced — the same information that regular reading of the meter would give him.

The Integrator actually uses the watt-hourmeter in integration process. Before each of the four operators

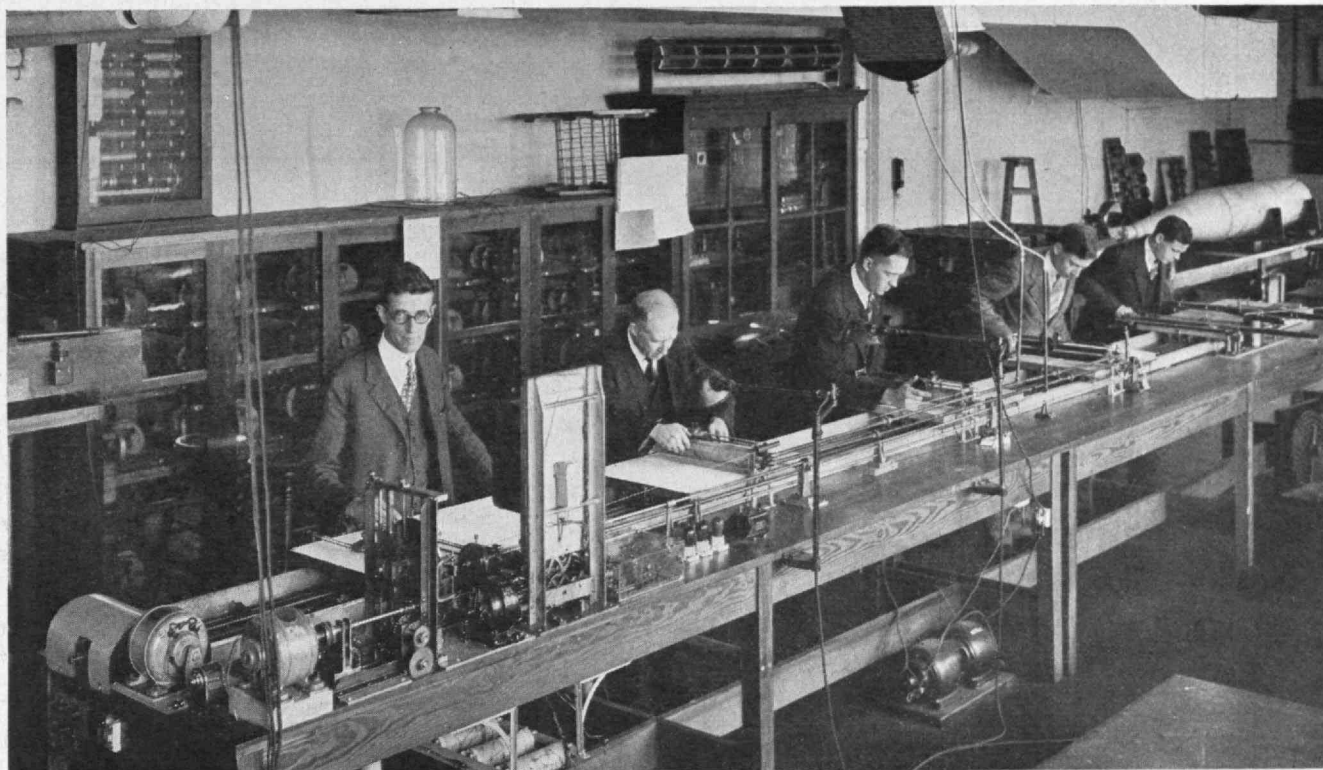
(on the right in the photograph on page 7) there moves a table carrying a graph which represents a single aggregate of facts in the stated problem. With a tracer point whose movement operates an electrical rheostat, each one follows the curve as it slides by him, the energy absorbed by the rheostat being made to operate a watt-hourmeter, which, in turn, moves a pencil on the fifth, or recording table. Thus is the integration of a complicated differential equation traced out — the position of the tracer point on each moving table corresponds to the



BOOKKEEPING BY ELECTRICITY

Louis F. Woodruff, 2d, '18, Assistant Professor of Electric Power Transmission and Edward Rogal, '18, making final tests on an electrical maid-of-all-work recording and bookkeeping device

P. and A.



George H. Davis

INTEGRAPH

The Product Integrator being operated by Professor Vannevar Bush, '16, Walter F. Kershaw, Frank G. Kear, G. Harold L. Hazen, '24, and Murray F. Gardner, '24. The Ford radiator is an essential part of the machine, helping to keep constant the temperature of the rheostats

"number of lights"; the motion of the table, to the lapse of time in the example of the power consumer's electricity meter above described.

But the Product Integrator can do much more. By means of a mechanical arrangement it integrates the result of the first integration and plots it on the recording table. All five of the tables are dragged along at the same rate, the displacement representing, for example, elapsed time. For complicated work, however, a "back coupling" mechanism can be made to drive one or more of the tables at a rate depending on the result of either the first or second integrations. These features make possible the solution of almost any second order total differential equation. To the mathematician and many engineers it means much, for into this class of equation fall many highly complicated problems in dynamics, structural design, ballistics, and electric circuits.

The Product Integrator is an important engineering advance, but however much it helps the research engineer it will in no way lighten the burdens of the adolescent sophomore embroiled in the mazes of the integral calculus and differential equations, any more than the invention of the adding machine shortened the working day in grammar school.

Elihu Thomson

IT is hardly news any longer when a new award is made to Elihu Thomson, from 1920-1922 Acting President of the Institute, and since 1902 Non-Resident Professor of Applied Electricity. The presentation to him in England of the Faraday Medal this past

summer, according to extensive computations, brings his total number of medals and prizes up to eleven or more. Six of these were awarded by foreign organizations. He also has been elected to more than a dozen professional or scientific societies.

These awards and honors, in a crude sort of way, are manifestations of the world's high regard for genius. For certainly Dr. Thomson is a genius: no American except Edison has been a more fecund inventor or has done more to further electrical progress. Over five hundred patents are registered in his name; the watt-hourmeter and electric welding are included among them. To cover adequately his scientific work is far beyond the scope of a journalistic item such as this, but the amazing record exists for those who wish to search it out.

But his scientific record does not constitute the entire record of this many-faceted man. Between inventions he has served as educator: since 1898 he has been a member of the Institute's Corporation, from 1920-1922 he was Acting President, and at the present time he is a Non-Resident Professor of Applied Electricity and a member of the Visiting Committee to the Department of Electrical Engineering. In addition to all this he has found time to act as a trustee for the Peabody Museum at Salem.

It is reputed that he is a descendant of the Thomson Clan of Dunfermline, Scotland, famous in "The Bruce," Stuart, and Douglas days. Certainly it is possible to reason that here is an example of that hardy, courageous line, who has used his energies as a scientist instead of as a fighter. He was born in Manchester,

England, March 29, 1853, and came to this country five years later, obtaining his education in grammar schools and by dint of self-study.

Something of the nature of the man is indicated by his attitude toward the Presidency of the Institute. He refused to accept permanent occupancy because he felt that a younger man was needed, and because as head of the Thomson Laboratory of the General Electric Company, he was working on a number of electrical projects that demanded a large share of his time. Consequently, to fill the interlude between the death of President Richard C. Maclaurin and the selection of his successor, Dr. Thomson agreed to act only as titular and temporary head for the signing of diplomas and important documents.

A contemporary electrical journal refers to him as our "Swampscott professor, inventor, philosopher, and friend." Surely here is a man for some biographer to get down on paper. We know too little of our scientists in comparison to what we know of men in other fields. Perhaps this fact is a tribute to the reticence of the true scientist, but it is not to the historians.



ELIHU THOMSON

Sometime Acting-President of the Institute and the most distinguished of American engineers and scientists, who recently had added to his list the Faraday Medal. See page 7

Spider Ranches

AS Brigadier General Logan Feland, '92, last August relinquished command of the United States Marines in Nicaragua, declaring, "The time is past when it is necessary to use armed force to maintain peace in Nicaragua," international complications loomed on the Pacific horizon of the insect world as a result of the announcement of George L. Clark, from 1924 until September 1, Assistant Professor of Chemical Engineering. He declared that spiders and silkworms weave *exactly*, if not identically, the same kind of fiber.

This momentous news, which is said to have been the result of x-ray investigations, puts a new and perhaps ominous interpretation on that song of childhood: "Here we go Round the Mulberry Bush!" What effect the news will have in the silkworm world is not yet known, but it is considered likely that this most recent use for the all-seeing eye of Professor Clark's x-ray tube may start a war of competition. It is possible that even now the silkworms, who, it is said, thrive on mulberry leaves, are wriggling around that well-advertised bush faster than ever.

Whatever the outcome of this important discovery, much interest attaches to the possibility of putting spiders to work in some useful occupation. One may now picture spider ranches with millions of insects toiling to make America the silk center of the world. Is it also too much to imagine that in time every household will have its private spider coop where these busy little fellows will spin the fiber that is used so much in many attractive garments of this day of many wonders?

Agrarian Lamentations

SINCE the political defeat of Andy Jackson's motley mob in 1840 the irresistible course of that Frankenstein, the Machine Age, has inexorably shoved the farmer back into a rear seat in the national political orchestra, there to express an inferiority complex by scratching on a very second fiddle. This has not prevented him, however, from now and then rising above the din with the squeaking, wailing note, that can set the national nerves on edge.

This past July at the Williamstown Institute of Politics, Henry C. Wallace, from out in Iowa, the son of a former Secretary of Agriculture, wailed a bit over the grave injustice which has been done the farmer during the past six years, and warned of an impending food shortage brought about by the decreasing agricultural population. Agricultural labor shortage, consequent food shortage, consequent higher prices, industrial labor discontent — so ran his line of reasoning.

Naturally he did not go unchallenged and he had flung back at him the charge that his initial premise was wrong, that there were too many, not too few, farmers. Professor Donald S. Tucker, of the Institute's Department of Economics and Statistics, was the disputant and he contradicted Mr. Wallace's statement that the present ratio of one-fourth