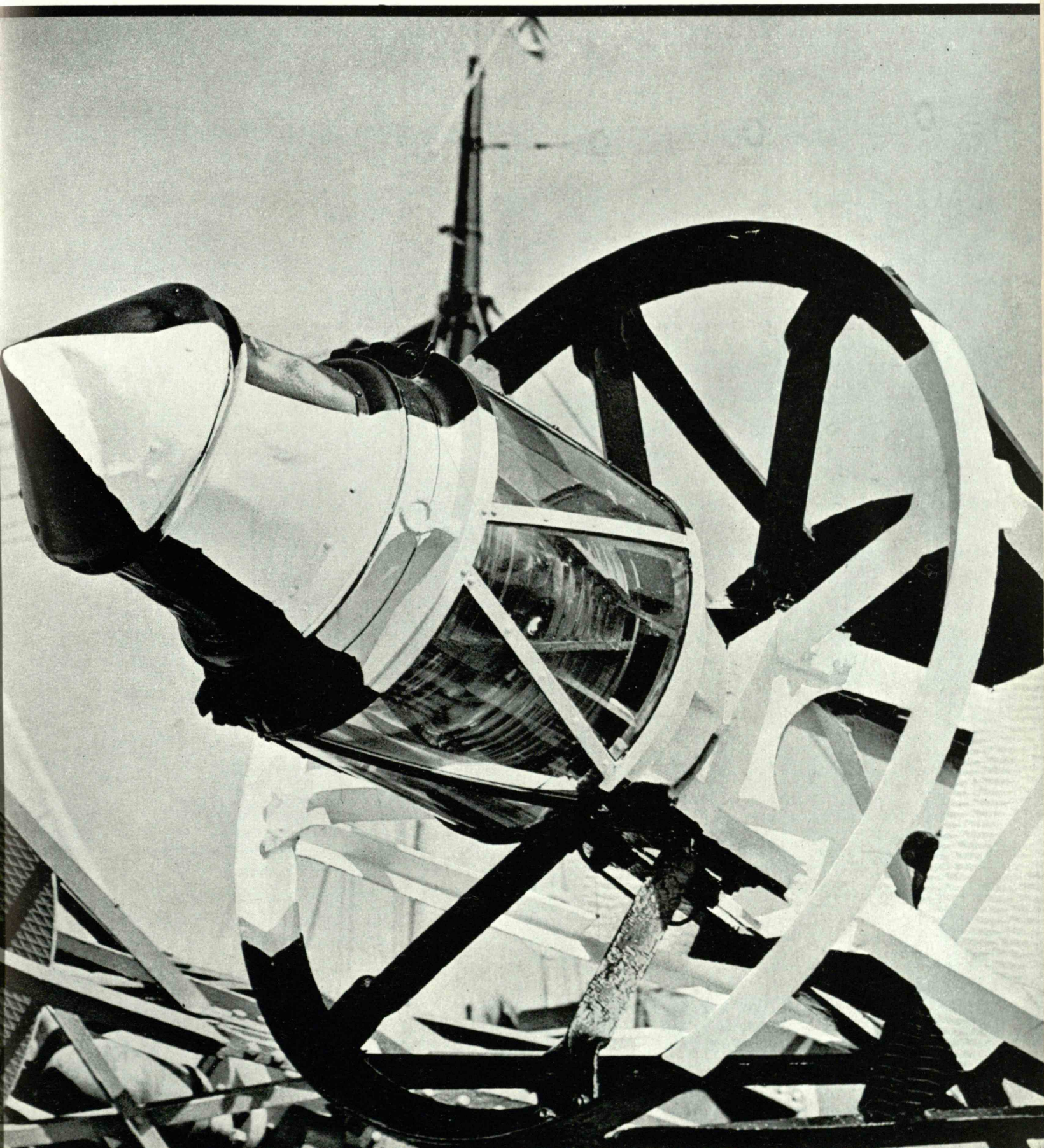
February 1939

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office



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THE TABULAR VIEW

FOR the possibly doubtful honor of labeling the puzzling times in which we live, according to some commentators, electricity has but one serious rival. In so many ways and for so many things do we depend upon the lens — for amusement, record, health, investigation — that to call this the age of the lens appeals to them as reasonably accurate. The Review is content with remarking the diverse virtues of the lens, the extremes of its usefulness, suggested in two articles this month. Contour of the far-flung jungle, configuration of the microscopic fiber, each is by its aid added to man's working knowledge. ¶ HAROLD G. CROWLEY, '23, as chief of the air survey unit of the Papua Oil Development Company, Ltd., which mapped the New Guinea jungle, relates high lights in his recent years (page 163). Before his work in New Guinea, he took part in air operations for the two Forbes-Grenfell-MacMillan expeditions for the mapping of the Labrador Coast, the story of which he told in The Review for February, 1933. The economic aspects of the New Guinea oil search are not touched upon in his present article, since as explorer he was not concerned with that phase of the development. ¶ The second votary of the lens who contributes to The Review this month (page 166) is likewise familiar: Classmate of Mr. Crowley, EDWARD R. SCHWARZ, as professor of textile engineering at the Institute, has been in the forefront of the effort to rationalize the utilization of fibers. Ability to manufacture artificial fibers, which has already given rise to great industries, may in time become ability to design and construct fibers of special fitness for special tasks; it is this provocative possibility with which Professor Schwarz is currently concerned. ¶ Antiquary of applied technology, L. L. THWING, '03, who in The Review for October, 1934, rescued from near oblivion a pioneer in the application of electricity, now (page 169) tells of two early experimenters with the art of automobility. His article is another outgrowth of an avocation that turned into a profession when, after riding for years the hobby of collecting data on the history of technology, he became connected with the New York Museum of Science and Industry. ¶ Another aspect of transportation is commented upon in this issue by JAYSON C. BALSBAUGH, '24, Associate Professor of Electric Power and Distribution, who reviews Lucius Beebe's "High Iron" with the interest of both teacher and *aficionado* (page 160).

TO the Cover Club this month comes as a new member, CLAYTON D. GROVER, '22, whose photograph of a freshly bedecked buoy was taken at the United States Lighthouse Service depot at Woods Hole, Mass. ¶ Proposal that The Review publish monthly a list of staff papers to supplement the list of alumni publications now carried was made in our November issue by Professor Leicester F. Hamilton, '14. Response to the editorial query thereto appended has thus far been scattering; failing further expression of desire by readers, The Review presents no list, waits.

MAIL RETURNS

Further Aims for Management

From William A. Rhodes, '12:

If one might be so bold as to attempt supplementing President Compton's summary of the problems of management in the December Review, one might add the following as specific objectives which are perhaps especially pertinent at the present time:

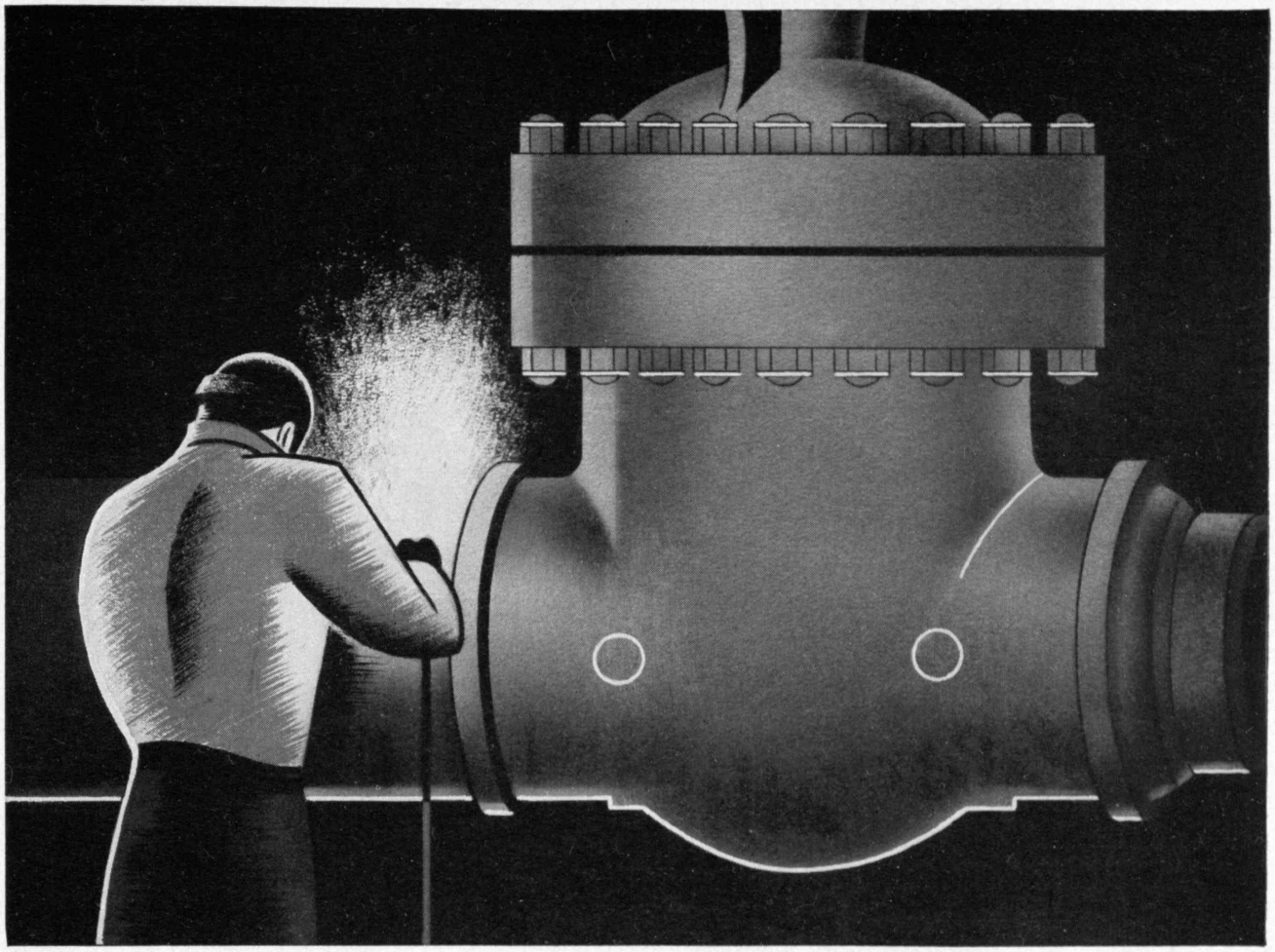
(1) The production of goods and of services suitable in kind and in price for sale to the poorer populations. It so happens that this class of production requires the most costly and elaborate plant, the most skilled of technicians.

(2) The employment of the poorer populations at work for which they are best fitted. This is repetitious hand labor, and an example of it is in the work of machine and instrument and commodity assembly. It very frequently pays to ship materials and parts to low-wage areas for hand labor and back to market for sale. It so happens that the class of goods containing a high percentage of handwork tends toward luxury products and is chiefly salable in the richer districts.

It is by the applications of the principles of management so ably stated by President Compton — supplements, after all, are secondary affairs — that more human desires are to be satisfied and the potential labor of those now idle or poorly occupied is to be utilized to the benefit of everyone concerned in all professions, work, and trades.

New York, N. Y.

Readers who wish to join Mr. Rhodes in further projection of the fundamentals set up in President Compton's statement may desire reprints of the article, "New Demands on Technology." These may be obtained from The Review.



IT'S 10 TO 1

... your vital problem right now is a better product at a competitive cost; and improved materials may be the answer. Better re-check your material specifications today for Molybdenum steels. They are continually replacing other long established steels.

Here's a concrete case. Several important manufacturers of steam generating equipment have adopted Carbon-Molybdenum steel for many different parts. They find it has the better elevated temperature properties and creep strength necessary for the high temperatures common to modern plants. They also find that it is suitable for welded construction (many installations today are of welded construction).

What is more, Carbon-Molybdenum steel not only meets the physical requirements exactly but also comes within the cost limitations that usually exist.

We will gladly send our booklet, "Molybdenum in Steel", containing a great deal of practical data, free to technical students and others interested in improved materials giving more per alloy dollar.

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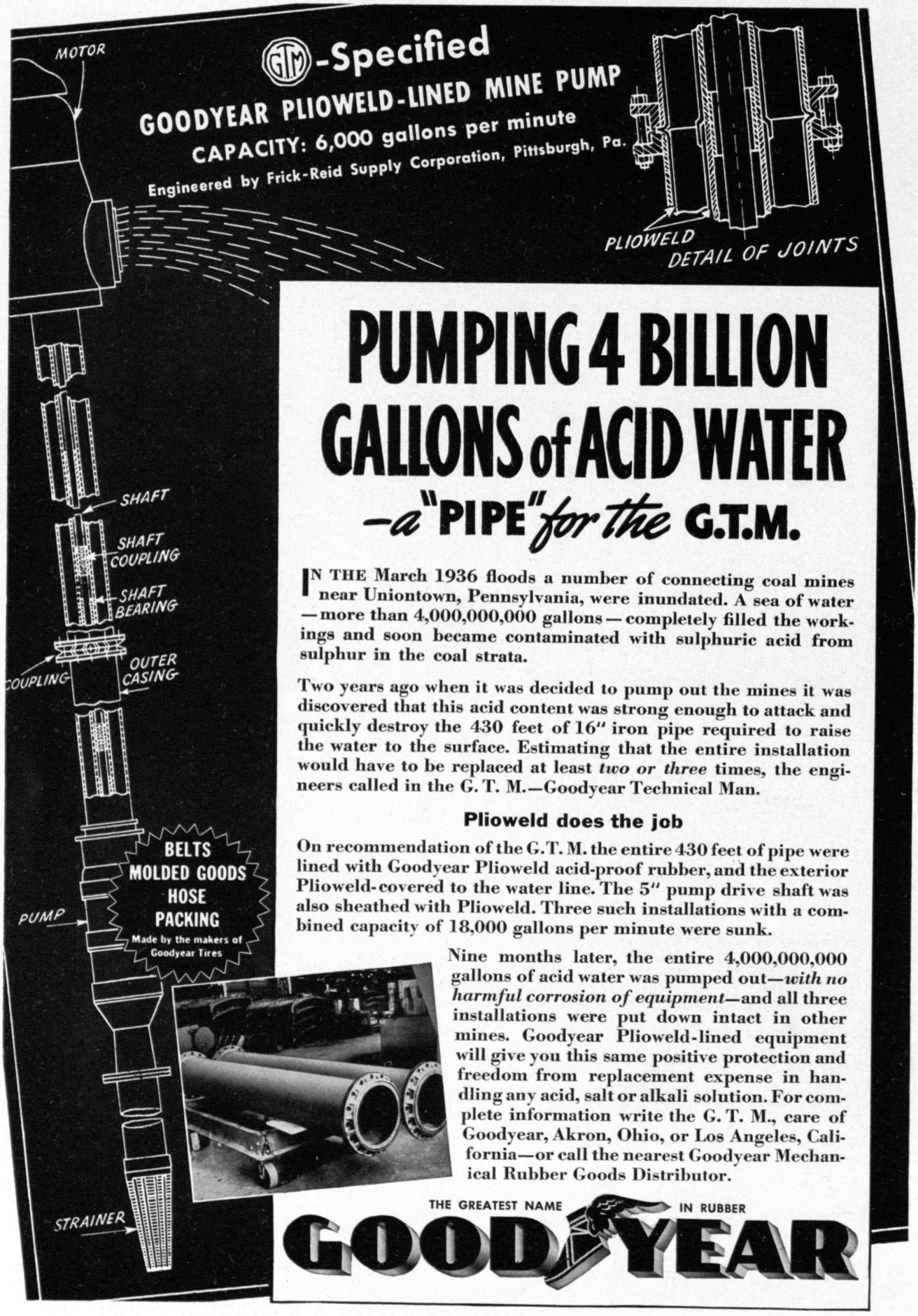
MOLY



PUMPING 4 BILLION GALLONS of ACID WATER

—a "PIPE" *for the* G.T.M.

IN THE March 1936 floods a number of connecting coal mines near Uniontown, Pennsylvania, were inundated. A sea of water—more than 4,000,000,000 gallons—completely filled the workings and soon became contaminated with sulphuric acid from sulphur in the coal strata.

Two years ago when it was decided to pump out the mines it was discovered that this acid content was strong enough to attack and quickly destroy the 430 feet of 16" iron pipe required to raise the water to the surface. Estimating that the entire installation would have to be replaced at least *two or three* times, the engineers called in the G. T. M.—Goodyear Technical Man.

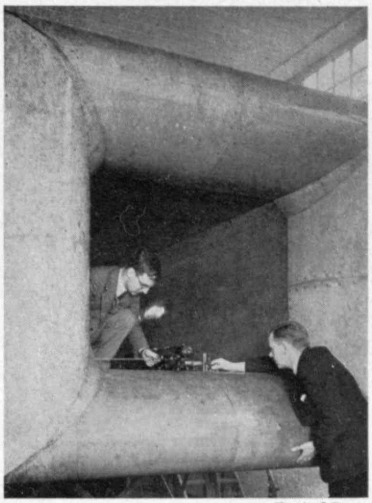
Plioweld does the job

On recommendation of the G.T. M. the entire 430 feet of pipe were lined with Goodyear Plioweld acid-proof rubber, and the exterior Plioweld-covered to the water line. The 5" pump drive shaft was also sheathed with Plioweld. Three such installations with a combined capacity of 18,000 gallons per minute were sunk.

Nine months later, the entire 4,000,000,000 gallons of acid water was pumped out—*with no harmful corrosion of equipment*—and all three installations were put down intact in other mines. Goodyear Plioweld-lined equipment will give you this same positive protection and freedom from replacement expense in handling any acid, salt or alkali solution. For complete information write the G. T. M., care of Goodyear, Akron, Ohio, or Los Angeles, California—or call the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER

GOODYEAR



Topical Press

This wind tunnel tests streamline model locomotives at the Derby works of the London, Midland and Scottish Railway

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THE COVER

From a photograph by Clayton D. Grover, '22

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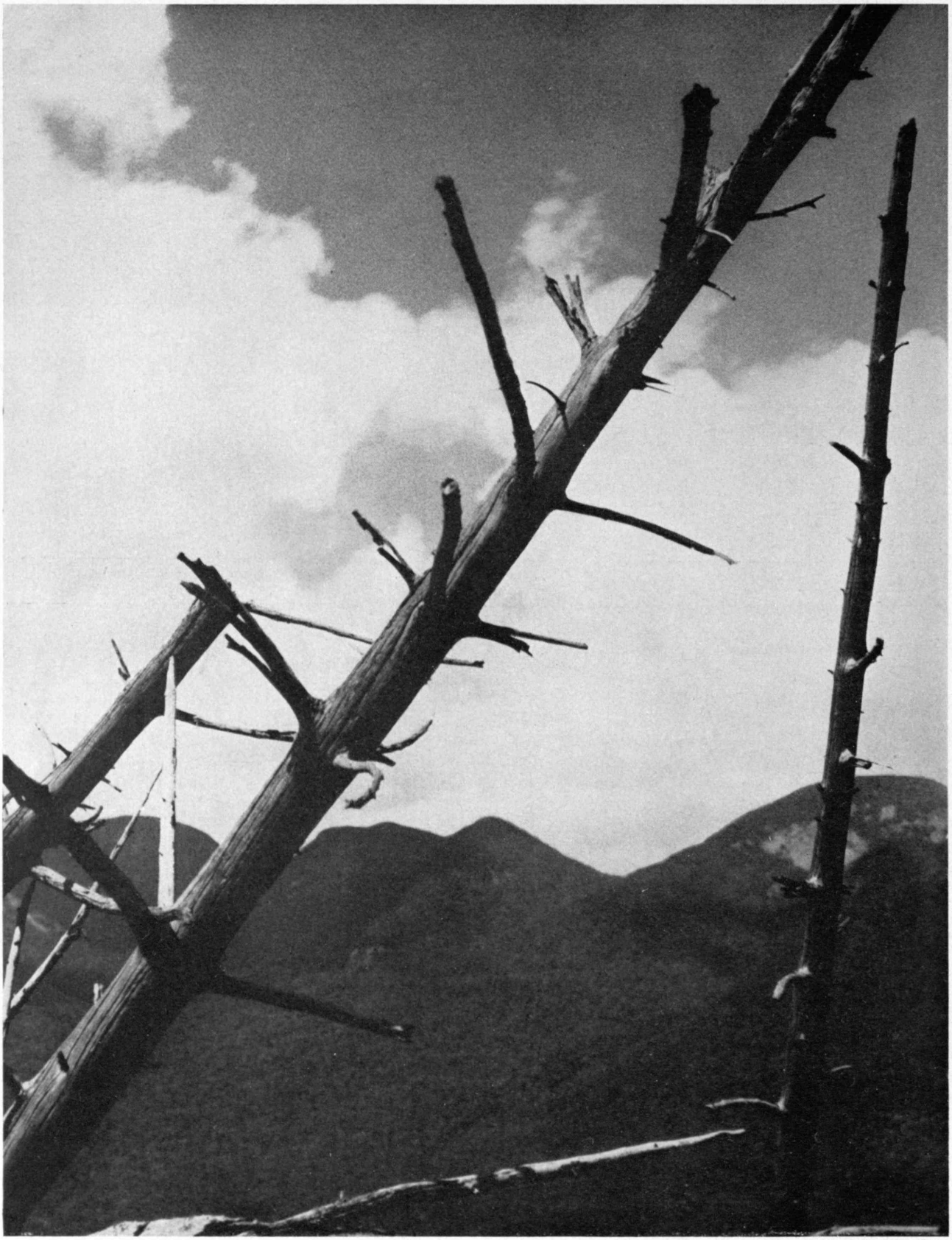

George A. Makaroff, '26

FAR FORESTS

Peaks and spurs in the Adirondacks with a foreground of trees that were

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The Trend of Affairs

From Liége to the Sea

A GREAT engineering feat which might well have attracted more attention were it not for the long succession of crises in Europe will be completed next summer when Belgium opens the Albert Canal, her new and potentially most important waterway. Winding its way across country from Liége, on the Meuse River, to Antwerp, the great North Sea port, the new canal will provide a much needed highway of commerce from Belgium's rich coal and industrial districts to the seaboard.

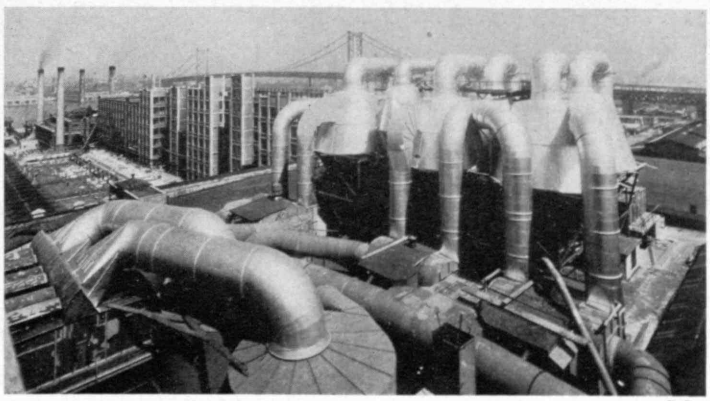
The Albert Canal, started in 1930, will cost some $500,000,000, and its completion is expected to swing to Antwerp the tide of commerce that now flows to Rotterdam by way of the Meuse River and the Juliana Canal. In contrast with the existing system — a shallow waterway that leisurely winds across Belgium and at one place wanders into Holland, with consequent customs entanglements — the new canal is being constructed entirely within the borders of Belgium itself.

The old canal route between Liége and Antwerp, which has been in existence for many years, is slightly more than 96 miles long and necessitates the tedious passage of 23 locks. The new canal is nearly 78 miles long, but because there are only six locks, the passage between the two cities will be very much faster.

The new waterway will accommodate vessels up to 1,350 tons, and special features of construction will permit ships to operate at full speed without endangering the banks of the canal by the effects of turbulence.

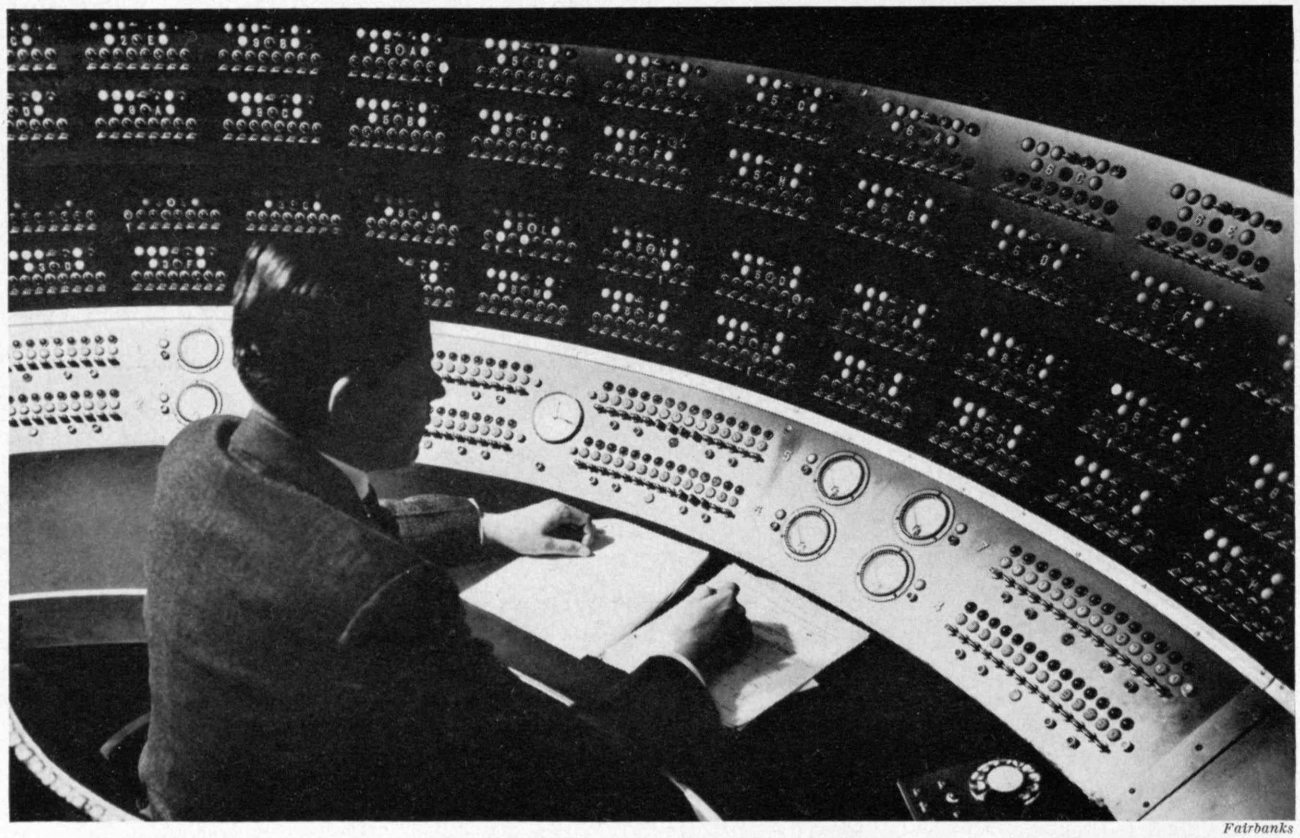
The present competing waterway between Liége and Rotterdam is 141 miles long, but because it can accommodate larger vessels than those that can navigate the present Liége-Antwerp Canal, it has carried a huge volume of traffic to the Dutch port. This route follows the Juliana Canal on the Meuse River and later joins the Waal River, southeast of Rotterdam.

The new Albert Canal has a width of 85.3 feet on the bottom; its channel has a depth of 16.4 feet and measures 11.48 feet at the sides. With the exception of three drawbridges near Antwerp, all bridges are fixed structures built at a height to give ample clearance for any vessel using the waterway. Estimates indicate that the canal will have a traffic capacity of fifteen million tons of freight a year. This is many times greater than the maximum of the existing system between the Meuse and Antwerp. In order to facilitate traffic, large basins have been provided at each lock, permitting the rapid handling of vessels. Disturbance of the water during the process of filling and discharging the locks will be reduced to a minimum by means of new methods of control.



R.C.A.

Liége lies in the Meuse Valley near the eastern frontier of Belgium — a coal region. It is an important center for metal products and is noted for its ordnance works, where much of Belgium's arms and muni-



Fairbanks

WHERE THE NETWORK CENTERS

A section of N.B.C.'s main control desk, with lights representing the different studios and 85 stations on the coast-to-coast hookup — all under the operator's control

tions are manufactured. Near by are also diversified industrial plants for the construction of railroad equipment and machinery. Thus the new waterway will have significant military importance, in addition to its value to commerce.

Determined to build a canal securely within the frontiers of Belgium, the government engineers turned their eyes from the line of least resistance along the paths of existing canals and streams, and boldly struck across the formidable plateau that stretches along the Meuse River. Here they lifted the canal over a ridge more than 330 feet in elevation. This difficult feat was accomplished without compromise with the requirement that the water supply flow from the Meuse to Antwerp. Thus the canal progresses from the valley of the Meuse and dips into the watershed of the River Scheldt near Antwerp. This undertaking necessitated enormous cuts through solid rock, clay, and unstable subsoil. The vast amount of material excavated was used in building embankments along the route where the new canal was superimposed on the old waterway.

Rhumbatrons and Electrons

TO the electrical communications art of tomorrow efficient devices capable of generating, modulating, and receiving electric waves of but a few centimeters in length will be essential. By many noteworthy advances, the ordinary vacuum tube has been refined, reshaped, and generally overhauled until, watchlike, it is beautiful and indispensable and is a precision instrument as well. Despite these remarkable developments since the introduction of the historic audion of Dr. Lee De Forest in 1906, the communications engineer has been awaiting the contribution that would be to the art of tomorrow what the audion was to the communications art of the last three decades.

A dynamic group of researchers on the West Coast has turned the trick. Four members of the physics department of Stanford University — two brothers, Russell H. and Sigurd F. Varian, William W. Hansen (National Research Fellow at M.I.T. in 1933–1934), and David L. Webster (Assistant Professor of Physics at the Institute in 1919–1920) — are the workers concerned. At a recent colloquium of the Institute's Department of Electrical Engineering, Dr. Webster told for the first time of the development of a new type of ultrahigh-frequency generator and receiver working on principles strikingly different from those of the ordinary vacuum tube. Known in one of its embodiments as a klystron, the new device has overcome the objectionable features that have so long limited the applications of present-day tubes in the ultrahigh-frequency and communications field.

In the klystron a beam of electrons representing a constant current is sent through two resonant metal containers, known classically as rhumbatrons by the research workers at Stanford. In the first rhumbatron is an oscillating electric field, parallel to the stream and of such strength as to change the speeds of the