February 1941

TECHNOLOGY REVIEW

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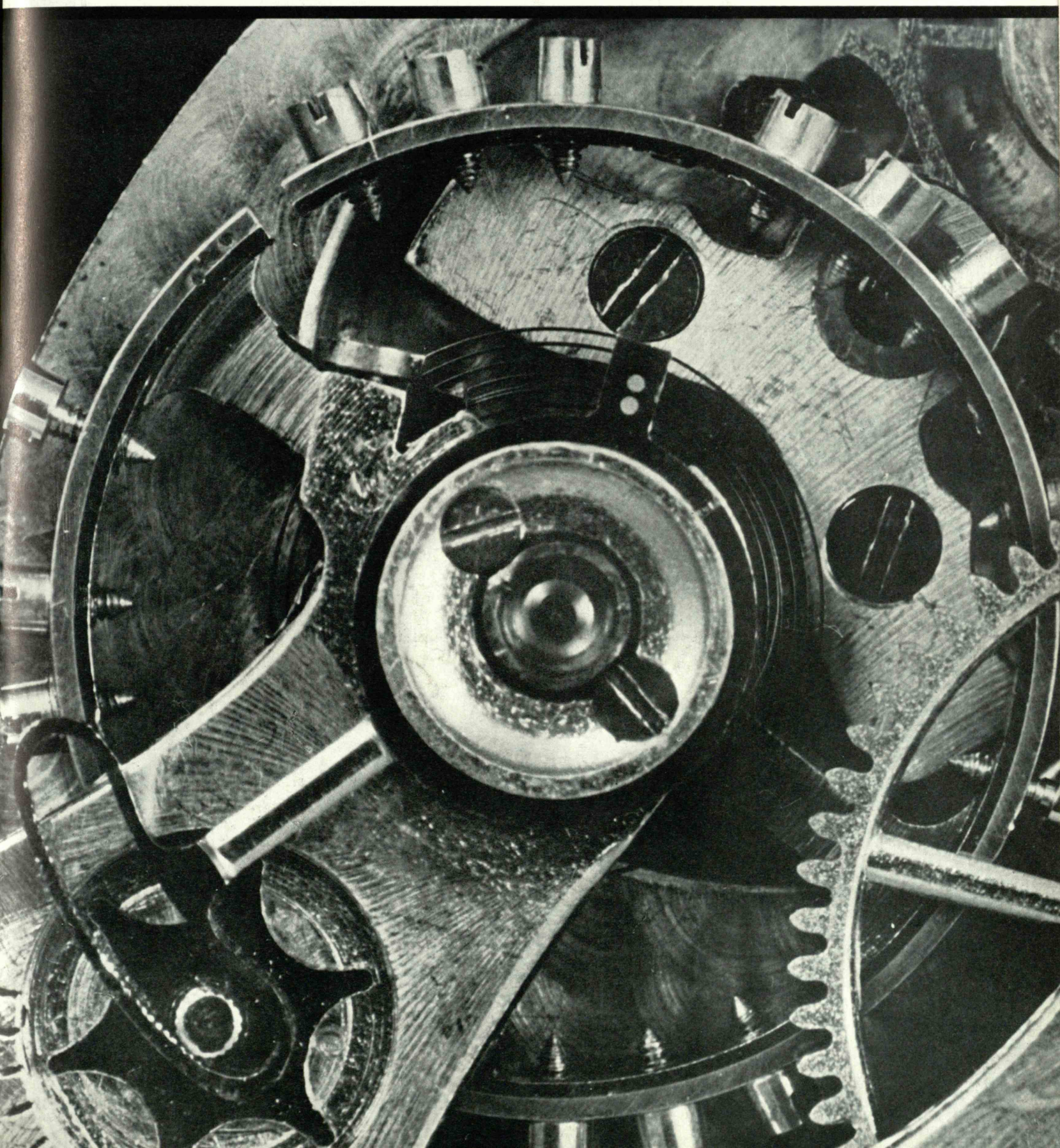

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THE TABULAR VIEW

Work. — What periodic dislocation of the economic system means has in the past been a subject monopolized by theoricians, statisticians, analysts, to be charted and tabulated mainly in terms of price movements, supplies of this or that, even sunspots. Our own times, however, have seen a shift in treatment, as in photographic studies of the submerged and the dispossessed. Economics has turned to direct discussion of the human beings involved in depression. ELI GINZBERG, who sketches research in the subject (page 150), has been on the staff of the School of Business at Columbia since 1935. He held the Cutting traveling fellowship from Columbia the year before, studying conditions in large-scale American industries. Dr. Ginzberg has published several volumes on economic topics and contributes frequently to journals.

Forward. — Designer of airplanes and airships, founder in 1914 of the Institute's pioneer course in aeronautical engineering, builder at M.I.T. of the first wind tunnel in this country, member of the National Advisory Committee for Aeronautics, JEROME C. HUNSAKER, '12, bears a distinguished reputation in aviation. His survey of technical advances in that field (page 152) is based upon his address as retiring vice-president of the engineering section of the American Association for the Advancement of Science.

Dynamic. — The crowded days of the Renaissance saw many modern activities attain to firm beginning stature. This was the period of the explicit formulation of the metallurgical art that earlier had been carried in the minds of its exponents — a reduction of ideas, a cupeling of concepts. CYRIL STANLEY SMITH, '26, research metallurgist of the American Brass Company, who is also historian and antiquary of the art, describes for Review readers (page 155) some of the principal events involved. A member of the Institute's staff in the year following his completion of graduate study here in 1926, Dr. Smith is a frequent and stimulating writer on matters metallurgical.

Millimicrocosmos. — A strange dimension of matter is that of the colloids, where properties change for reasons which must be ascertained by the remotest of remote control. As familiar as one can be with the elusive inhabitants of this region is ERNST A. HAUSER, Associate Professor of Chemical Engineering at Technology, who writes about them (page 158) with the authority of wide research. From Dr. Hauser's work resulted, among other things, the first commercial process for concentrating latex.

Groundwood. — Groundwork for the establishment of Canada's great paper industry drew on the abilities of her neighbor to the south, in an example of international co-operation ably reported (page 161) by J. N. STEPHENSON, '09, who, editor of the *Pulp and Paper Magazine of Canada*, medalist of the industry's technical association, knows well whereof he speaks.

Ticker. — To the Cover Club this month comes VERNON E. WHITMAN, '22, with an interesting magnification of what makes time fly.

MAIL RETURNS

Very Much Needed

FROM JOHN F. GUMMERE:

I have just read the article, "Linguistics as an Exact Science," by Benjamin Lee Whorf in the December issue of The Review. This is the kind of article which is very much needed, for there are relatively few people in the scientific world who know much of the work that is being done in the field of linguistics. . . . I congratulate you upon this very real and important contribution to an understanding of linguistic studies and hope that the author may be willing to write more.

Germantown, Pa.

That Cow Again

FROM M. J. KEOUGH:

In your Review of January, 1938, I recently came across the following answer to a brain twister about a cow tethered to a stake at the edge of a circular one-acre pond:

Let a be the radius of the pond, S the area over which the cow can graze, and w the angle formed by the tether in the two extreme positions of the cow on the shore of the pond. A little geometry then gives for S,

$$S = \pi a^2 + a^2(2\pi - w)\cos w + a^2 \sin w.$$

Since the area of the pond is one acre, and the area S must also be one acre, we must have

$$S = \pi a^2, \text{ or}$$
$$a^2 (2\pi - w) \cos w + a^2 \sin w = 0,$$

which reduces to $\tan w - w + 2\pi = 0$.

This transcendental equation can be solved only approximately. The approximate solution is $w = 1.790 = 102.56°$.

The length of the rope is given by

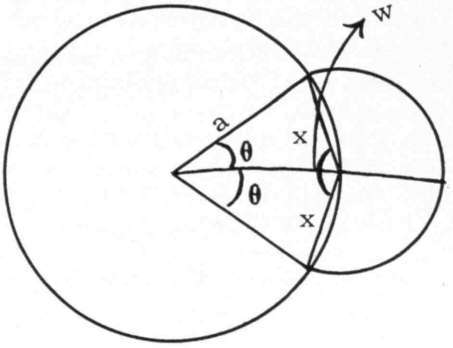
$$x = 2a \cos (w/2)$$
$$= 1.251a.$$

Since $a = 117.75$ feet, the length of the rope is 147.31 feet.

As I'm specially interested in thoroughly understanding the solution, I'd appreciate complete details as to the "little geometry" that gives the first equation.

Westmount, Quebec.

The "little geometry" to which Mr. Keough refers has been supplied to The Review by Professor Raymond D. Douglass, '31, as follows:



Let x = length of rope and 2θ the angle measured from the center of the pond to the extreme positions of the cow.

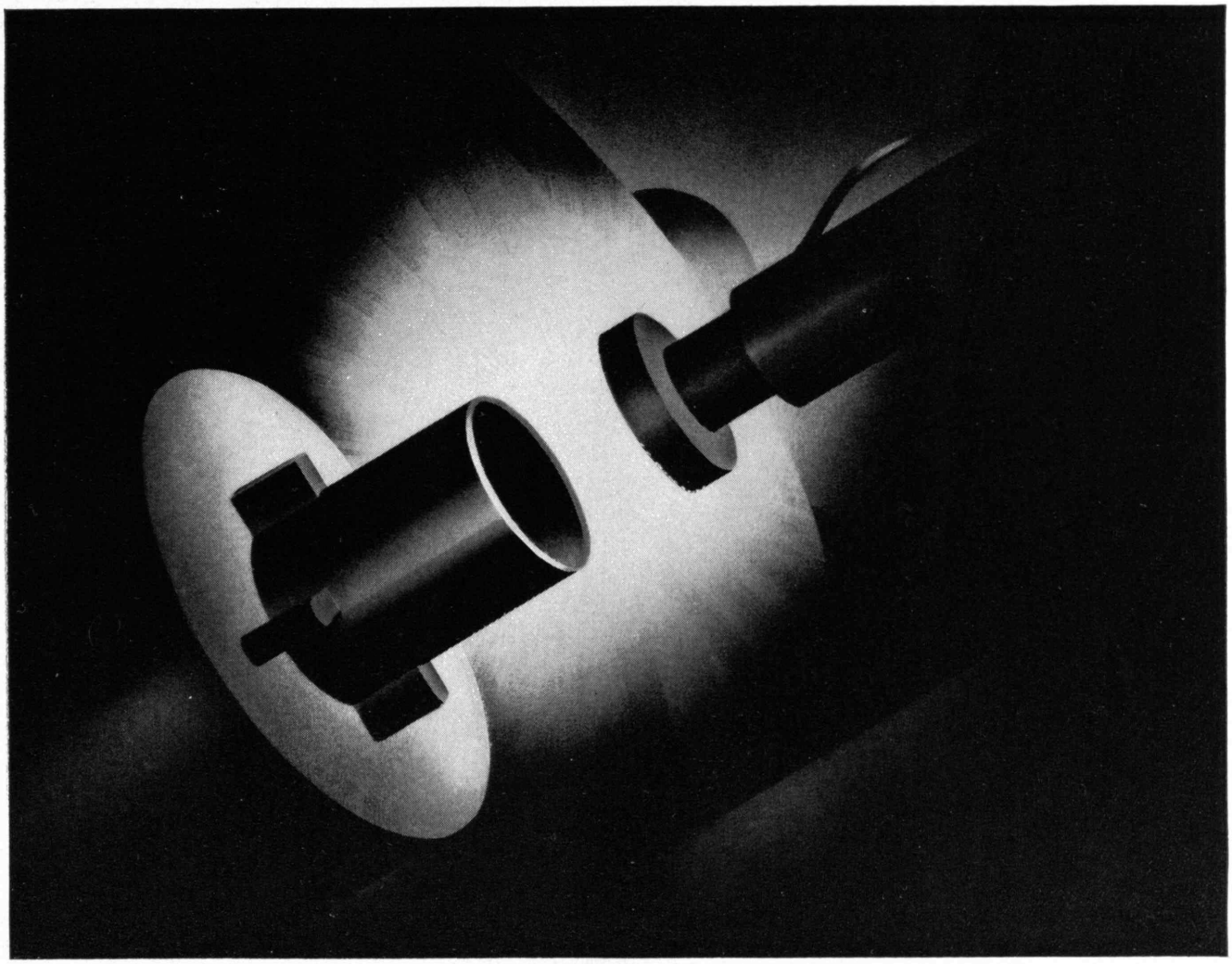
$$\text{Area} = \tfrac{1}{2}x^2 (2\pi - w) - a^2 (\theta - \sin \theta),$$

where $\theta = \pi - w$ and $x = 2a \sin \dfrac{\theta}{2} = 2a \cos \dfrac{w}{2}$.

$$\therefore \text{ area } = (\pi - \frac{w}{2})4a^2 \cos^2 \frac{w}{2} - a^2(\pi - w - \sin w)$$

$$= a^2 \left[4(\pi - \frac{w}{2}) \frac{1 + \cos w}{2} - \pi + w + \sin w\right]$$

$$= a^2 [(2\pi - w) \cos w + \sin w + \pi].$$



A LITTLE DOES A LOT

Experience in many foundries is proving that good gray iron plus a little Molybdenum will do many an exacting job — and do it economically.

Liners on the steam valve chest of a high pressure pump — a difficult application at best — are a case in point. The manufacturer makes them of good quality gray iron to which is added 1.00% Molybdenum. They are oil quenched and drawn to a hardness of 40-45 Rockwell "C".

He thus meets the difficult requirements for wear resistance at operating temperatures and general reliability, and does it with better than average economy.

You will find our book, "Molybdenum in Cast Iron", helpful. It contains complete data on the various Molybdenum irons used in modern foundry practice and is sent free on request to technical students and all others interested in learning more about modern materials for modern needs.

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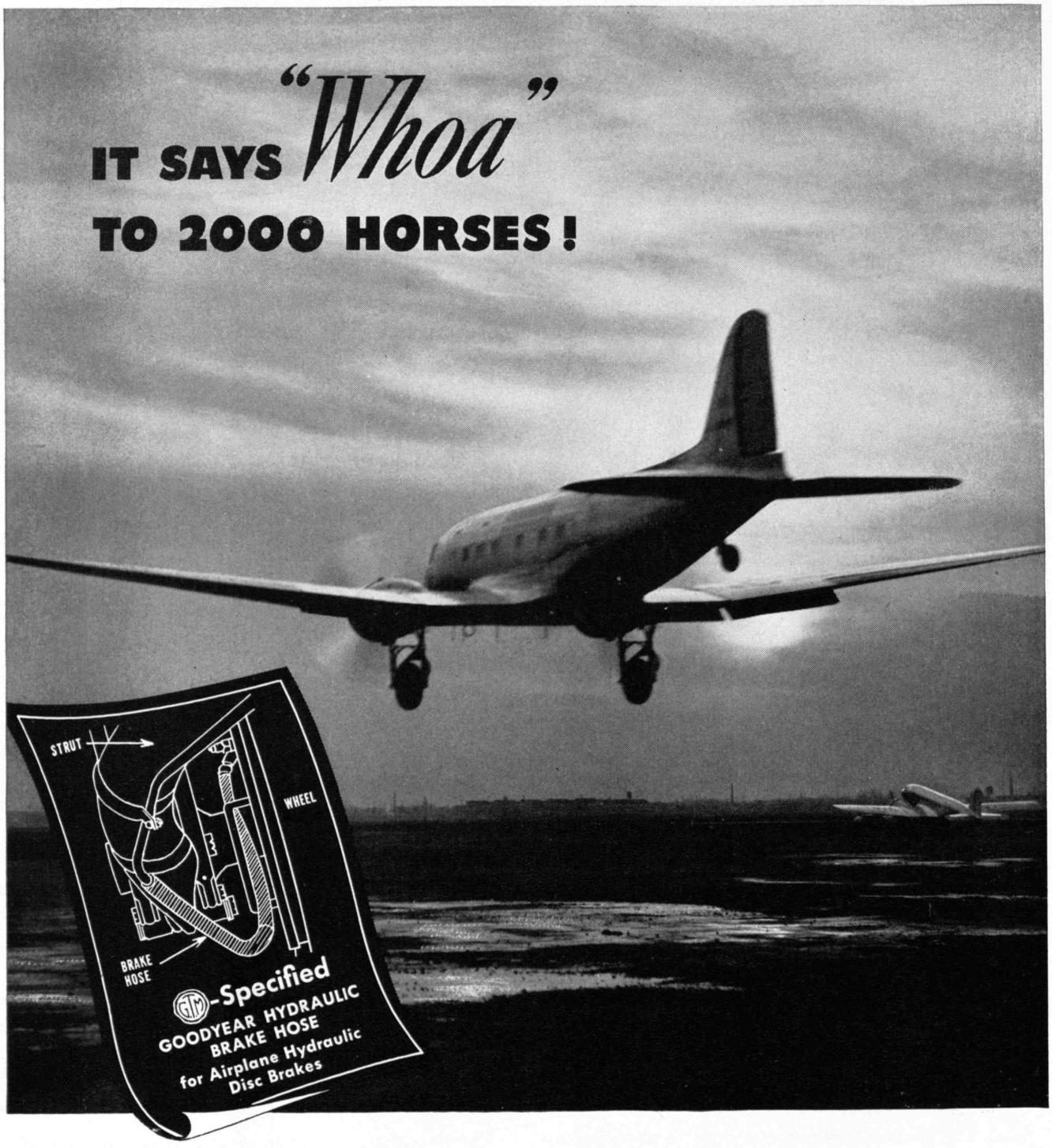
MOLY



WE think it means something that so many great multi-engined airliners are equipped with Hydraulic Brake Hose designed by the G.T.M.—Goodyear Technical Man. This flexible rubber tubing transmits to wheels the tremendous braking pressure that brings today's fast ships to such quick and gentle stops—and no hose takes more abuse. It is whipped by propeller blasts, bombarded by flying gravel and subject to extreme vibration and flexing. A single pin-point leak would cause a loss in braking power that might easily lead to a serious accident. But Goodyear builds this hose to withstand *five* times greater pressure than the maximum required in braking—a 5 to 1 safety ratio that insures many thousands of safe, sure-stop landings.

Greater safety explains why Goodyear brake hose is used in many leading motorcars, too. You will find this same high quality and built-for-the-job dependability in all rubber products specified by the G.T.M. To consult him on your problem, write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER
GOODYEAR

Robert K. Phelan, '30

Sampans along the sea wall at Singapore

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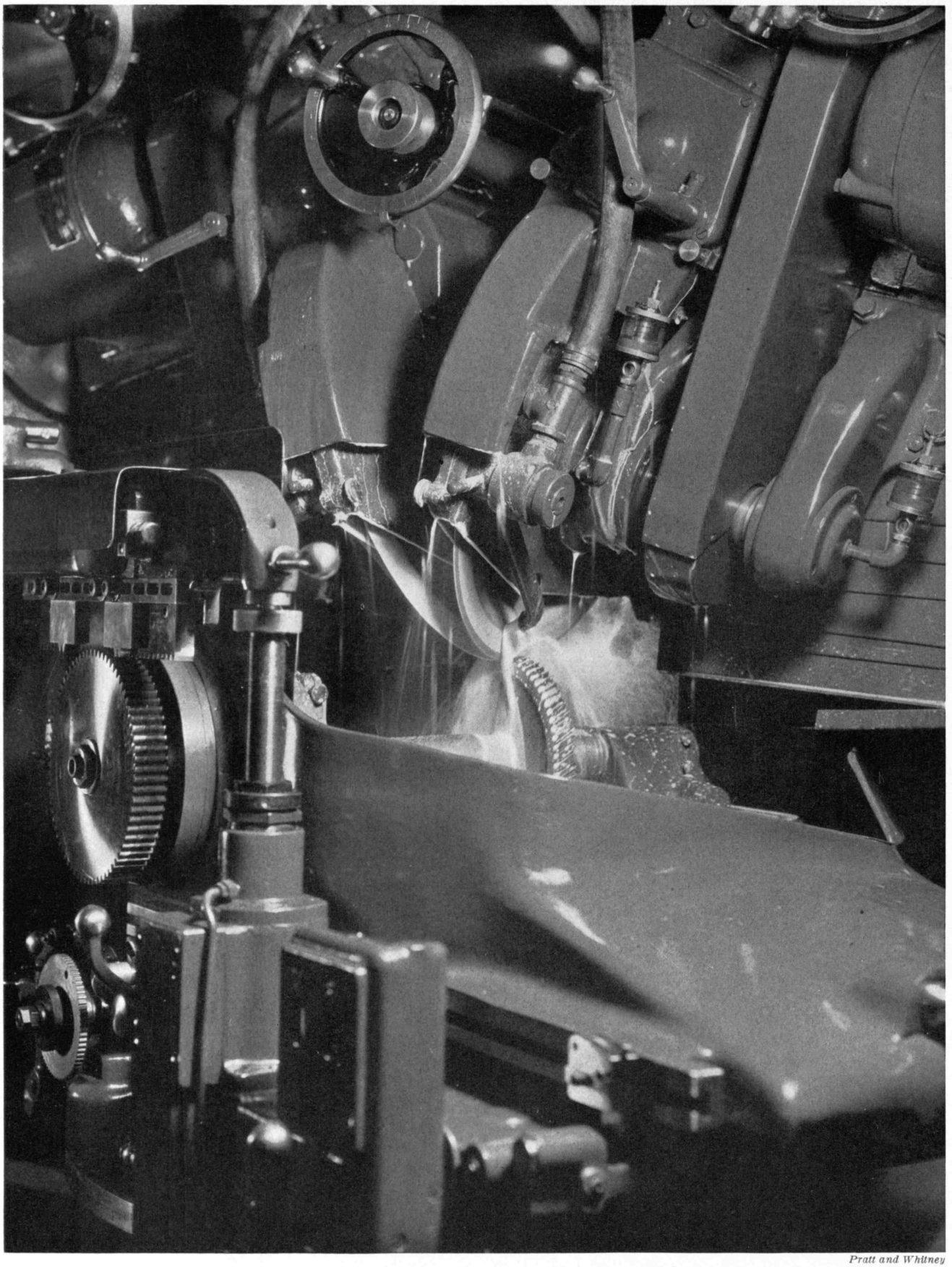

Pratt and Whitney

Precision in production—a gear grinder at work

THE
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The Trend of Affairs

Consols of the East

THE trade winds of war are blowing in the South Seas and the schooners and island steamers are on the move, for copra is booming again. This South Pacific staple harvest — the dried meat of the coconut, from which oil is extracted — was in great demand in the first World War, and now the cry for copra is rising after a period of several years during which production declined. On all the islands of the South Seas the copra knives are busy again. Thousands of natives squat under palms, slicing the nuts with machetes, stripping the white flesh from the brown husks to be dried by the tropical sun.

Every South Sea island, from Tahiti to the Solomons, has its coconut palms, and often the first indication that a ship is approaching land is the sight of floating coconuts. The coconut grew in the Pacific before man settled the islands, for the seeds were blown across the ocean from the East Indies long before the Polynesian migration brought inhabitants.

The coconut palm starts to bear when it is five or six years old and thereafter produces steadily for many years. Although sun-drying is the principal method for treating the copra in the Far East, artificial dehydration of the meat has been applied to a limited degree in recent years. This latter method, while the more expensive, is the better, for sun-drying is uncertain and the action of intense sunlight may decompose or destroy large quantities of the oil.

In the early years of the copra trade, native workers lacked the skill and equipment for extraction of oil, the coconut meat being generally marketed in the form of copra, which, when dried, is a hard, brownish substance. In recent years, however, oil-extraction plants have been built in the coconut regions. The method for the production of the oil requires that the copra be shredded and heated by steam to soften the tissue and liquefy the oil for extraction under pressure. After removal of the oil, the highly protein copra is converted into meal for cattle feed.

While coconut oil finds its largest use in soaps, shaving creams, and cosmetics, it is now widely employed in foods in the form of solid and liquid shortenings. The effects of war on the production of animal fats will no doubt greatly increase the use of this valuable vegetable oil for food, particularly as an ingredient of substitutes for butter.

The Philippine Islands, where there are at least eight large oil-extraction plants, produce most of the coconut oil used for food purposes, but the Netherlands, France, Ceylon, British Malaya, the Dutch East Indies, and Germany have exported the product. The United States is the leading importer, and tank ships which carry petroleum from the west coast of the United States to the Far East often return with cargoes of coconut oil, the total importation of which was nearly three million pounds in 1927. During the last war, when copra was in tremendous demand, prices reached the sum of $100 a ton. The demand continued until the world trade slump period of 1932, when prices for the material fell as low as $35 a ton.

Coconuts are literally meat and drink for many natives of the South Seas, and on some of the smaller islands which have no drinkable water the milk from young nuts is the only liquid for quenching thirst. The meat of the coconut finds its way into many native dishes, and excellent timber is made from the trunks of the coconut palm. The leaves of the tree provide thatch for the houses, matting for the floors, and costumes for the inhabitants. The tough fiber from the husks is used by the South Sea island natives to lash the roof beams of their houses and, writes Stanley Brogden in the *Christian Science Monitor:* ". . . The material is so

tough that the native houses will remain standing after a storm which has demolished most European-built houses." From the dried coconut meat, natives make an oil with which they anoint themselves after bathing. The oil is a salve which protects the skin from the sun and, scented with crushed flowers, is often presented in little pots as a gift.

For Burners of the Weed

LILAC, mountain laurel, mesquite from Texas, and the stout yew wood of England are by way of finding special place in the affections of man. They are prominent among the woods being considered as raw material in the manufacture of the bowls of tobacco pipes, for war has sadly decimated exports of traditional brierroot from France, Italy, and Algeria. Hope that Spain might become a source of good supply has not been realized, reports *Domestic Commerce*, since the quantity produced there is not large and the bulk of the exports must be paid for in foreign exchange at an artificially high rate.

For the past eighty years, the root wood of the white heath — in French, *bruyère*; hence the English "brier" — has made the bowls of many of the best pipes in the world. The wood is fine, is easily worked, and does not char readily. Commercial quantities of it are found in Spain, France, Italy, Corsica, Sardinia, Sicily, Greece, Asia Minor, and along the northern coast of Africa. These sources have been drawn upon since the discovery by a French firm in 1860 that the wood is well adapted to the demands of devotees of tobacco. For the root of the brier to grow to proper size for pipe blocks requires from twenty to sixty years. Skilled workers are needed to dig the roots, since judgment by age and size of the stems is the only way of determining whether the root is large enough to be worked. Extraction of the roots begins with the first rains of fall and ends in spring or early summer. Kept damp to prevent their being split by drying before they reach the factory, the roots are there sawed into blocks, which are boiled in water some ten or twelve hours as further insurance against splitting. Graded and sacked, the blocks next go to the pipe manufacturers.

Italy, chief supplier of brierroots to the United States since 1932, exported 12,000,000 blocks to this country in the first half of 1940 but only 302,000 in the four months following. Shipments from France and Algeria likewise fell off sharply. The Spanish possibilities are not very great, and recent price quotations on Spanish blocks are more than twice as high as normally. These are reasons which have set American foresters to speculating on the utility of native woods, such as the wild lilac of Oregon and California, which has large and frequent burls; and to considering a return to the mountain laurel, from whose roots the pioneers whittled pipe bowls in early American days. A fine-grained hardwood, native to the southern mountains of the eastern United States, the mountain laurel is a member of the heath family. It carves easily, withstands splitting, is slow to char, and darkens with age — in all these respects offering qualities like those which have made the brier famous — but it is not to be had in large sizes or great quantity. The Texas mesquite, however, is generously available, the area in which it grows being said to have more than doubled since Texas entered the Union. The