December 1934

TECHNOLOGY REVIEW

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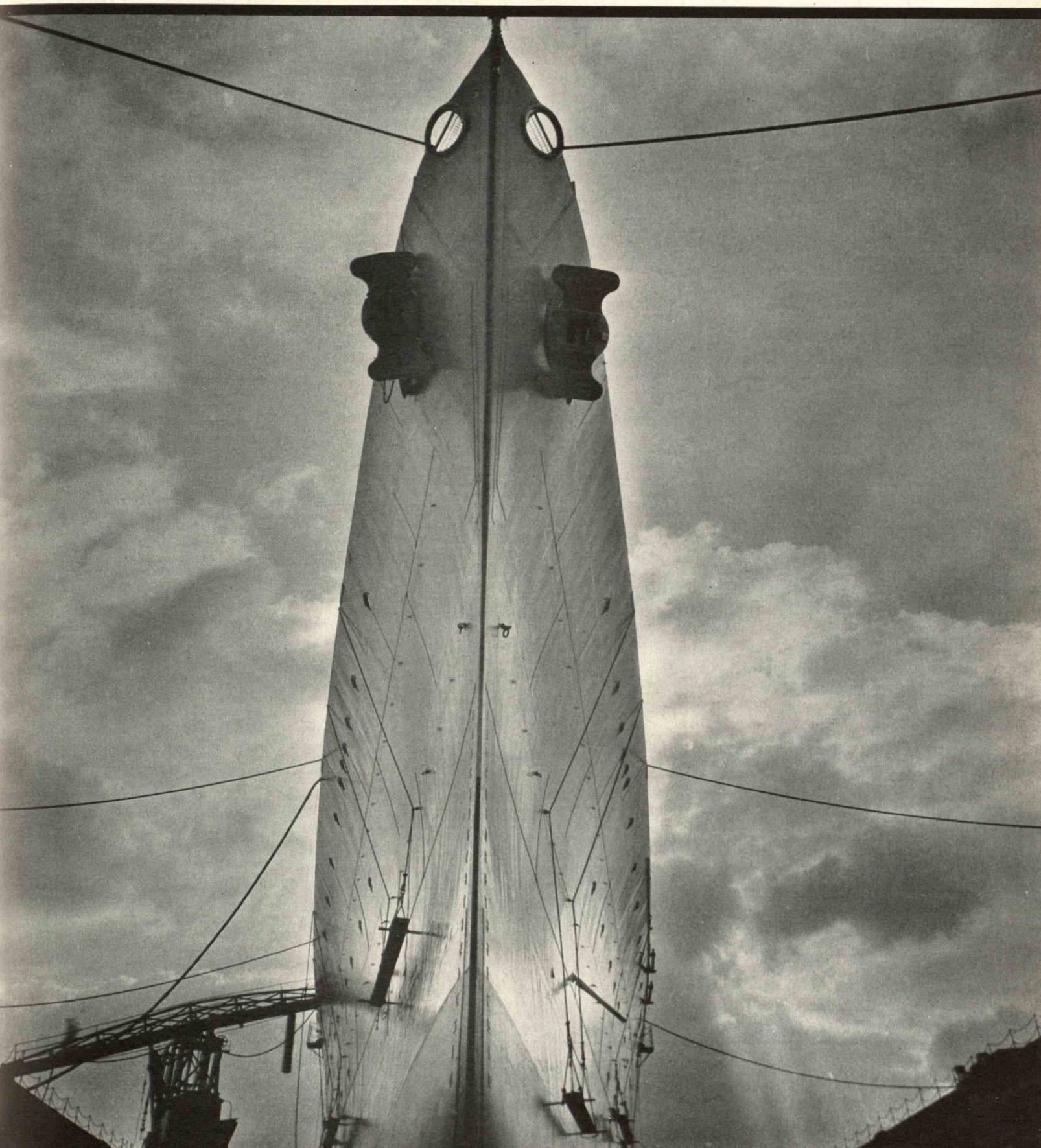


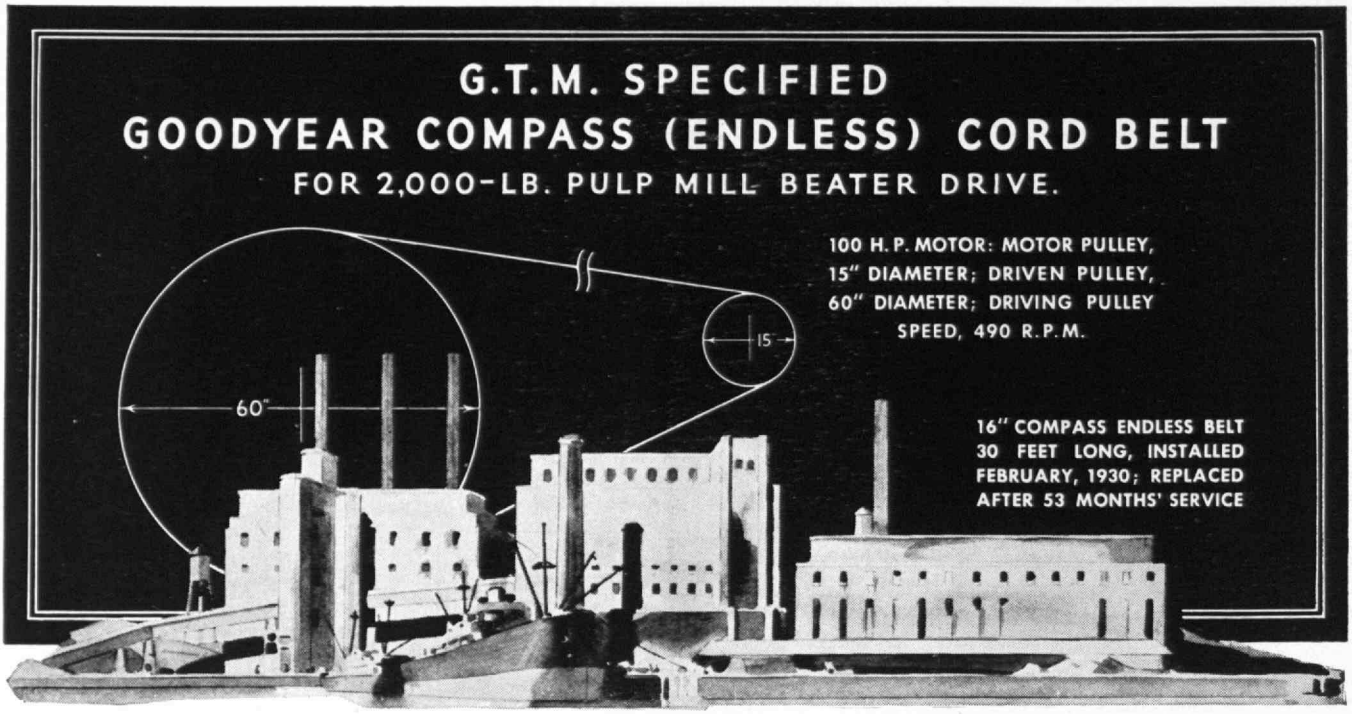
THE TECHNOLOGY REVIEW, December, 1934. Vol. XXXVII, No. 3. Published monthly from October to May inclusive and in July at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and Foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

THE TABULAR VIEW

IN presenting his excursion into the by-ways of patent practice in this country, JOHN E. BURCHARD, 2nd, '23, does not offer the study as a definitive piece of statistical research. It represents valid and probably indicative conclusions based on a small amount of recent data and its principal importance is a suggestion for a more extensive, comparative research that might be made by some sociologically minded statistician. As an executive of Bemis Industries, Inc., Mr. Burchard has been in charge of its Patent Department. He has worked on committees of the International Association for the Protection of Industrial Property, American Group, and served at the meetings of the International Chamber of Commerce, Amsterdam, 1929, Washington, 1931, as a member of the American Delegation. This work had to do principally with revision of the International Convention which was to serve ultimately as a basis for further treaties. ¶ HUNTER ROUSE, '29, is a member of the staff of the Civil Engineering Department of Columbia University. Among other articles by him published in The Review have been: "Amerikanismus," December, 1930; "Engineers as City Planners," February, 1932; "Night Watch at Obernach," December, 1932.

THE Review is indebted to Professor GEORGE R. HARRISON for the description of the spectral analyzing machines presented on page 101, and to DANIEL C. SAYRE, '23, of the staff of *Aviation*, for aid in preparing the article on new developments in American aviation published on page 85. ¶ For permission to reproduce the photograph on the cover of this issue The Review is grateful to *Fortune* and to the photographer, RUSSELL AIKINS who made it for that magazine. ¶ I. N. Zavarine, '20, is Assistant Professor in the Department of Mining and Metallurgy. His beautiful pictures were made with the Edgerton system of high-speed photography.

DO Review readers approve the absence in these pages of wine, beer, and spirit advertising? We solicit comment in the hope that reader reaction may assist us in formulating future policy. Our present policy of exclusion is dictated by these considerations: The Review, as a professional and institutional journal, seeks to maintain unimpeachable standards in both its editorial and advertising columns. It reaches not only a large audience of adults, but a substantial number of pre-college and college students, and it professes an obligation to this younger group. And finally, it carries a variety of advertising — particularly its high-grade technical accounts — which does not, at least it seems to us, mix well with liquor advertising. There is nothing of the blue-stocking attitude in our refusal to open our pages to repeal advertising; we think it is perfectly proper in most magazines. But we still feel, for the reasons enumerated above, that we have been and are on sound ground in rejecting the many hundreds of dollars of liquor advertising offered us.



TEN TIMES LONGER SERVICE

for just 1/5 of the cost

ON a 2,000-lb. beater drive in a certain pulp mill*, a Goodyear COMPASS (Endless) Cord Belt, specified by the G. T. M. — Goodyear Technical Man — was installed in February, 1930.

On that same beater drive, the previous belt delivered three months' service, then had to be reconditioned, and was discarded at the end of five months.

The Goodyear COMPASS Belt was not replaced until July, 1934 — *after 53 months of unfaltering, trouble-free performance.* Its cost was only one-fifth that of the other belt — *yet it delivered more than ten times the service!*

As one result of its record, all nine beater drives in this mill now are equipped with Goodyear COMPASS Belts.

That is the kind of performance you get from Goodyear Belts and other Goodyear Mechanical Rubber Goods specified to your needs by the G.T.M. They come *built for the job,* and they make good on the job far more efficiently, at much lower ultimate cost.

Why not have your plant officials talk cost-reducing equipment with the G.T.M.? Just write to Goodyear, Akron, Ohio, or Los Angeles, Calif., or call your nearest Goodyear Mechanical Rubber Goods Distributor.

*Name on request by responsible parties

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Made by the Makers of GOODYEAR TIRES

THE GREATEST NAME IN RUBBER

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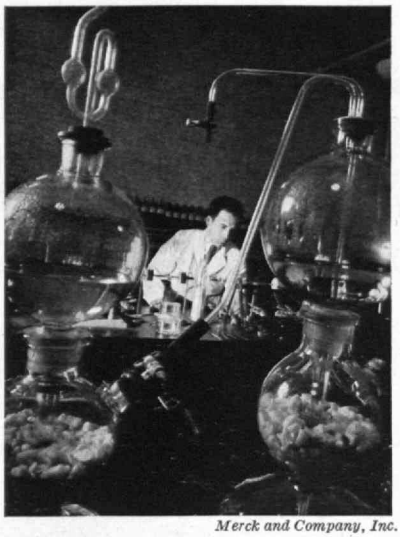
GOODYEAR



Merck and Company, Inc.

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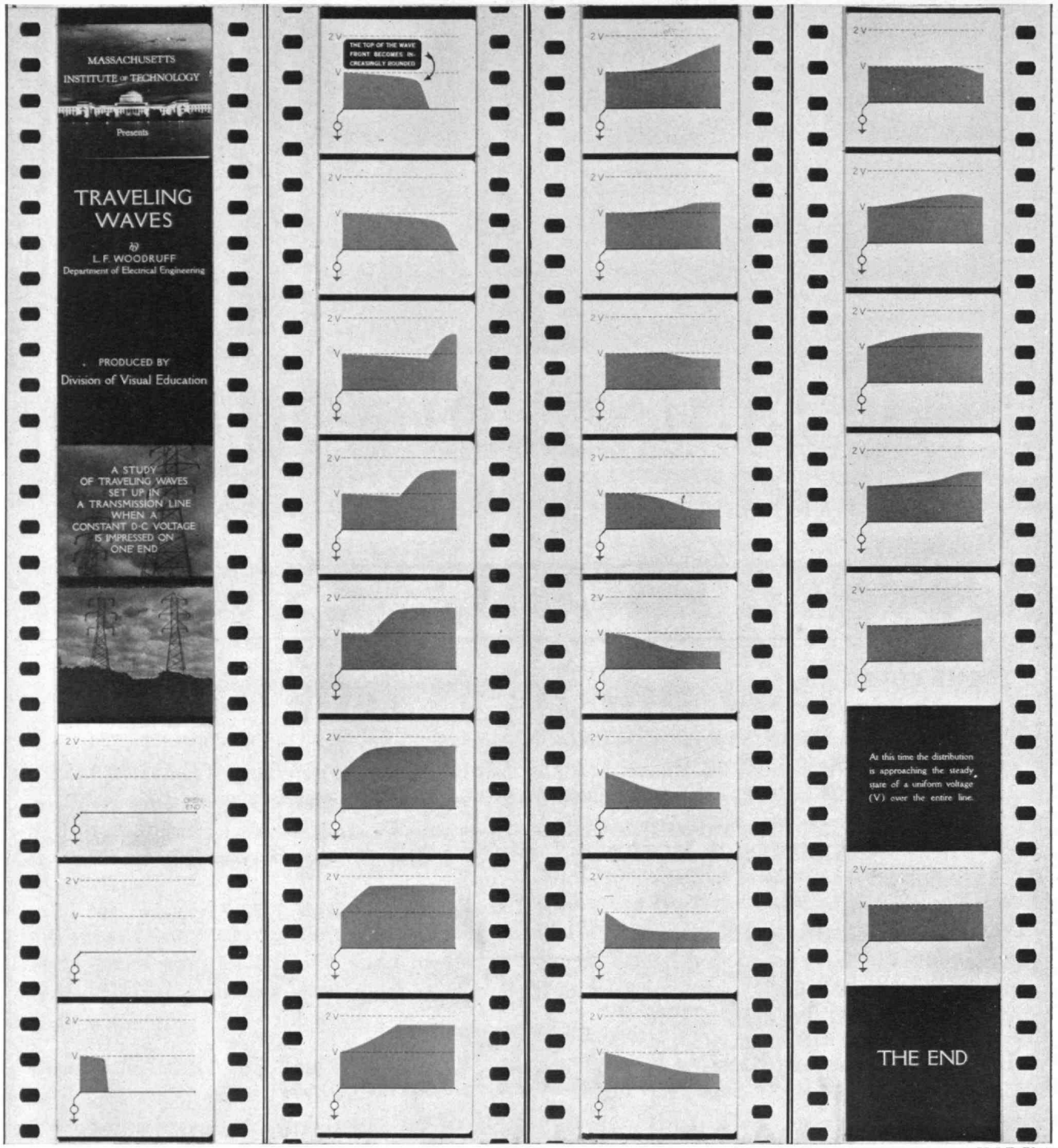

M.I.T. Photo

Inaugurating a New Program in Visual Education

Above are shown excerps from the first of a series of motion pictures produced at M.I.T. for instructional purposes. By utilizing the resources of animation technique, these pictures present material difficult to convey in any other way and afford the educator a new and more lucid method of exposition.

The initial film, *Traveling Waves*, shows for the first time the voltage variations which occur when a constant D-C voltage is impressed on one end of a transmission line. The mathematical analysis of the complete effect is so complicated that it has never been worked out, even for the simplest actual conditions. The form and progress of the electrical impulses have, however, been reconstructed by Professor L. F. Woodruff, '18, of the Department of Electrical Engineering, accurately and for the first time, from precise continuous records made at short intervals along the line which was carrying the impulse. The records were made by a device called a multi-element cathode-ray oscillograph. Many hundreds of these reconstructed forms were carefully prepared and photographed to make possible the throwing on the screen of the actual progress of voltage down a line. The speed of the actual wave, incidentally, is the same as that of light — 186,300 miles per second — but on a 20-foot screen it is slowed down to about one six hundred millionth of this speed.

This new program in visual education was suggested by Treasurer H. S. Ford and is being carried out under the direction of Frank H. Conant of the Institute's Photographic Service. While produced for use in the Institute's own class rooms, these films, covering a variety of scientific and engineering subjects, will ultimately be available to other institutions.

THE
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Vol. 37, No. 3 December, 1934

The Trend of Affairs

Air Transport Comes of Age

ONE thing above all else is certain about this remarkably unsure year: 1934 is going to be printed in bold face in any future histories of American air transportation. For three separate and excellent reasons will it be so respected: it has been marked as a turning point in governmental regulatory policy; it has seen our domestic airlines increase their average cruising speeds from 120 to 200 miles per hour; and it has brought a new importance to American designers and operators in the rapidly developing field of world-wide air transportation.

The story of governmental gyrations is still being written, either in the spotlight of publicity, prearranged or ill-concealed, or behind the scenes in off-the-record powwows. The details of our new high-speed domestic services are as widespread as the 90,000 persons who each month travel in the United States by air can scatter them. The rise of American aeronautical importance abroad, with which we are here chiefly concerned, has caused, on the other hand, comparatively little comment, and yet it is the most significant of the year's developments.

RECENT and imminent world air-route progress is something to jolt the imagination of even the most land bound. Before the middle of this month, it will be possible to mail letters or parcels from any large city in Australia and have them travel with the sun the entire distance by scheduled air routes to any large city in the United States. And, on most of the journey, the addressor may choose between two or three different lines. True, it would cost a good deal for postage, and the missive would travel several times the great circle distance between the mailing point and destination. But what a trip: Darwin to Singapore, Delhi, Bagdad, Cairo, and Marseilles; then southward across the Mediterranean and Africa to Dakar in Senegal or Bathurst in British Gambia, on over the South Atlantic to Natal in Brazil; northward via Port-of-Spain to Miami. Even at that, depending on the luck of weather and inter-line connections, it might be the quickest mail route between the terminals. Certainly in another 12-month it will be, and by the same token one may by then be able to return an acknowledgment by way of New York, Lisbon, Berlin, Moscow, Irkutsk, Vladivostok, Shanghai, Singapore, Darwin. Or a little later, via Seattle, Fairbanks, Tokio, Shanghai, Darwin.

BUT enough of this speculation so seductive to philatelists specializing in air post stamps and "covers." Right now there are three highly efficient airlines running

BAEDEKER

For this Section

between Western Europe and Southern Asia: Imperial Airways, *Air France*, and the *Koninklijke Luchtvaart Maatschappij* which considerately stamps its tickets "Royal Dutch Air Lines" and does not resent being called the K.L.M. Their eastern terminals are at the moment Singapore, Saigon, and Batavia, respectively. These three, significantly, have been for a considerable period maintaining scheduled flying services up and down what John Bakeless was pleased to call, in his "Origins of the Next War," the "outline of the British Empire's backbone," to trace which one should draw a line ". . . over the Mediterranean, past the Island of Malta, by the sun-baked banks of the Suez Canal, along the torrid length of the Red Sea, out into the Gulf of Aden, through the Indian Ocean to Bombay and Calcutta, and . . . a few more hundred miles across the Bay of Bengal and through the Malacca Straits to Singapore. . . ."

Stock Douglas air liner, of the type flown daily in regular transport across the U. S., which placed second in the London-Australia race. Its performance together with that of the Boeing transport, which placed third, was a triumph for American transport designers. See annexed text

All three — British, French, and Dutch — plan early extensions southeast, east, or north. Imperial, of course, with the help of Quantas Empire Airways, shifts from Singapore beginning December 10, at which time the Duke of Gloucester is due to post Christmas greetings from Brisbane to his royal parents, thus opening regular air-mail service within less than 60 days over the trail blazed in the London-Australia race of last October. Imperial also has an existing, and sizable, feeder for its main line in a trunk route running south from Cairo to Cape Town.

To the north there is the German-Russian line between Berlin and Moscow which has now been extended by the Soviets across Siberia to Vladivostok. To the southwest, French and German services to South America are definitely emerging from the stages of final experimentation and should be on a permanent all-air basis by spring. Finally, there are over 33,401 miles of air routes now being operated in 33 countries by the Pan American Airways system.

The suddenly increased American tinge to the world's air picture is due to the development of our new domestic high-speed equipment coupled with the 59¢ dollar; the launching of the giant Sikorsky *S-42* flying boat, or *Brazilian Clipper* (the maiden voyage of which was noted in The Review last October), and the other activities of Pan American in China, Alaska, and toward Europe across the North Atlantic; to the trans-Pacific flight of Sir Charles Kingsford-Smith's *Lady Southern Cross*, an American-built Lockheed Altair monoplane with a Pratt and Whitney engine (his *Southern Cross* of 1928 was a Fokker powered by three Wright Whirlwind motors); and to the success of American planes in the London-Australia race. This event, won gallantly by one of the three British-piloted and British-built De Haviland Comets, especially designed for the race, was no minor triumph for American aeronautical skill in that second and third places were captured by two stock airplanes of the types being flown daily in regular transport across the United States by TWA and United Air Lines: a Douglas, powered by Wright Cyclones; and a Boeing, powered by Pratt and Whitney's Wasps, respectively. The Douglas, a Dutch entry, flown by two K.L.M. pilots, might have done even better if it had carried more fuel instead of several passengers, their food and baggage, and 30,000 letters.

THERE is every good reason why the domestic American airlines should have pointed the way toward the new higher speeds. They were forced to compete with a highly developed system of ground transportation which was entirely free from the inconveniences imposed by the English Channel and other geographical, as well as political, barriers with which European travel is afflicted. A speed of 120 miles an hour simply did not furnish enough of a speed advantage over our best train schedules to offset the higher costs, the time losses at the terminals, and the uncertainties of weather which penalize air travelers.

There is no theoretical reason, however, for the adoption of the new speeds elsewhere, even in Europe. On the long, intercontinental routes, there is no need even to fly at night when competition with surface transportation alone is considered. Unfortunately for the peace of mind of English and Continental designers, a sharply-roweled spur is supplied by rivalry between airlines of the different countries.

Besides the three paralleling lines to Asia, there are few European capitals not served by from two to four airlines operating under different flags. As long as all flew at 120 miles an hour, or a little slower, European air transport failed to worry about speed, but somebody—

it appears to have been a Swiss, for Lockheed Orions are used on their services to the Balkans — imported a few of the fast American ships and the war was on. The deflated dollar made things that much the merrier.

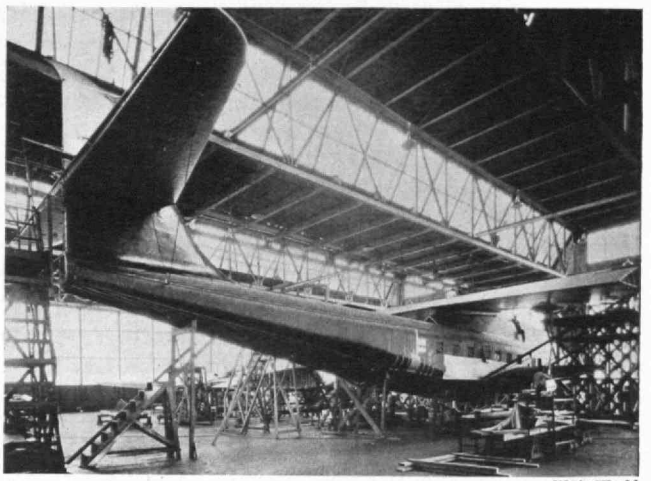
The Swedes purchased a couple of Northrups; the Germans use several Boeing Transports; the Belgian S.A.B.E.N.A. ordered two Douglas ships last September; and the Dutch ordered ten Douglases after the London-Australia race. For the Dutch also, Anthony Fokker has recently delivered a 16-passenger sleeper-plane powered by four 700-horse power Wright Cyclone engines. These are but a few of the more striking examples. With the increasing shipments of planes and engines go instruments, adjustable pitch propellers, and other subsidiary gear — a nice flow of export goods, but an even more substantial flow of American ideas of aircraft design and operation. It is indeed a phenomenon to have all this happening in a year featured in Washington by so much spectacular testimony about the superiority of European aircraft.

THE launching of the giant Sikorsky and its test flights in which it broke ten world records was as important in the field of flying-boat design as the higher speeds have been for land-planes, with the special significance that here at last is an aircraft which seems really to measure up to the requirements for scheduled service across the North Atlantic.

Pan American's preparations for the future are not limited to the development of aircraft. For years they have been studying routes to Europe and Asia, collecting meteorological data, training crews, developing instruments and special radio equipment. They have operated in Alaska through two arctic winters to gain experience which their South American routes did not provide. They have acquired operating control on the most important of the Chinese airways, over 3,000 miles of routes. Given an extension of their mail contracts, they are ready technically to begin operation of the Bermuda-Azores route to Europe upon the delivery of the two Sikorsky boats still abuilding and the three Martin boats which are to be even bigger than the *S-42s*. Within two years they could put a first-class airline into Asia via Alaska and their giant boats wouldn't be so bad on the Asiatic run via Hawaii either.

Lincoln

A suggestion for combining utility and aesthetics in the amateur garden: Pear trees as grown en espalier *in Normandy*



Wide World

Fifty-passenger air liner, America's largest, now being completed in the Martin plant in Baltimore. Designed to fly at a three-mile-a-minute clip, it will enter Pan American service this month

But this discussion begins again to verge on prophecy, and it is still 1934. The ultimate need for the slogan — "Mail, Passengers, and Express Delivered Anywhere Within the Week, or Money Cheerfully Refunded" — to be suitably translated into Esperanto or Basic English, is, however, measurably more pressing than it was in December of 1933.

New Fabrics

WE WERE shown the other day some novel fabrics that will bear watching. One was woven of copper wire and conventional textile fibers, another was crease-proof, and the third was water-repellent.

In the first, copper is inter-spun with silk, cotton, wool, or rayon. This wire-fiber yarn increases the strength of the material in which it is used, prevents shrinkage and stretching, and acts as a conductor for a warming electrical current. The wire, lacquered and insulated, may be woven or knitted, and in the finished material it offers no obstacle to sewing machines, nor does it kink or snarl. No special machinery is necessary for weaving or knitting, and it may be used interchangeably with threads or yarns composed entirely of fibers.

Carpets made of the wire-reinforced yarns are strong and attractive. A flexible cable attached to one corner makes it possible to plug in to any household electrical circuit. Heated over its entire surface to a temperature of 116°, such a carpet quickly warms a room of considerable size.

One of the most interesting applications for this new wire-and-fiber yarn would be its use in airplane wing fabric. It could be heated to prevent formation of ice on wings, and it would be stronger than present airplane cloth.

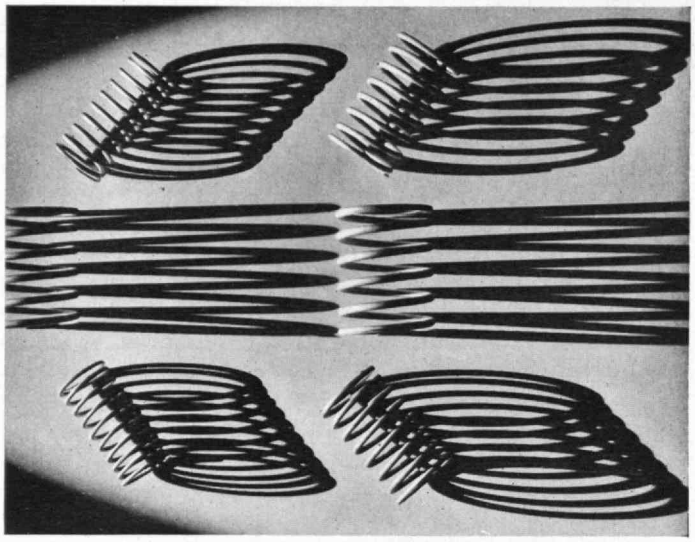
Other forms in which the new material may appear include upholstery fabrics, curtain cloths, wall coverings, clothing (which might be plugged into automobile electrical circuits), surgical bandages and garments, socks and mittens, blankets, corduroy, poplin, rep, broadcloth, webbings, felts, fire hose, parachute cloth and harness webbing, rope, asbestos cloth, screening and tobacco cloths, acoustical fabrics, automobile robes,

canvas and duck, agricultural cloths, umbrella coverings, and many others. The term "hot pants" may yet become respectable.

Although specially processed copper wire is now employed in these new textiles, wire of other metals, after processing, may also be used.

The process for making fabrics crease-proof was developed in England and is now being applied in this country under license. It is a finishing operation during which a resin is formed in the textile. The process is not applicable to the heavier cloths yet, so wrinkled and baggy trousers will continue to be a pressing problem for the meticulous, but it is useful for cotton and rayon fabrics such as are used for shirts or women's garments.

Various fabrics, including hosiery, dress material, heavy suiting textiles, and others, may now be rendered water-repellent by the application of a colloidal wax. The process is applied in the form of a cold water solution and lasts between washings or cleanings. It may be applied in home laundries or in the various commercial laundry operations without effect upon the fabrics.



Helical springs —

Notes and Observations

OF ALL the professional men whose handiwork might be assumed to lend itself to fair critical comment," recently noted Stanley Walker,* City Editor of the New York *Herald-Tribune*, "the architects, in New York at least, are the least able to stand adverse comment. A musician can shrug off a blistering comment on his recital; a sculptor may say, 'Sorry he didn't like it, but what the hell?' but let a critic print his opinion that a certain building is a monstrosity, and the architect will get his lawyer and go into battle with all the legal weapons from Blackstone to Max D. Steuer. The courts, also, have been surprisingly generous to the offended architects. This situation, it is probable, will not last forever. The architects should learn to stand up under criticism without whining; if they don't, the law some day will be changed to cover their status."

For years The Review, along with other journals friendly to the architectural profession, has considered "reviewing" important new buildings, but it has hesitated because of the tender susceptibilities and curious jurisprudence which Mr. Walker describes. It believes that the barriers to sound and fair architectural criticism should be lowered and that if they were, the competent architect would be the chief beneficiary.

* In "City Editor." New York: Frederick A. Stokes Co. 1934.

Carl Zeiss

THIS IS BRONZE

The beautiful structure of arsenical bronze as revealed by the microscope

TRADITION has it that those who sleep in the moonlight grow weak in the head; they become "looney" or lunatic (from the Latin, *luna*, meaning moon), moonstruck, and mad. Like those "who smoke fusees," they

> "Grow weak by slow degrees,
> Brainless as chimpanzees,
> Meager as lizards,
> Plunge, after shocking lives,
> Daggers and carving knives,
> Into their gizzards."

The alleged results perhaps are not unlike those of looking too long and too persistently on the moonshine. In the case of real moon madness, the results are supposed to be caused by nothing more than the innocent light of the moon. That light, however, is not like ordinary light. It is sunlight reflected from the moon's surface and is largely polarized light — as may be shown by a simple experiment. If, on a