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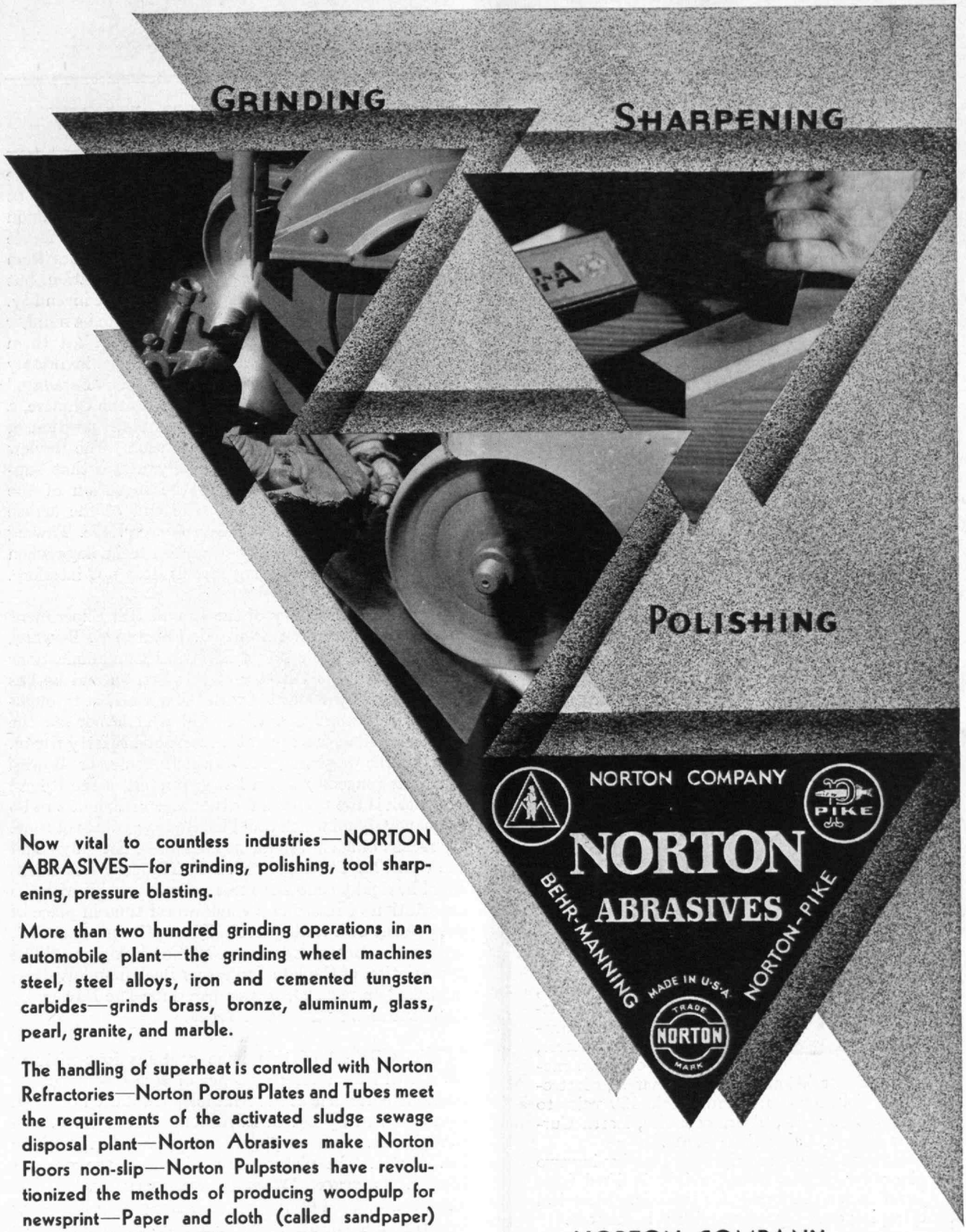

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THE TABULAR VIEW

AS DEAN of the School of Science and Head of the Department of Biology and Public Health at M.I.T., Professor S. C. PRESCOTT, '94, draws upon years of experience in pointing the way to a more fertile research procedure. ¶L. L. THWING, '03, rescues from near oblivion a man endowed, not with education, but with a remarkable amount of genuine Yankee ingenuity. After receiving Mr. Thwing's ms., we accosted a number of electrical engineers and peremptorily asked them who invented the electric motor, and almost invariably they either were stumped or replied "Faraday." (Strangely enough, no one credited it to the Chinese, a race that is rapidly achieving the dubious position of being blamed for nearly every invention.) The Review presents Mr. Thwing's article fully aware that supporters for other claimants to the invention of the motor will doubtless appear. The end of the article discusses certain of these other pioneers. Mr. Thwing collects data on the history of applied technology when his other hobby of building models does not interfere.

AT LAST the history of the Round Hill Experiment Station has been prepared. EDWARD L. BOWLES, '22, Associate Professor of Electrical Communications at Technology, is Director of this Station and he has been intimately associated with the work there throughout its existence. Colonel Green, who has made the station possible, is a son of the late, famed Hetty Green. One of the beguiling ideas which Professor Bowles mentions (page 20) which has grown out of the Round Hill work is the proposal for the transmission of a radio frequency signal which could be used as a source of time. By means of such a frequency standard not only could the world have a single reference frequency but clocks could be rigidly coupled to this radio time shaft with the expectation of realizing a single world time in place of the present awkward system. ¶JOHN C. SHERMAN, '95, is with the Brown Company, Portland, Maine. ¶The appreciation of the late Professors Phelan and Walker, published on page 24, was prepared for The Review by Assistant Dean THOMAS P. PITRÉ.

THE COVER of this issue contains four pictures drawn from a long sequence of high-speed shots of birds in flight made at the ornithological station on Cape Cod operated by Dr. O. L. AUSTIN of New York. The sandpipers shown on page 24 were also furnished by Dr. Austin. The pictures are, of course, the work of Messrs. EDGERTON, '27, and GERMESHAUSEN, '31. The Edgerton method of high-speed photography is rapidly being extended into new fields and is proving enormously helpful in the solution of technical problems. We record one notable instance on page 22 — its demonstration of a definite periodicity in the cavitation process. Readers will note in this issue a new department, "Mail Returns," which will include timely letters from our readers. We hasten to add, however, that it will be a general policy not to publish letters as long as the one which initiates the section.

IN THEIR 1934 WORLD'S FAIR BUILDINGS, CHRYSLER, FORD AND GENERAL MOTORS USED—

Albert Kahn, Detroit, Architect for General Motors and Ford Bldgs. W. P. Nelson Painting Co., Painting Contractors for Ford and Chrysler Bldgs.; for General Motors, W. Alt & Sons

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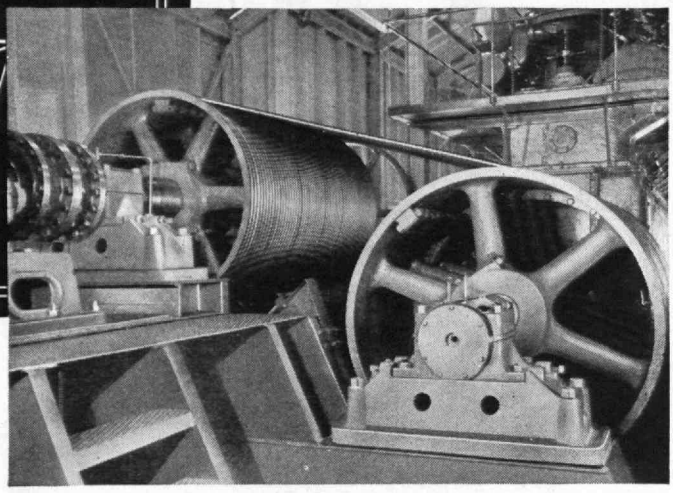
54 Goodyear Emerald Cord V Belts speed giant dredge pump



Matched construction insures close to 100% power-efficiency

THE practicability of using high-efficiency multiple V drives on heavy duty machinery is demonstrated by the 54-belt giant pictured here, said to be the largest in the world.

It is part of a 1000 H.P. Diesel-driven pump installation, recently made by the Worthington Pump and Machinery Corporation on a huge dredge operated by the McWilliams Dredging Company of Chicago.

Because efficiency, dependability and long life command a special premium in dredge service, the Worthington engineers took no chances. They specified 54 Goodyear Emerald Cord V Belts, 1½" wide, 420" long, as recommended by the G.T.M.—Goodyear Technical Man—for these reasons:

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The load is carried entirely by a core of high-tensile low-stretch cords, deeply embedded in high quality rubber that neutralizes the forces of tension and compression in flexing over pulleys — *insuring greater strength, long flexing life and high fatigue resistance.*

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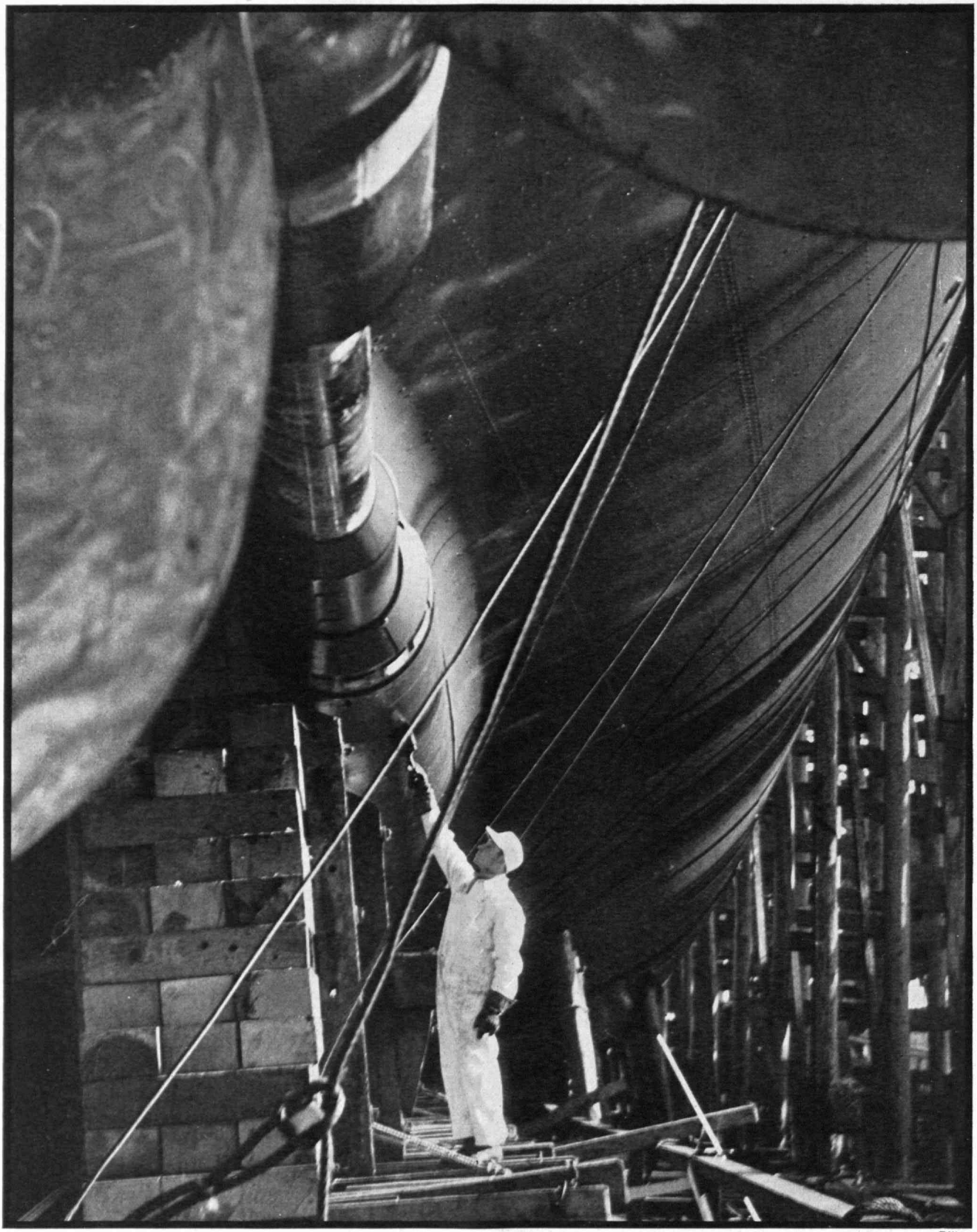

Rittase

Tonnage figures may indicate a low point in shipbuilding activity, but to the layman interesting things are happening in shipyards as the United States enlarges its navy and England and France speed construction on two monster craft. On September 26 as thousands cheered and bands played, Queen Mary aimed a bottle at the stem of the 1018-foot, 18-story high No. 534, *and safely in the water went the 30-million-dollar job. Her ventilators, says publicity matter, could (but, let us hope, won't) swallow a subway car. By 1936 she's due to enter the North Atlantic ferry on a four-day schedule, competing with the French* Normandie (*the comparably sized liner now fitting out at St. Nazaire for next summer's season*), *with the Italian* Rex *and* Conte di Savoia, *and with the German* Bremen *and* Europa.

THE
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The Trend of Affairs

Frontier Pushing

TECHNOLOGICAL frontier pushing, geographically and figuratively, has been progressing at a remarkable rate in 1934 despite world depression. The following inventory sheet of recent achievements, beginning with transportation, contains formidable evidence of this advance.

ROADS. While an English company, in the absence of motor roads, is shipping, via camel-back, electrical equipment to light Tibet's forbidden city of Lhasa, a force of 12,000 men is diligently at work completing a trunk highway from the Rio Grande crossing at Laredo, Texas, to Mexico City. Simultaneously, China's vast terrain is succumbing stubbornly to penetration by roads through the activities of the Chinese National Economic Council. This body, in the face of inner chaos and aggression from without, has financed or supervised in the last two years 2,500 miles of construction and has a program of 5,600 miles for the current year. In Italy and Germany, unified national highways are rapidly taking form, and the latter's superhighway express systems (*autobahnen*) constitute a monumental program.

The activity of Mexico is particularly significant in the light of an expanding plan to interlace the three Americas by highways. Engineers of the Automobile Club of Southern California have computed that 10,991 of the 13,219 miles, the estimated length of the International Pacific Highway, are at least passable. In other words, they say that 83% of the route from Fairbanks, Alaska, to Valparaiso, Chile, and Buenos Aires, Argentina, is travelable under favorable conditions. This colossal stretch, passing through 17 countries, will certainly be, if ever completed, the world's longest highway.

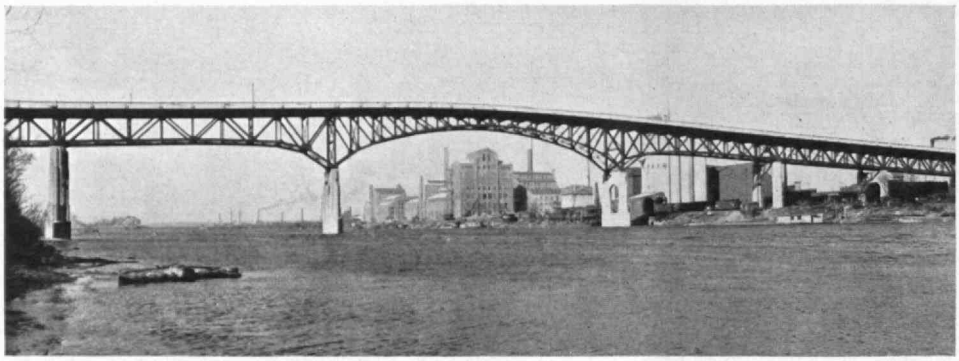
C. A. Dyer

Current in natural lightning flashes like this seldom rises above 150,000 amperes. Last summer General Electric engineers piled up 250,000 amperes in creating artificial thunderbolts

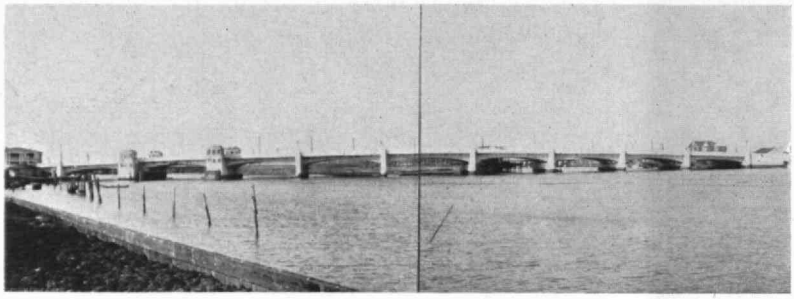
AIR TRANSPORT. While astronomers opine that the universe is expanding, engineers demonstrate that the earth shrinks. On July 7, 1929, there was inaugurated a 48-hour air-rail passenger service across the United States; on August 1–2, 1934, there began a 16–18-hour overnight all-air service using D. Douglass's ['14] newest monoplanes having a cruising speed of 175 miles per hour. Still faster Boeings are in the offing.

Over-water air travel, especially in the South Atlantic, is being rapidly bettered. The *LZ-129*, slightly longer and with a capacity of a half million cubic feet more than the *Macon*, is soon to supplement the *Graf Zeppelin* on the Europe-South America service; the 5,000-ton M.S. *Schwabenland*, with a rotating catapult on its after deck, is now being anchored somewhere between Africa and Brazil as a companion floating airport to the *Westfalen*, similarly stationed last January. Then the bi-weekly transocean mail service of the *Deutsche Lufthansa* will expand to a weekly schedule. This company, which has a Chinese affiliate in Eurasian Aviation Corporation, envisions a service from Berlin to the Far East.

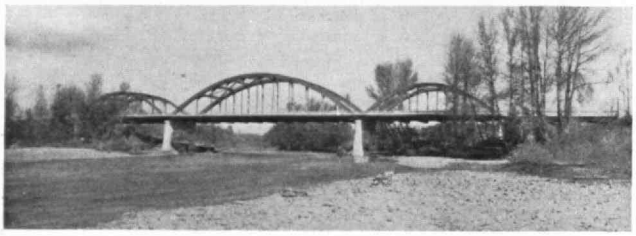
Our own prestige in international air is, for the present, committed to Pan American Airways with its criss-



Class A. Cedar Street Bridge, across the Illinois River at Peoria. The main cantilever has a 296-foot span



Class B. Shark River Bridge, Avon, N. J. It has nine spans, each 83 feet long, plus one bascule span of 110 feet



Class C. McLoughlin Bridge across the Clackmas River in Clackmas County, Oregon. The central span is a 240-foot tied or bow string arch

PRIZE WINNERS

Of the steel bridges built in 1933, the American Institute of Steel Construction has selected these three as the most beautiful

crossed flying routes over the Caribbean, in the Central Americas, and up and down the South American coasts. During August, Pan American's new 19-ton *Brazilian Clipper* negotiated her maiden voyage to the Argentine without mishap to cut the running time between Buenos Aires and the northern terminal in Florida from seven to five days. Her last hop, 1,900 miles from Port of Spain, Trinidad, to Miami, took a little over 12 hours.

TUNNELS AND BRIDGES. As air lines wistfully ponder future cruising speeds of 250 miles per hour, land transportation crawls into new territory, speeds up by dodging over and under barriers. Within a single month (July), two vehicular tunnels opened: the Queensway (longest and largest yet built) between Liverpool and Birkenhead, and the Sumner or East Boston tube, leading from a point near Faneuil Hall, Boston, under the harbor to what used to be Noddle Island; and a caisson was sunk in the Hudson off West 39th Street to get sand hogs started on an upstream duplicate of the Holland Tube through which the 75,000,000th vehicle passed around midnight of September 8.

The East Boston, much smaller to be sure than the English tunnel, nevertheless ought to go down in the files as somewhat epoch-making in the muck-handling methods perfected during its building.

More and more acutely does the need for improved motoring arteries press upon the multitudes seeking entry to or egress from Manhattan Island for which New York's newest bore is to be a partial answer. Ferries, which ply in the reaches of the Hudson between the Holland Tunnel and the George Washington Bridge, still carry some 12,000,000 vehicles a year, as many as crossed by them ten years ago before either tunnel or bridge were available to carry the major portion of the traffic load.

Manhattan's eastside burgeons as well as its westside, and, because it has been used to bridges, calls for more. But, whether the rising towers of the new Triborough Bridge will do more than temporarily muffle the hue and cry of the impeded motorists, remains to be seen. Nevertheless, its three-and-a-half miles overall length — it is really a plural bridge with four distinct spans, including one of 1,380 feet over the Hell Gate, connected by elevated boulevards — will get many, many times the patronage of many another bridge now built or building; that over the Golden Gate, for one example, with its record suspension span a fifth longer than the 3,500-foot George Washington Bridge across the Hudson. The other San Francisco Bridge, the one to Oakland, may fare better as to patronage. As the world's greatest aggregation of bridge units (plus a tunnel), this enterprise is a formidable instance of engineering. Its remarkable 230-foot open caisson piers were six months ahead of schedule last July and the pioneer tunnel on Yerba Buena was holed through.

As Glasgow prepared last month for the launching of the *534* (see page 6), it was also studying estimates for a bridge over the Clyde; and at Stockholm the