

### THE MARINE DEPARTMENT OF THE TRANS-SIBERIAN RAILROAD.

BY WALDON FAWCETT.

Probably never in the history of transportation enterprises has there been constructed a railroad system which has been dependent to so great an extent upon auxiliary water communication as the Trans-Siberian Railway, which has, within the past few months, progressed to the point where uninterrupted communication across the continent is possible. Ultimately, when the whole great project has been carried out in its entirety, the proportion of the work of the system performed by water craft may be greatly lessened; but for years to come the shallow draught steamers are likely to constitute the connecting links between many sections of railroad. Nor indeed will the marine interests fostered by the new system be confined to this class of shipping. Many vessels of large size will be required to handle the commerce on the Pacific, the growth of which will be in a great measure resultant from the influence of the new railroad system; and it is significant that upward of a dozen vessels designed especially for such service are now building in the shipyards of the United States.

The final section of the road to be completed is in the neighborhood of 700 miles in length, and extends from the eastern shore of Lake Baikal to Stretensk. Communication between the last-named place and Vladivostock, the ultimate terminus of the line, is principally by boat. The Shilko River, on which Stretensk is situated, is a tributary of the Amur, and on these two rivers steamers are operated to the north end of another section of the railroad which follows the Ussuri River direct to Vladivostock.

Ultimately, of course, the main line of the railroad is to pass down the valley of the Amur to Vladivostock; but the consummation of this plan is certainly several years distant. The Manchurian Railroad, however, a short cut or branch road from Stretensk straight to Vladivostock, through Chinese territory, will it is expected, be completed within two years. While it may be taken for granted that upon the completion of this new Manchurian Railroad, much of the through business will take the all-rail route, there is no doubt that a constantly increasing volume of traffic will be developed in the territory drained by the Amur and its tributaries, and this will, of course, be handled almost exclusively by boat. Appreciating this, the Russian government has already taken steps to deepen the channels and otherwise improve the Shilko, Amur, and Ussuri Rivers. Not only have the rivers been buoyed so that the best navigable channel is clearly indicated, but upward of two dozen stations have been established at which daily records are kept of the depth of water. New charts of the rivers have been published and these will, ere long, be supplemented by others.

One of the avenues of usefulness in which the marine department of the railroad early figured was in the operation of huge barges on the Amur River. These vessels which conveyed all classes of constructive material to Stretensk, the head of navigation, were, together with the steamers which towed them, built at the Sentinel Works of Alley & Maclellan, at Glasgow, Scotland. The vessels were erected at the Scotch yard

and then dismantled, shipped in sections to Siberia, and there re-erected by forces of workmen sent especially for the purpose.

The steamers or tugs were each 183 feet in length over all, 175 feet between perpendiculars, 26 feet molded beam, 8 feet depth and 2 feet 9 inches draught. Each is fitted with compound, surface-condensing engines of 600 indicated horse power, with cylinders 20 and 40 inches in diameter and 48 inches stroke. To these steam is supplied from two locomotive type of boilers, arranged for wood firing, and with a total heating surface of 2,200 square feet and a working pressure of 150 pounds. The barges designed to be towed by steamers of the class just described are each 210 feet in length, 35 feet beam, and 9 feet depth, and will carry a cargo of 400 tons on a draught of only 3 feet 6 inches.

Possibly the most striking transformation which has been effected in the entire system is found in the service on the Amur and Sungari Rivers, where the poorest type of Chinese junk has been supplanted by handsome new steamers which make regular runs of

length over all, 80 feet between perpendiculars, 20 feet beam, 3 feet 6 inches depth, and 1½ feet draught. These vessels have high-pressure engines and boilers of the locomotive type. The vessels were built in riveted sections weighing about 15 tons each, and shipment to Siberia was thus made possible. It will be noted in the accompanying illustrations what precautions the builders took to plainly mark every component part of the vessel in order that there might be no possibility of confusion during the process of re-erection.

The center of maritime activity in connection with the Siberian system is at Vladivostock, in the improvement of which port millions of dollars have been spent, and where there are magnificent piers and an excellent floating dry-dock. Ultimately Port Arthur may in some degree divide supremacy with her; but this is a long look ahead.

The development of the maritime phase of the project will henceforth be largely under the control of the Chinese Eastern Railway, which is the official name of the short-cut line through Chinese territory, previously mentioned. To all intents and purposes, this latter line is a Russian institution, being nothing more nor less than the final section of the Trans-Siberian Railway; but in the transaction of business the two corporations are kept rigidly distinct. That in reality, however, they are one is evidenced by the fact that the immense docks constructed at Vladivostock, when it was supposed that that city would be the main terminus of the Trans-Siberian line, have been transferred to the Chinese Eastern Company.

The Chinese Eastern Railway will operate a fleet of eighteen vessels, averaging 4,000 tons each, for the purpose of carrying freight from Shanghai to Port Arthur and Vladivostock. For the maintenance of this fleet, large repair shops are being constructed at Port Arthur. Much has been written regarding the triumphs of American tools and American locomotives in

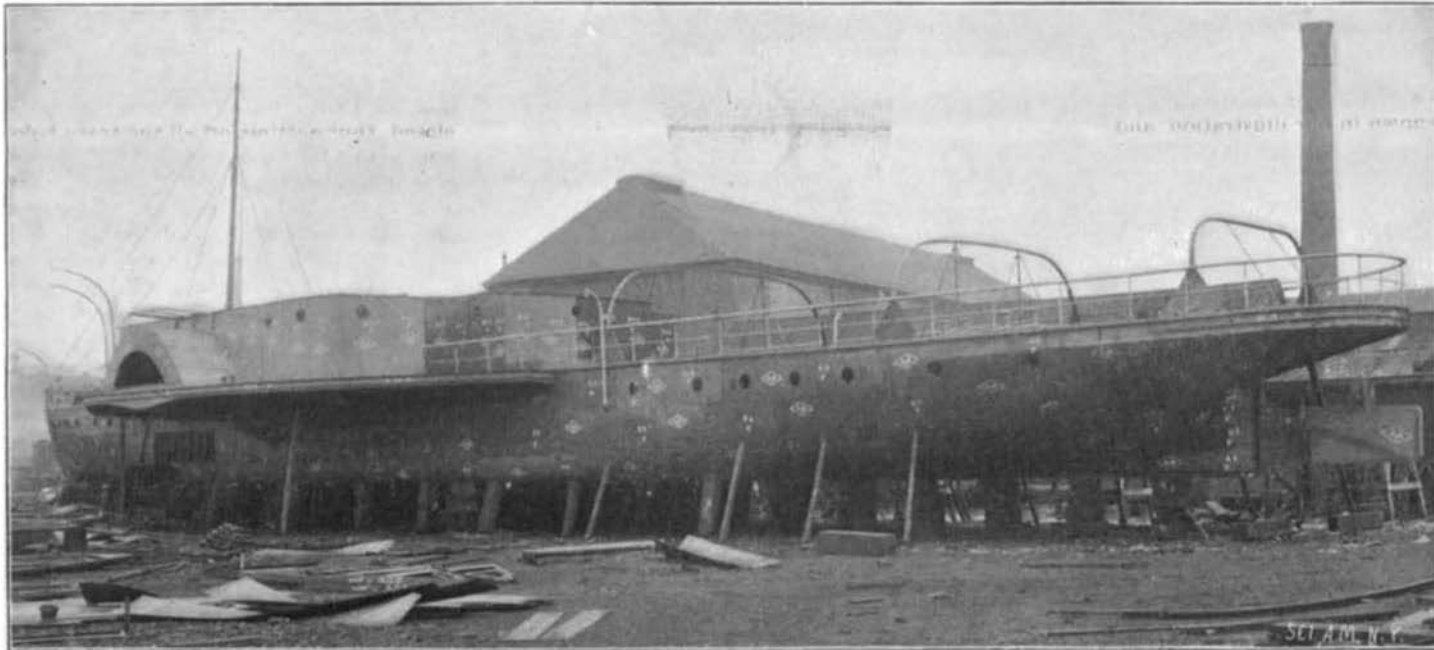
the construction of the rail line, and it would seem that the creditable record is to be maintained, for the Russian officials have stipulated that the entire equipment of these new repair shops, including engines, boilers, and machinery, shall be purchased in America. This, too, in the face of the fact that several European firms offered to supply the equipment at a lower figure. A representative of the Russian officials has been in this country for several weeks past filling out the equipment specifications of the new Port Arthur plant, and has placed contracts aggregating upward of \$200,000 with American manufacturers.

#### American Scientists Honored.

The bi-centenary of the Prussian Academy of Sciences was inaugurated on March 19 at the castle at Berlin in the presence of the emperor and prominent officials. The scene was of great splendor, as, with a fanfare of trumpets the procession entered, headed by the high state dignitaries and generals and ministers bearing the imperial insignia. There were representatives of various universities present and three Americans were elected: Prof. Josiah Willard Gibbs, of Yale University, Prof. H. A. Rowland, of Johns Hopkins University, and Prof. William James of Harvard.



STEEL BARGES FOR SERVICE ON THE AMUR RIVER—TRANS-SIBERIAN RAILROAD.  
Length, 210 feet; beam, 35 feet; depth, 9 feet; Capacity, 400 tons on draught of 3 feet 6 inches.



PADDLE STEAMER "AMGOON," FOR THE AMUR RIVER PASSENGER SERVICE—TRANS-SIBERIAN RAILROAD.  
Length, 160 feet; beam, 24 feet; depth, 8 feet; draught, 3 feet; Compound Surface-Condensing Engines supplied by two locomotive wood-burning boilers.

more than 2,000 miles per trip. The "Amgoon" may be taken as thoroughly typical of the vessels engaged in this service. She is a side-wheel steamer 160 feet in length over all, 24 feet molded beam, 8 feet depth, and 3 feet draught. Her engines also are of the compound, surface-condensing type, and the locomotive type boilers, like those in the vessels previously described, are arranged for burning wood fuel.

Another break in the rail line which requires boats to serve as a connecting link is found at the southern end of Lake Baikal, a point at which the mountains extend practically to the water's edge. An expenditure of many million dollars would have been necessitated to put the railroad through this section, and so it was decided to substitute instead a fleet of ferry-boats, which now transfer trains of cars back and forth just as is done at numerous ports in the United States. An ice-breaking steamer, somewhat similar in design to those in service on the Great Lakes of America, keeps the channel open in winter. The trip across the lake is about forty miles in length, and the vessels employed on the route are especially designed for the service.

Another very interesting type of vessel shipped from British yards for service in Siberia is a class of stern-wheel steamers, each of which is 91 feet 6 inches in