

The Largest Floating Crane in the World

A 350-Ton Giant for Japan

THERE is no more interesting member of the large family of giant cranes than the self-propelled floating crane. Whereas the larger land cranes have a very limited radius of movement, the floating crane is able to steam slowly and majestically to any part of a harbour or dockyard and take up the best position from which to tackle the work to be done. This freedom of movement makes the floating crane of the greatest possible value in the construction of the huge battleships and passenger and cargo liners of the present day, and indeed it is doubtful whether these monster vessels could be built and equipped without the aid of such cranes. Their value is also very great in various operations of ship repairing.

Floating Giants

Many giant floating cranes have been built during recent years for various naval dockyards, great ship-building firms and harbour authorities. Those Meccano boys who have been regular readers of the "M.M." from its early days may remember that in the September — October issue, 1921, we illustrated and described an immense crane of this type belonging to the British Admiralty. This crane was designed to lift a load of 250 tons over a radius of 100 ft. and to a height of 77 ft. 6 in. above the level of the water. On test, however, it proved capable of lifting 312 tons. The proportions of this crane were so well designed and its weight was so well distributed that even when the crane-arm was lifted to its greatest extent without a load, and at its minimum reach athwart-ships, the deck was inclined only four

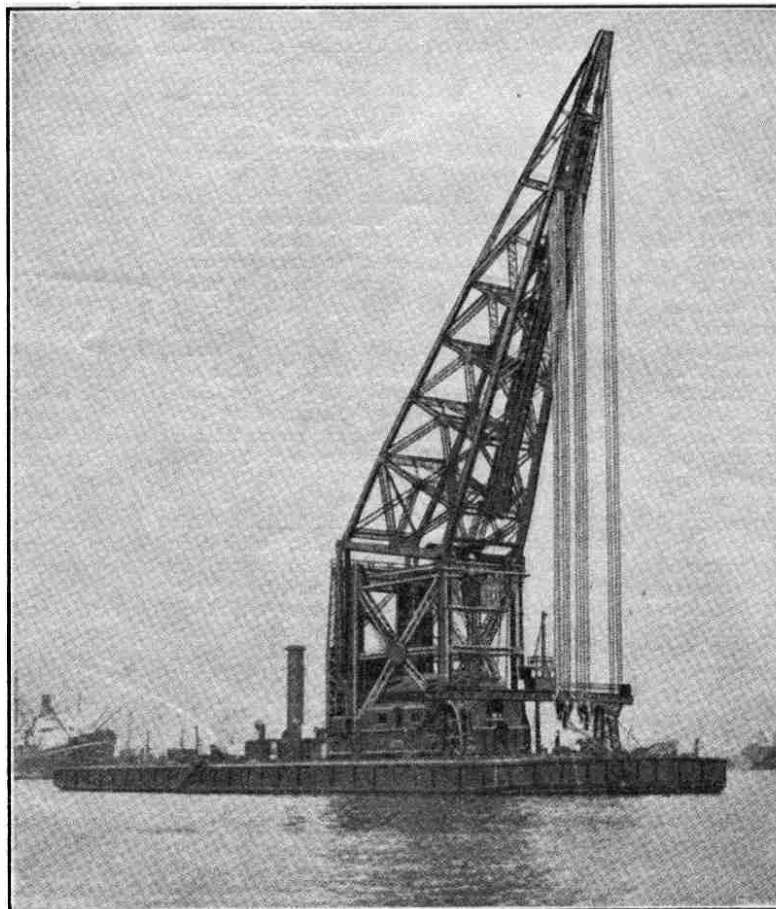
degrees in a direction of depression on the side behind the elbow. Another crane of very similar capacity was built in 1923 for the United States Navy department. An unusual feature about this crane is that it is built on to the hull of an old battleship.

The Mersey "Mammoth"

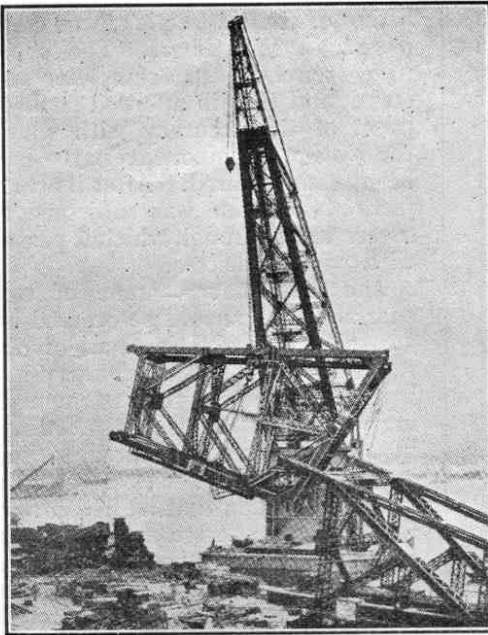
Another interesting floating crane is the "Mammoth," belonging to the Mersey Docks and Harbour Board. This crane is capable of handling loads up to 200 tons. It is of the derricking-jib type, and is able to deal with heavy loads over the gates of large graving docks, which is a very valuable asset, particularly in ship repair. It is also capable of lying alongside the largest vessels and delivering loads up to 60 tons from the hold of the vessel direct on to the quay. This crane was built in Holland, and on a trial trip on the River Meuse it

was shown that its two sets of triple-expansion marine type engine were capable of propelling it at an average speed of nearly five miles per hour. It is interesting to know that the crane was towed from Schiedam to Liverpool without the jib being dismantled.

One of the most interesting feats accomplished by the "Mammoth" was the transporting of a lock gate across the Mersey. The gate was removed from the Alfred Dock, Birkenhead, to the Brunswick Dock, Liverpool, in three sections, for strengthening and various repairs. The necessary work was carried out, and half of the gate, weighing approximately 190 tons, was transferred by the "Mammoth" back to the Alfred Dock. Later the "Mammoth" successfully transferred the second half of the gate



Completed Crane with Jib fully raised



Lifting Lower Section of Jib

was that of lifting into position a bridge section weighing 152 tons at New Brighton Ferry.

Monster to Lift 350 Tons

The increasing tonnage of modern vessels has led to a corresponding growth in the size of cranes, and last year Messrs. Cowans, Sheldon & Co. Ltd., of Carlisle, designed and built for a Japanese shipyard the floating crane shown in our illustrations. This monster is capable of lifting no less than 350 tons. It was partially erected in the builders' works at Carlisle, and was finally erected in Japan under the supervision of one of the builders' engineers. The Japanese firm to whose order the crane was built, Mitsubishi Shoji Kaisha Ltd., themselves constructed the pontoon and propelling machinery to plans prepared for Messrs. Cowans, Sheldon & Co. Ltd., by Sir W. G. Armstrong, Whitworth & Co. Ltd., of Newcastle-on-Tyne.

Main and Auxiliary Lifting Gears

The following details of this crane, for which we are indebted to "*The Engineer*," give some idea of its vast size and power. It is capable of lifting and revolving through a complete circle with loads up to 350 tons at 100 ft. radius, or 300 tons at 121 ft. radius. It can lift either of these loads through a vertical distance of 140 ft. The main loads are lifted on two independent blocks, each of 175 tons capacity, the operating machinery being arranged so that these blocks may be used either coupled together or independently as desired.

An auxiliary purchase of 50 tons capacity is provided at the end of the jib at a distance of about 40 ft. in front of the main purchase, and this block is arranged for a vertical lift of 200 ft. There is also another

without any difficulty. On each occasion the crane raised the half gate from the dock wall and swung it on to her own deck where it rested vertically in an improvised cradle. The crane was towed across the river by a pair of tugs with a third tug astern. Another feat of the "Mammoth"

purchase of 50 tons capacity. This is carried on a trolley that travels along the underside of the jib to a sufficient extent to move the load through a distance of about 75 ft. measured horizontally. This feature enables the crane to deal with comparatively small loads at high speed without any necessity for using the derricking motion.

Nine Sets of Engines

The jib is capable of derricking in from the maximum radius of 121 ft. to a minimum radius of 50 ft., and when in this position the overall height to the top of the crane is 240 ft. The whole crane is mounted on a roller path having a diameter of 50 ft., and fitted with special machinery that enables the crane to be revolved with its load through a complete circle in either direction.

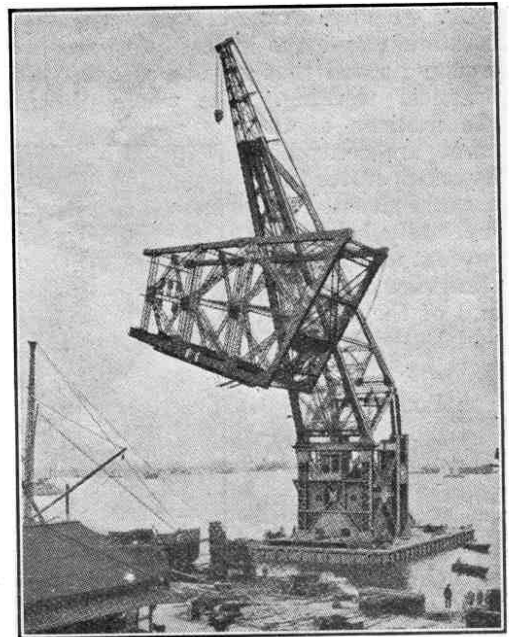
Each individual motion is operated by an independent set of double-cylinder engines. These are fitted with link motion reversing gear, and altogether there are nine such sets of engines.

The jib is raised and lowered by means of two steel screws 49 ft. in length and 14 in. in diameter, placed at the back of the crane and driven from the engines through a train of gearing.

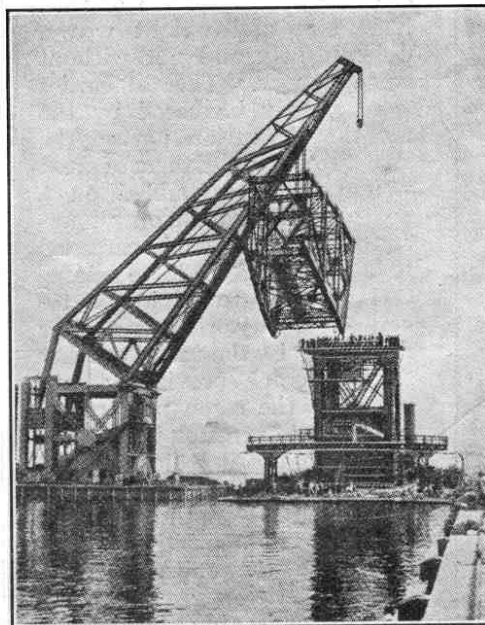
The superstructure consists mainly of a rectangular braced frame supporting the jib and carrying the guides for the cross-head. It is 66 ft. in height, measured from the roller path to the jib foot pivot. The whole of this portion of the crane had to be designed with the greatest possible care because of the various forces it had to withstand—these being much greater, indeed, than in any previous floating crane.

Hydraulic Brakes

The main and auxiliary lifting gears are each fitted with specially-designed hydraulic brakes to control the lowering of the loads. These brakes are powerful enough to enable any load to be sustained with safety or lowered with pre-



Jib in mid-air



Jib swung round ready for Lowering

cision at any space between the maximum and the lowest possible creeping speed that may be used in practical working. The whole of the motions of the crane are controlled by one operator from a cabin situated immediately below the jib foot and giving a clear view of the load and of the site over which the crane is working.

The Pontoon

The pontoon itself is 270 ft. in length and 92 ft. in width, with a draught of about 10 ft. Its size is such as to render unnecessary any moving or water ballast which usually has to be adjusted by the operator.

Behind the crane a large portion of the deck area is arranged so that it is possible to carry a deck load of some 700 tons. The propelling machinery, which is placed amidships, consists of twin-screw compound engines supplied with steam from two single-ended boilers at a pressure of 150 lb. per square inch.

The hull is built entirely of steel, and is divided by bulkheads into water-tight compartments. The

deck equipment includes a steam windlass, steam capstans, steam and hand-steering gear, davits, lifeboats, and all the accessories necessary for



Jib in Position

a sea-going vessel. The ship is navigated from a steel bridge extending the full width of the deck and situated immediately in front of the crane base.

Erecting the Crane

As may be imagined, the erection of a structure of such huge size and weight was a difficult task and not without some danger. The difficulties were greatly increased by the fact that the various parts of the structure, many of them of great weight, were assembled on a floating base, which, on numerous occasions, had to be careened to a sufficient angle to enable certain parts to be joined together. The work was greatly facilitated by the use of another floating crane previously supplied by the same makers.

The first operation in the task of erecting the jib, which weighed over 300 tons, was to lift the lower section from the quay side and place it in position for securing to the superstructure. This operation was carried out in the remarkably short space of six hours. The next task, the

lifting of the top section, was completed in four hours. The short time required to complete the erection of the jib afforded striking proof of the accuracy with which the various component parts had been manufactured. After its completion the crane was subjected to severe tests, through which it passed with perfect success.

The fact that a crane of this enormous size should be ordered by Japan is a notable instance of the rapid strides that that country has made during recent years in engineering work of all kinds, and not least in the building of warships and merchant vessels. It is also a matter for pride that a British firm was chosen to design and build this crane, and that when the various sections of it reached Japan after their long journey, and were erected, the gigantic machine worked exactly in the perfect manner aimed at by its designers.

(The photographs illustrating this article are reproduced by courtesy of "The Engineer.")

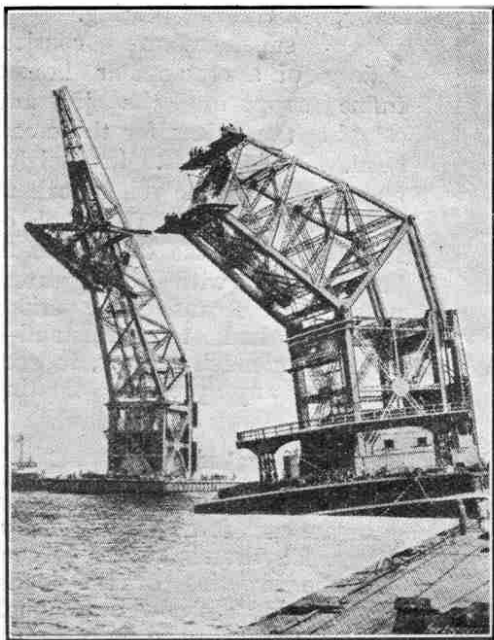
Wireless Aids Fishing Industry

Wireless seems destined to work something like a revolution in the fishing industry. The movements of fish are notoriously irregular and uncertain. For no apparent reason large shoals of fish will suddenly leave one part of the sea, where previously they have abounded, and travel to another part where before there was hardly a fish to be caught. Before the coming of wireless there was no means of quickly reporting these changes of fishing ground, and consequently, while one trawler might find herself in the midst of an enormous shoal, another might have absolutely no luck at all. To-day, many of the larger trawlers are fitted with wireless, so that reports of shoals of fish may be promptly transmitted from one vessel to another. At the same time such trawlers can communicate promptly with their owners in case of need.

Possibly in years to come every large trawler will be fitted with wireless, and in that case we should hear fewer of the sad stories of fine vessels leaving Hull or Grimsby for Iceland waters and never being seen or heard of again. There is no doubt that the crew of many a trawler might have been saved if a wireless call for help could have been sent out over the raging seas.

Receiver with Five Crystals

The would-be purchaser of wireless sets or accessories nowadays finds himself in the midst of such an embarrassment of riches that he has difficulty in making his final selection. The crystal detector, whether used alone or as the foundation of a valve set, is now more popular than ever as the result of the establishment of so many relay stations. The Service Radio Co. Ltd. (67, Church Street, Stoke Newington, London, N.16), lists a series of crystal detectors that should meet every possible requirement. In particular may be mentioned a "multi-crystal" device by means of which any one of five different crystals can be brought into adjustment immediately as required by the turn of a small handle. This firm also supplies excellent single-valve and two-valve amplifiers to increase the strength of reception, the two-valve amplifier making possible the use of a loud speaker. Yet another ingenious appliance is a "multiphone" arrangement that enables several pairs of telephones to be readily connected to one receiver.



Attaching upper section of Jib