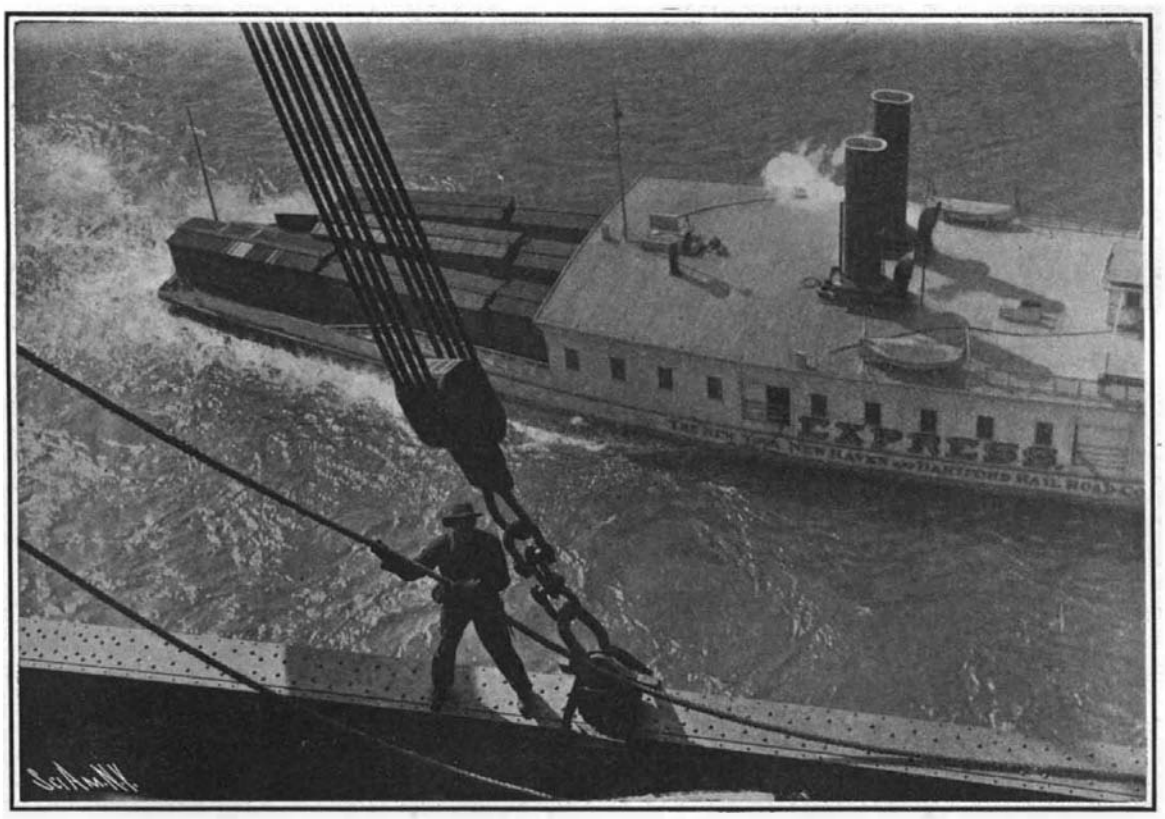
THE ERECTION OF THE BLACKWELL'S ISLAND BRIDGE.

As will be seen from our illustrations, the erection of the Blackwell's Island cantilever bridge across the East River, at 59th Street, has progressed to a point at which its majestic proportions and undeniable symmetry show up to good advantage. Particularly impressive is the view obtained, say, from the deck of one of the Sound steamers, when one is passing through the channel to the west of Blackwell's Island, or from the river front on Manhattan Island at the foot of 57th Street, the point from which the accompanying fine view of the structure was taken.

New York city is the home of majestic bridges. Two of the three giant bridges of the world (the third is the Forth Bridge in Scotland) are located in this city, namely, the old Brooklyn Suspension Bridge and the later Williamsburg Suspension Bridge. Both of these structures are of the suspension type, and because of the aspect of lightness and delicacy which they carry, due to the great strength of the wire and corresponding small dimensions of the suspension members, they fail to convey the appearance of strength and heavy mass which one naturally would expect in structures of this weight and magnitude.



One of the Bridge Gang Standing on a Floor Beam Which Has Just Been Swung Into Position.

Not so, however, with the great structure at Blackwell's Island, which is the first cantilever bridge built in this section of the country that is at all comparable with our two great suspension bridges in size, weight, and strength. Here the relatively close massing of the members of the trusses, and the great size of their sections, lend to this bridge an impressive grandeur which is more pronounced even than in the case of the two suspension bridges.

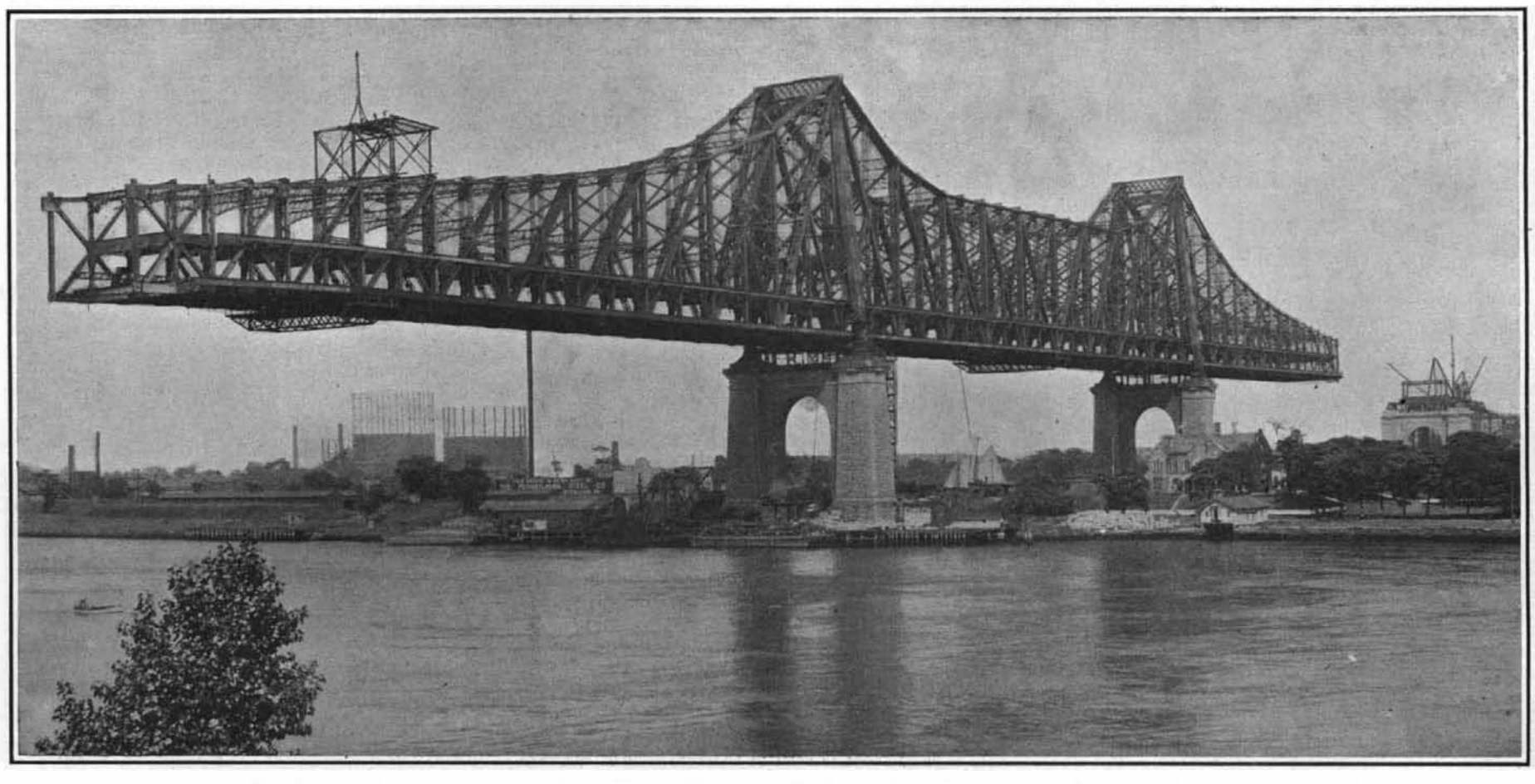
The whole structure is made up of five spans of varying length, with a long stretch of steel and masonry approach at each end. The Manhattan approach, built mostly of masonry, is 1,051 feet in length, and extends parallel with 59th Street to a pier on the westerly shore of the East River, where the truss bridge proper commences. Of this, there is first the shore arm 470 feet in length, of the westerly cantilever. Then follows the great 1,182-foot span, made up of two cantilever arms each 591 feet in length. Next follows the Island span, 630 feet between towers; then the span over the easterly channel of the East River, which measures 984 feet between towers, and consists of the two river arms of the two easterly cantilevers, each 492 feet in length. The last span is the shore arm of the easterly cantilever, which is 459 feet in length. The descent into Long Island is made over an approach 3,455 feet in length, which, for the most part, consists of steel bents and plate girders. From the above description, it will be understood that the bridge proper consists of four cantilevers carried upon the same number of towers. Provision for movement and changes of length due to temperature and loading is made at the center of the two channel spans, where the abutting ends of the cantilever arms are connected by a hinged rocker bent, the rocker being pin-connected to the bottom of one truss and to the top of the other. The total length of the cantilever structure is 3,725 feet, and the length of the whole bridge, including the approaches, is 8,231 feet.

The trusses are built partly of a special nickel steel and partly of the ordinary commercial structural steel, the structural steel being used, roughly speaking, for the compression members and floor system, and nickel steel for the eyebars or tension members. The use of nickel-steel eyebars is due to the initiative of the former Bridge Commissioner Gustav Lindenthal, from whose designs the present bridge, with slight modifications, has been built. In spite of the subsequent interested opposition against the use of nickel-steel eyebars, it was found that only by their employment could a satisfactory design be worked out for this bridge; and the present eyebars, as now being furnished by the manufacturers, are not only meeting the requirements of the specifications, but in the acceptance tests have invariably exceeded these requirements. In the structural steel, the specifications called for an elastic limit of 28,000 pounds, and an ultimate strength of 56,000 pounds, and the requirements for the nickel-steel eyebars are an elastic limit of 48,000 pounds and an ultimate strength of 85,000 pounds. From which it will be seen that the nickel-steel bars are from 40 per cent to 50 per cent stronger than ordinary structural bars of the same weight.

The steel superstructure of the bridge is carried upon masonry towers of unusually pleasing design and of most excellent masonry. Good foundations were found at every point, the rock lying only a few feet below the surface on Blackwell's Island, and at a depth of about fifty feet on Manhattan and Long Island. The piers are built of concrete below ground, and above ground of granite facing with limestone backing.

Because of the great weight of the superstructure, it was necessary for the contractors, the Pennsylvania Steel Company, to execute a large amount of preliminary work in order to facilitate the erection. The bridge, from anchor arm to anchor arm, weighs 52,000 tons. The 630-foot span across the Island alone weighs 10,400 tons, or 16½ tons to the linear foot, and this was the first portion of the superstructure to be erected. So great was the load to be carried, that the ordinary timber falsework was not deemed of sufficient strength, and a special steel falsework, consisting of latticed towers and plate girders, was built upon specially-prepared foundation. This falsework alone weighed about 1,700 tons, and this is the first time that steel has been employed for this purpose, at least on such a scale. After the Island span was completed, the projecting arms of the cantilevers were built out from each end until they extended partly across the adjoining channels. This work has recently been completed, and is now in the condition shown in one of our engravings.

The handling of the material, lifting it from barges below, or from the storage yard, and lowering it into



The Completed Blackwell's Island Section of the New Cantilever Bridge Over the East River. Length from End to End, 1,713 Feet.

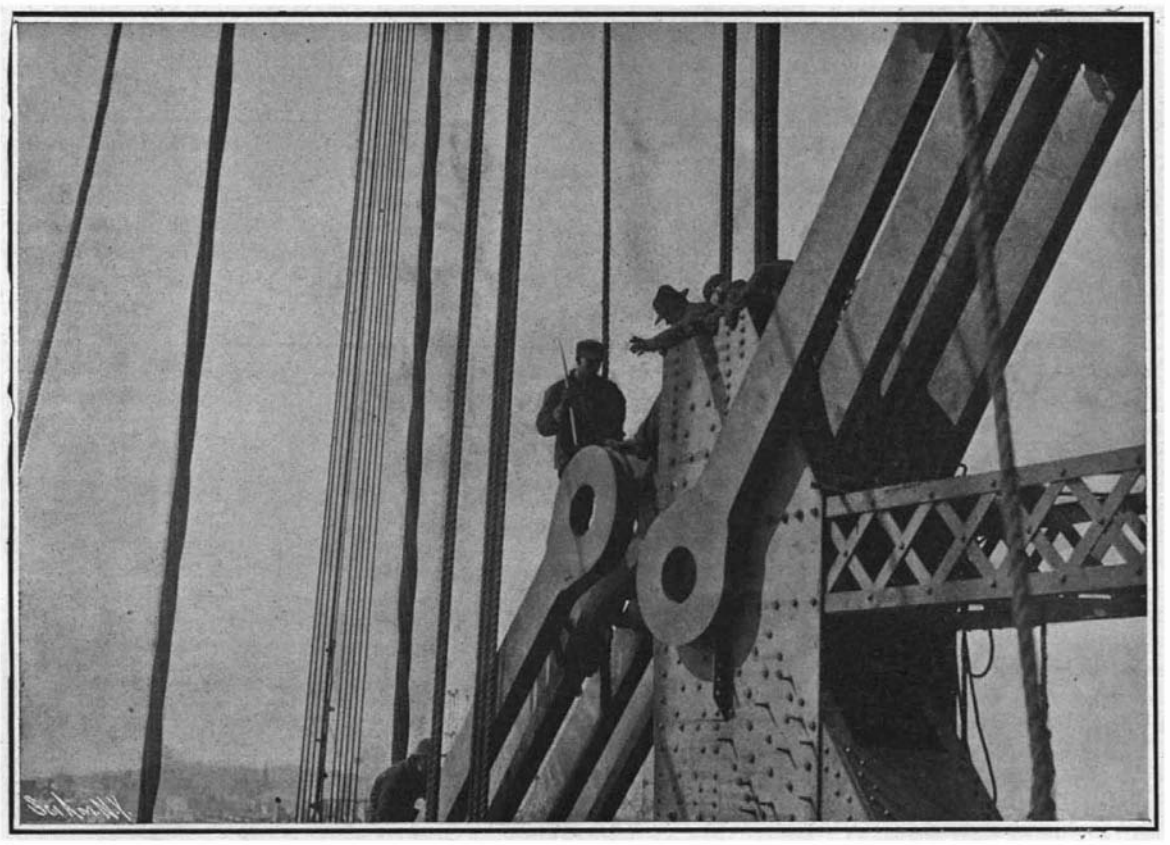
Cantilever arm in foreground, 591 feet. Central span, 630 feet. Cantilever arm in background, 492 feet.

ERECTING THE GREAT CANTILEVER BRIDGE ACROSS THE EAST RIVER AT BLACKWELL'S ISLAND.

place ready to be coupled up at the end of the projecting trusswork, was accomplished by special derricks and by a large "traveler," 120 feet in height, which moved out over the projecting cantilever as it advanced. The traveler is built in the form of the letter Z, the upper arm projecting over the work, and the lower arm reaching far back into the span, where it is counterweighted or bolted down to the completed cantilever. This traveler itself is a huge and costly affair, weighing 500 tons and capable of handling a load of 70 tons.

Several of our engravings show the bridge erectors at work, guiding the heavy bridge members into position and connecting them by large pins at the various panel points. Two of the most interesting views are those showing the assembling of the ends of the eyebars, and centering them at their point of intersection with the plates of one of the vertical posts. As soon as everything is in true line, the steel pin, which, in the case shown, was 14 inches in diameter by 5 feet long, is driven into position by means of a five-ton swinging ram, the blows of which are directed against the head of the pin in the way shown in our illustration. To guide the pin through the eyebars and posts, it is furnished at the front end with a false conical head, temporarily screwed upon the pin. After the pin is driven home, the head is removed, and the large nut which serves to keep the pin permanently in position is screwed into place.

The completed bridge will have a very large capacity for traffic. This will be carried upon two floors, one above the other. On the lower floor, between the trusses which are spaced 60 feet center to center—



Assembling Eye-Bars at Intersection of Vertical Post and Diagonals, Ready for Pinning.

Driving Home a 14-Inch by 5-Foot Steel Pin at Intersection.

the overall width of the bridge being 88 feet—there will be a roadway 56 feet wide, the central portion of which, 36 feet in width, will be devoted to street and general vehicular traffic, the other 10 feet on either side being given up to two trolley tracks. On the outside of the trusses on the same floor, there will be two more trolley tracks, carried upon cantilever extensions of the floor beams.

On the upper floor, provision is made for the immediate construction of two elevated tracks, and for the future construction of two more elevated tracks whenever they may be needed—all four tracks to be carried between the trusses. On the outside of the trusses will be two 13-foot foot-walks carried upon cantilever extensions of the floor beams. It is estimated that the whole bridge will be completed by July 1, 1908.

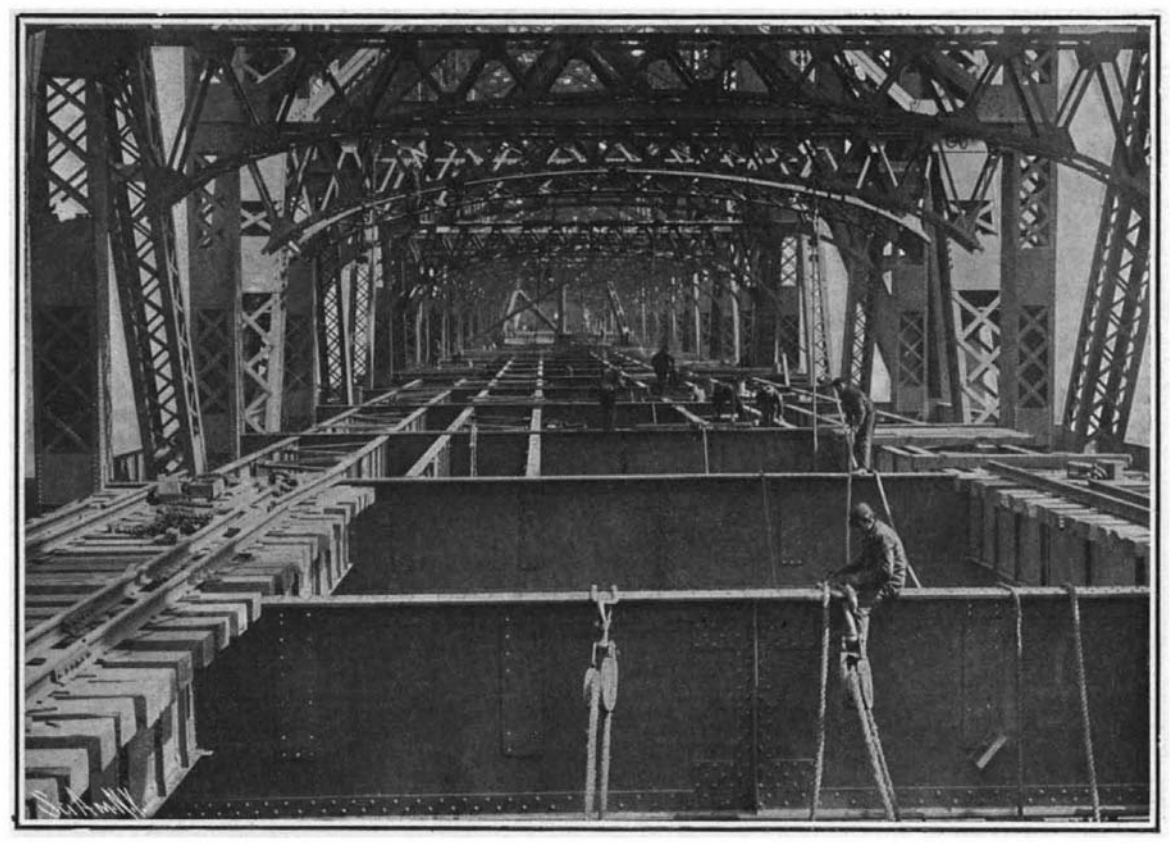
Mare Island Operator Performs Feat of Wireless Telegraphy.

Early during the present year the wireless telegraph operator at Fort Rosecrans, San Diego, established a record for receiving and transmitting long distance messages by intercepting a message sent from Washington, D. C., to a vessel on the Pacific Ocean. A remarkable feat of wireless telegraphy has recently been accomplished at the Mare Island station in California. On the morning of June 18 R. R. Murphy, wireless telegraph operator at the navy yard, while adjusting the instruments, intercepted a message from the steamer "President," then off the coast of Nome, Alaska, to the government station at North Head, Wash. Though Nome City is more than two thousand miles distant from Mare Island, Murphy caught the message, "We are off the coast of Nome. How do you hear us?" The Mare Island station is the principal one on the Pacific Coast and has accomplished a great deal of good long-distance work. The longest distance over which messages have been transmitted or received at the Mare Island station was 1,054 miles, but Murphy's work has quite eclipsed this. The admiral in command of the Mare Island navy yard has commended Murphy highly and will send a report of his achievement to the Navy Department at Washington, D. C.

One of the most interesting and novel gushing wells in the world, and perhaps without a rival in either respect, is a geyser of soda water that recently came up at Wendling, just across the Mendocino County border from Sonoma, Cal.

This well produces soda water—genuine soda water—and of a quality that would warrant bottling for the general trade, in such quantities as were never struck before. There is so much of this water that it is turned into a huge long flume, and used to float great logs from the forest to the lumber mills.

An artesian well borer was recently employed to secure an adequate water supply for a large sawmill in that region. He drilled to a depth of 200 feet, the lower 110 feet being through solid granite. Then a slight trace of water was found. The artesian-man then placed fifty-four sticks of dynamite at the bottom of the well, and exploded them. Instantly water gushed up, rising 20 feet above the surface of the ground, pouring forth in enormous volume. That was days ago, and since then there has been no indication of a cessation of this vast "natural soda fountain."



View Looking Along Upper Floor of Bridge; Shows the Main Trusses, Lateral Bracing, and Floor Beams.

ERECTING THE GREAT CANTILEVER BRIDGE ACROSS THE EAST RIVER AT BLACKWELL'S ISLAND.

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At Work Erecting the Cantilever. The View is Taken 160 Feet in Mid-Air and 500 Feet Out from the Point of Support.

ERECTING THE GREAT CANTILEVER BRIDGE ACROSS THE EAST RIVER AT BLACKWELL'S ISLAND.—[See page 100.]