COMPLETING THE RAPID TRANSIT SUBWAY.

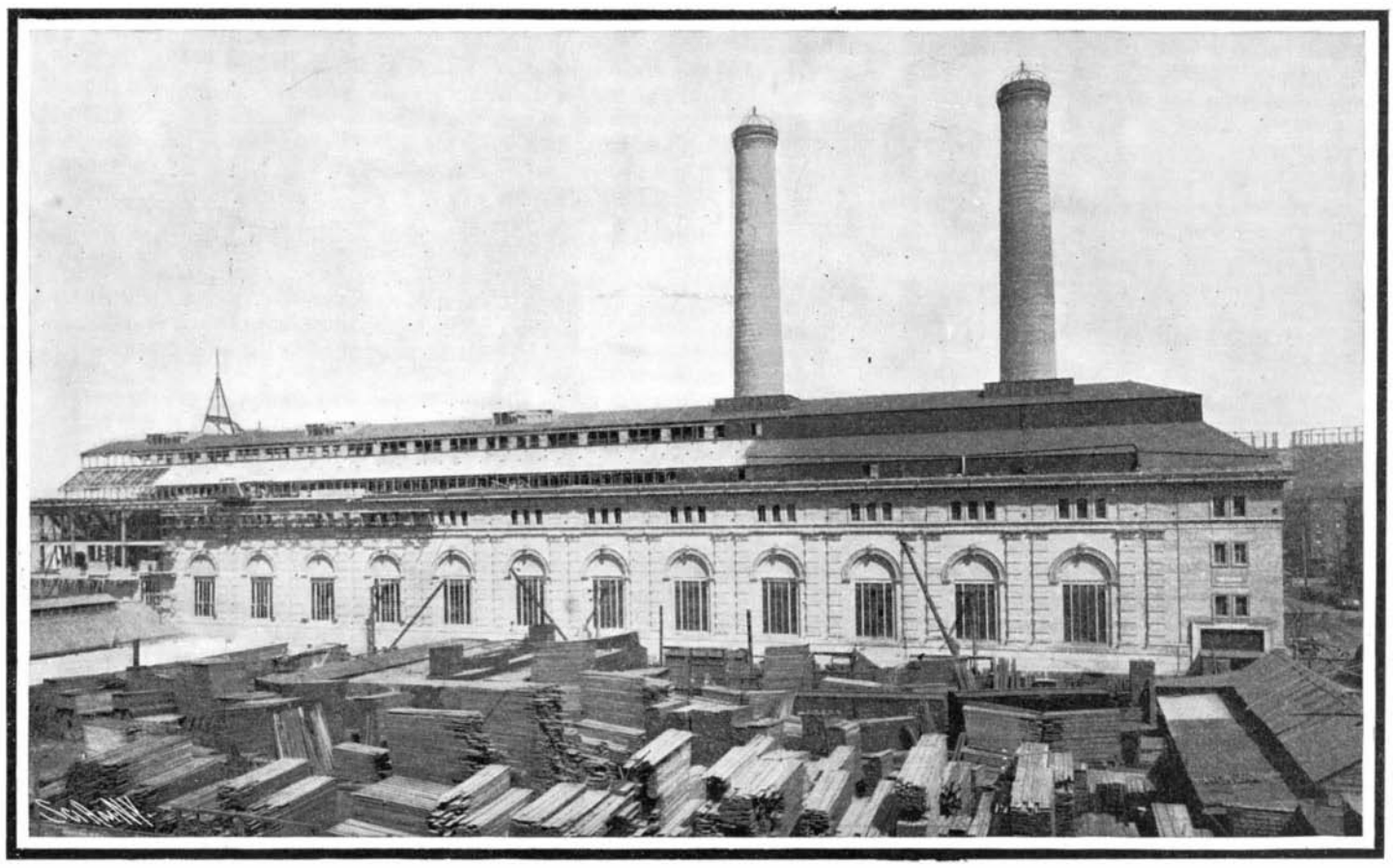
Although the work of finishing the all-but-completed Rapid Transit Subway in this city has seemed, during the last few months, to drag along in wearisome contrast to the dash with which the work was opened and the greater part of it carried through, it is pretty certain that the contractors are doing their best to have the road opened with the least possible delay.

That the promise made a couple of years ago that the road should be open on the first of this year, or nine months before the contract date for completion, has not been fulfilled, is due mainly to the succession of strikes which has occurred to hinder work on one or other section of the road. The most serious strike, as delaying the work, was that which practically shut down all work on the great power station, which is now under construction at the foot of 59th Street and the North River. This strike lasted for many months; and it was long ago seen that its effect would be to put back the opening of the Subway many months beyond the anticipated day of completion. The knowledge that everything would have to wait upon the power house undoubtedly exercised a dampening effect upon the various sub-contractors on the Subway, many of whom would seem to have pulled off their forces and plant for use on other contracts, leaving the work of finishing their Subway contracts to drag slowly along, with infinite discomfort to the citizens of New York.

As far as the contractors for the whole Subway are concerned, the case is entirely different, since there is every inducement for them to get the road in operation and secure some returns upon the vast amount of capital invested, as early as possible. It is certain that work is being rushed upon the power house with as much expedition as is compatible with the necessarily tedious work of building the great electric generators in place; and just as soon as a sufficient amount of the plant is installed for the operation of that part of the Subway which lies in Manhattan Island, the cars will be run into the Subway, the great 12,000-horse-power engines started, and this, the largest and most completely equipped underground system in the world, will be at the service of the citizens of New York.

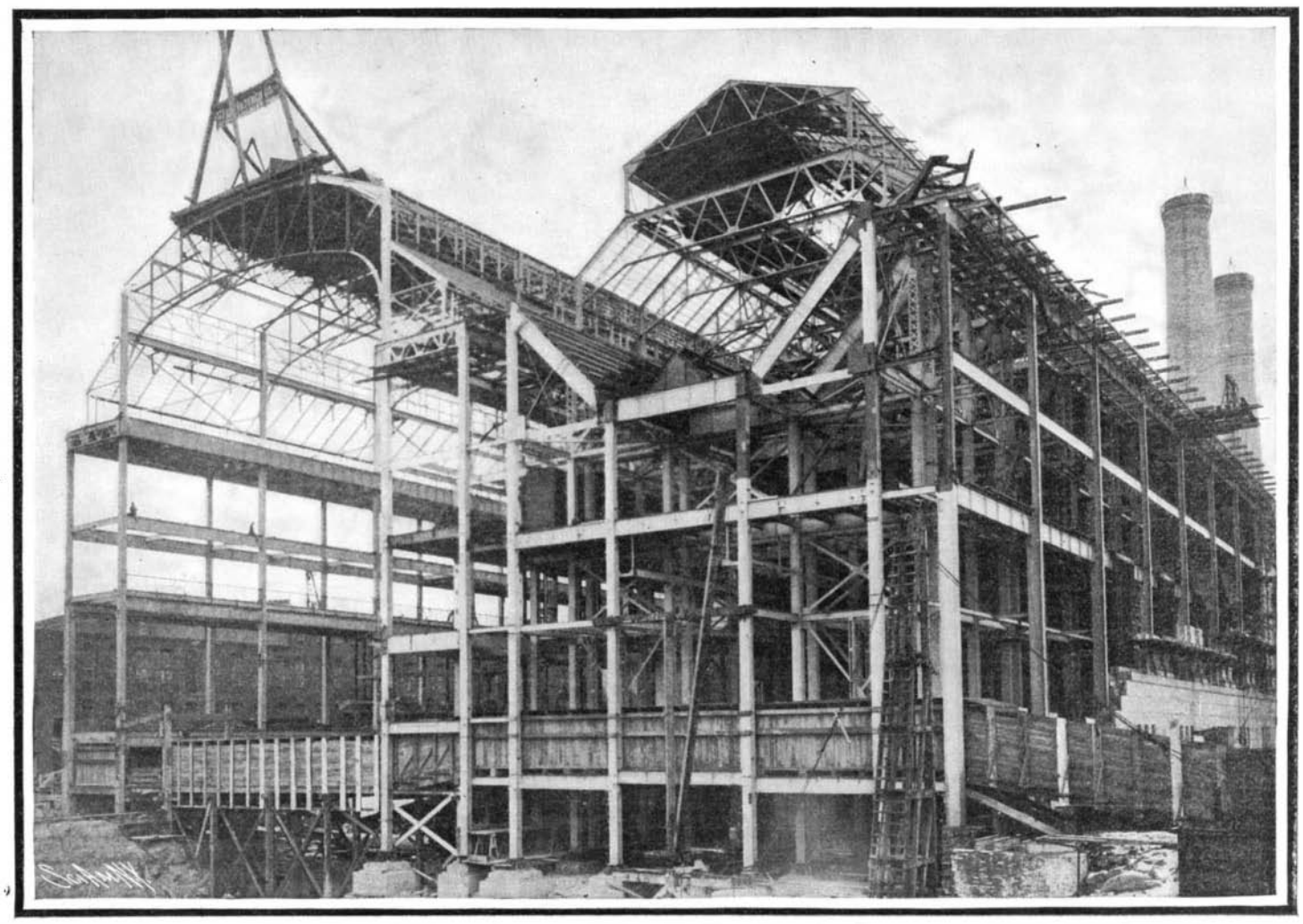
At the present writing it looks probable that the promise of the contractors that the road will be ready for opening on September 1 will be fulfilled. On Manhattan Island the tracks are laid, and practically all of the electric cables, and third rail, and most of the signaling apparatus have been installed, and a majority of the stations are completed, ready for use. The most backward station is the important junction at the Brooklyn Bridge, which, unless a very heavy force is crowded upon it, can hardly be finished by the day tentatively set for opening. There are other stations in the northern part of the city that are also in a backward condition. In some of the stations the work of building the entrance kiosks is not yet completed, and in one or two others the approaches have yet to be built.

We show on our front page two views of one of the most interesting stations on the line, namely, that on the lofty viaduct that carries the Subway tracks across Manhattan Valley. The station is built immediately above 125th Street, over which the viaduct is carried by a very handsome trussed arch of 168½ feet span—by far the most important bridge structure on the whole road. The bridge was designed in the office of the Rapid Transit Commission engineers, and must be regarded as an extremely creditable piece of work, both in its detail and the artistic character of the design. The main arch of three trussed ribs, each of which measures 168½ feet between the end pins and has a depth between the center of chords of 6 feet. A curious feature is that the northern abutment is exactly 5 feet lower than the southern abutment, the difference being due to the difference of grade in the street. Each half of the span is parabolic, the northern half measuring 81.4 feet, and the southern half 87 feet from the end pins to the crown. The chords of each trussed rib are of a general I-section, being built up of four 6-inch by 6-inch by 11-16-inch angles, two 15-inch top and bottom cover plates, and a central web plate. The trussing is on the single intersection system, with vertical posts and diagonal ties. At every other panel vertical posts are erected, which serve to carry the superstructure. The posts are built up of four latticed bulb angles. They are riveted at the top to plate-girder floor beams, upon which run the longitudinal eye-beam stringers for carrying the tracks and the passenger platforms. The main ribs are spaced 24 feet, 3 inches from center to center. The foundations for the bridge had to be made exceptionally heavy, for, on excavating, it was found that they were located on an old bowlder fill. Consequently the excavation was carried down to a depth of 30 feet below ground level, and a monolithic, concrete tower was built in the excavation thus formed, beneath the footing of each rib, each of the three foundations being carried back 44½ feet, or sufficiently far to provide a footing for the second transverse bent of the trestle viaduct. The concrete foundations are carried up to the ground level, where massive granite skew-backs serve to take the cast-steel footings of the ribs and the footings of the first trestle



Width, 200 feet. Length, 690 feet. Maximum capacity, 132,000 horse-power.

THE NEW RAPID TRANSIT POWER STATION.



VIEW OF THE POWER STATION FROM THE NORTH RIVER, SHOWING THE ENGINE HOUSE TO THE LEFT AND THE MASSIVE FRAMING OF THE BOILER HOUSE TO THE RIGHT.

bent. The ribs are drawn in at their ends and riveted to a cast-steel, heavily ribbed bearing, which rests, as shown in our front page engraving, upon a turned 8-inch steel pin. The weight of each of the outer ribs is 35 tons, and the inner rib, which carries about double the weight of each outer rib, weighs 60 tons. The total weight of steel in the bridge is 350 tons.

A novel feature in this bridge and its overhead station is that access to the station will be gained by means of a duplex escalator—the first of its kind ever made, which is being built by the Otis Elevator Company. This escalator will run above the ribs until the underside of the floor structure is reached, where it will terminate in platforms, from which stairways will lead to the passenger platforms of the station. The escalator, which will run at greater speed than those with which the New York public is familiar, will carry passengers in both directions.

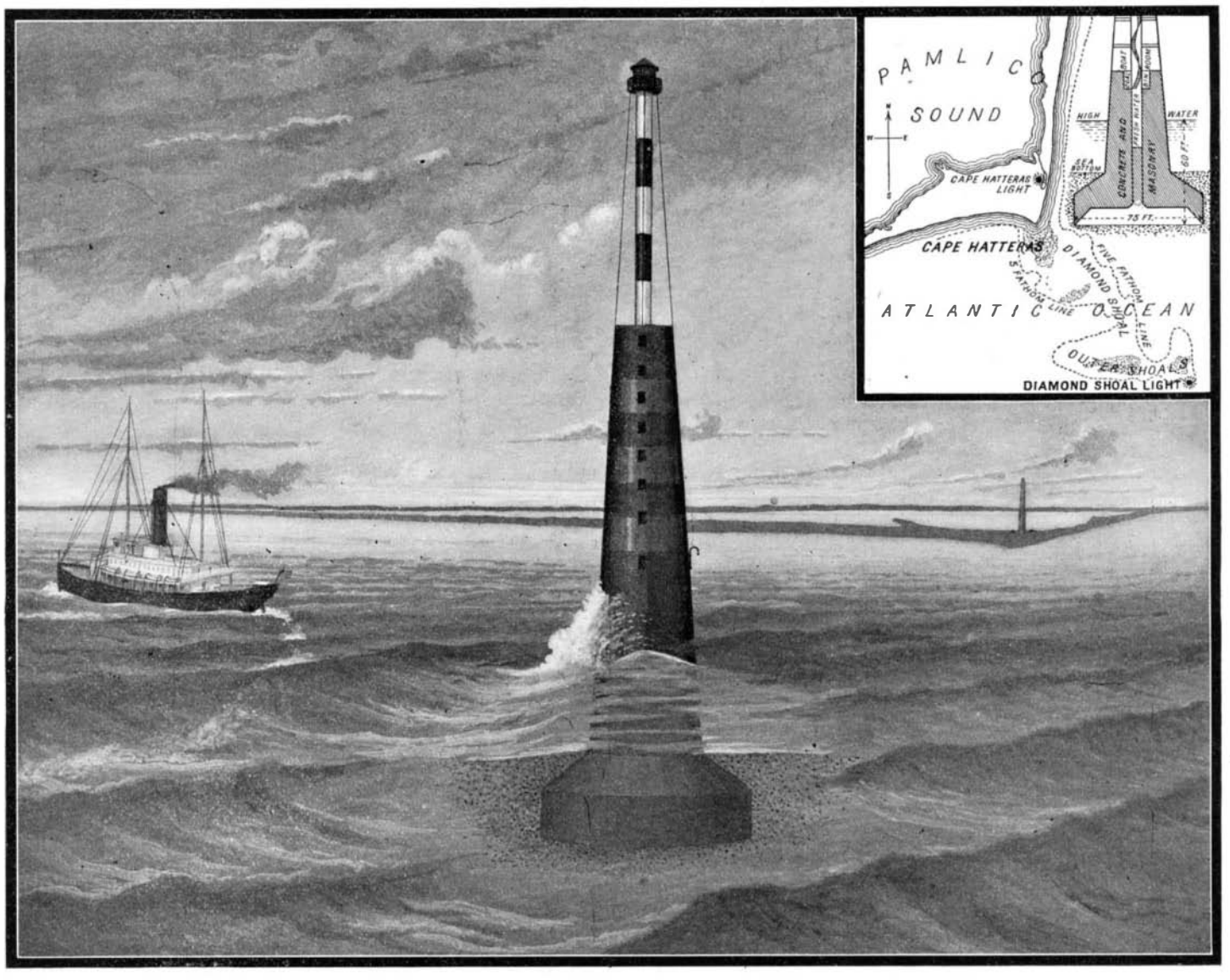
We present two illustrations of the mammoth power station at 59th Street and the North River. This huge structure, the greatest of its kind in the world, will, when completed, measure 200 feet in width by 690 feet in length. It is divided centrally through its entire length by a wall, which separates the engine room from the boiler room and coal bins. The batteries of water-tube boilers will be carried on several floors, while the uppermost portion of the building below the roof will be occupied by an enormous coal bin, capable of containing 25,000 tons of coal when completely filled. Chutes will lead the coal down directly to the hoppers of the mechanical stokers, from which it will be automatically fed to the furnaces. The ashes will be dumped into the basement, from which they will be conveyed out to be loaded directly into barges on the river front. The coal will be brought in barges to the same dock, whence it will be unloaded by elevators and carried up by automatic conveyors to be dumped into the great coal bin above mentioned. Six lofty smokestacks will be arranged at intervals, down the full length of the building, and a novel feature is that the brick portion of the smokestacks will terminate soon after it enters through the roof of the building, the whole substructure of the stacks, consisting of massive steel towers built of riveted columns similar to those that carry the floors of the building. A large amount of interior space will thus be available which has hitherto been taken up by the large bulk of the brick smokestacks. Current will be generated by compound engines of 8,000 horse-power. They will be of the same general type and slightly more powerful than those installed in the 76th Street power house of the elevated railway system, and they will have a maximum capacity on overload of over 12,000 horse-power. There will also be installed a separate set of generators for generating current for lighting the Subway, and these will be driven by direct-connected, Westinghouse-Parsons turbines. When completed, this great building will have a maximum capacity of 132,000 horse-power.

William Wilcox, a well-known manufacturer of Middletown, Conn., died during the latter part of March. He was the inventor of the rotary key-hub and the flat key which is now in general use. The business over which he presided until a year ago is a very extensive one, and the deceased had amassed a very large fortune in the manufacture of devices and inventions, which were largely the product of his own brain.

PROPOSED LIGHTHOUSE FOR CAPE HATTERAS DIAMOND SHOAL.

The marine graveyard for many ships, steamers and other vessels on the Atlantic coast is generally known to be located around the treacherous Cape Hatteras shoals in North Carolina.

The lighthouse located on the outer bar is too far inward from the Diamond shoals to correctly locate them, while the lightship is too distant seaward to indicate just the line of their outer boundary, but is far enough out to insure sufficient depth for all vessels. In rough weather the light is not easily discernible. A permanent structure located at the edge of the outer shoal, and high enough to be seen in all kinds of weather, has become a necessity. An attempt was made not very long ago to build a lighthouse on this shoal, but was unsuccessful. For four or five years past Capt. Albert F. Eells, of Boston, Mass., has given the subject much study, and has recently been successful in persuading Congress to give him an opportunity to build a lighthouse at his own expense, as explained in the House of Representatives bill No. 7,264. Under the terms of the bill he is authorized to construct a substantial, sufficient lighthouse and fog signal of the most improved construction, together with auxiliary works of the most modern character and such as will be necessary to maintain the same permanently at the outer side of the outer Diamond shoal on the coast of North Carolina, at Cape Hatteras.



THE PROPOSED NEW DIAMOND SHOAL LIGHTHOUSE OFF CAPE HATTERAS.

Work of construction must begin within a year from last April, and the structure must be begun where the water is at least thirty feet in depth at mean high tide.

The superstructure of the tower, being 30 feet above the high-water line, must conform to the specifications of the government engineers and must have a circular steel tower or mast of sufficient diameter to contain a spiral stairway, all properly braced, the tower to have a light supplied by the lighthouse board which shall be at least 200 feet above mean high tide.

Capt. Eells is given the right to construct the base to a point 30 feet above high water in any modified form and to locate it on the site selected by the lighthouse authorities subject to the approval of the Secretary of the Department of Labor and Commerce.

When the structure is completed Capt. Eells is required to maintain it and the light for one year at his own expense. The Lighthouse Board then operates it for four years at the government expense. If the lighthouse is then approved and accepted by the Secretary of Commerce and Labor, the United States is authorized to pay Capt. Eells the sum of $590,000.

The illustration shows the general shape and proportions of the proposed lighthouse, and the upper diagram sketch explains the sectional construction of the base, with a map showing the location relative to the present lighthouse on the bar. This point is about ten miles seaward therefrom.

The present plan is to construct a steel base about 60 feet high and at the bottom about 75 feet in diameter, with double walls, one inside the other, with a space between varying from 15 feet at the bottom and 4 feet near the top, which annular chamber is to be filled with sufficient masonry to sink the bell-shaped caisson to a floating depth 28 feet in the water. The entire structure is framed and braced like a ship and planked in the same way. It is expected the caisson will be built in Portsmouth, Va., and towed in about two days to the designated site, which has a depth of 30 feet of water. There it will be sunk or grounded. Then the wall built up between the two walls and the sand in the interior to be drawn up by suction pumps worked probably by gasoline engines. As soon as the caisson is well sealed at the bottom compressed air will be admitted to the working chamber, which will be about 9 feet in height, and workmen will dig out the sand in the usual way under the edges of the structure, permitting the whole to sink possibly to a depth of 30 feet or more in the sand until a solid foundation is obtained. After this the central chamber, 6 feet in diameter, is filled, first by a wall being laid, on which the structure rests; then the chamber is filled with sand or other material, which completes the work. After this the steel superstructure, including the spiral steel stairway, is built. The masonry work is to be carried up 90 feet from the extreme bottom.

The lamps can be lighted when the structure is first towed to sea and showed nightly, if desired, while the work is going on.

The lens will be placed in a room at least 10 feet high, where nearly all the intricate mechanism for working the light and feeding the immense burners will also be situated. On the outside of this structure will be a high railing and promenade where the keepers and their families may take outings and observe the waves 200 feet below. Either a steady light or one of the flash order can be placed in the structure under the design; but as all first-class-order lighthouses hereafter will be provided with the quick-flash light, it is probable when Capt. Eells' design is accepted, that this character of light will be placed in it. A space has been provided for a powerful siren. An equipment of wireless telegraph apparatus is likely to be provided, besides local telephones between the base and the living apartments above.

By making the structure exceptionally strong and solid with steel and masonry, it is believed that it will be well able to withstand the fury of the sea at this notable locality.

The inventors' models in the possession of the Canadian Patent Office have been turned over to T. C. Brigham, of Detroit, Mich., and it is announced that they will be classified and grouped in such a manner as to best demonstrate the progress of the country in this particular direction, after which they will be given over to the custody of universities and museums in different parts of the country.

The public schools of Chippewa Falls, Wis., have sent an exhibit to be displayed in the Palace of Education at the World's Fair.

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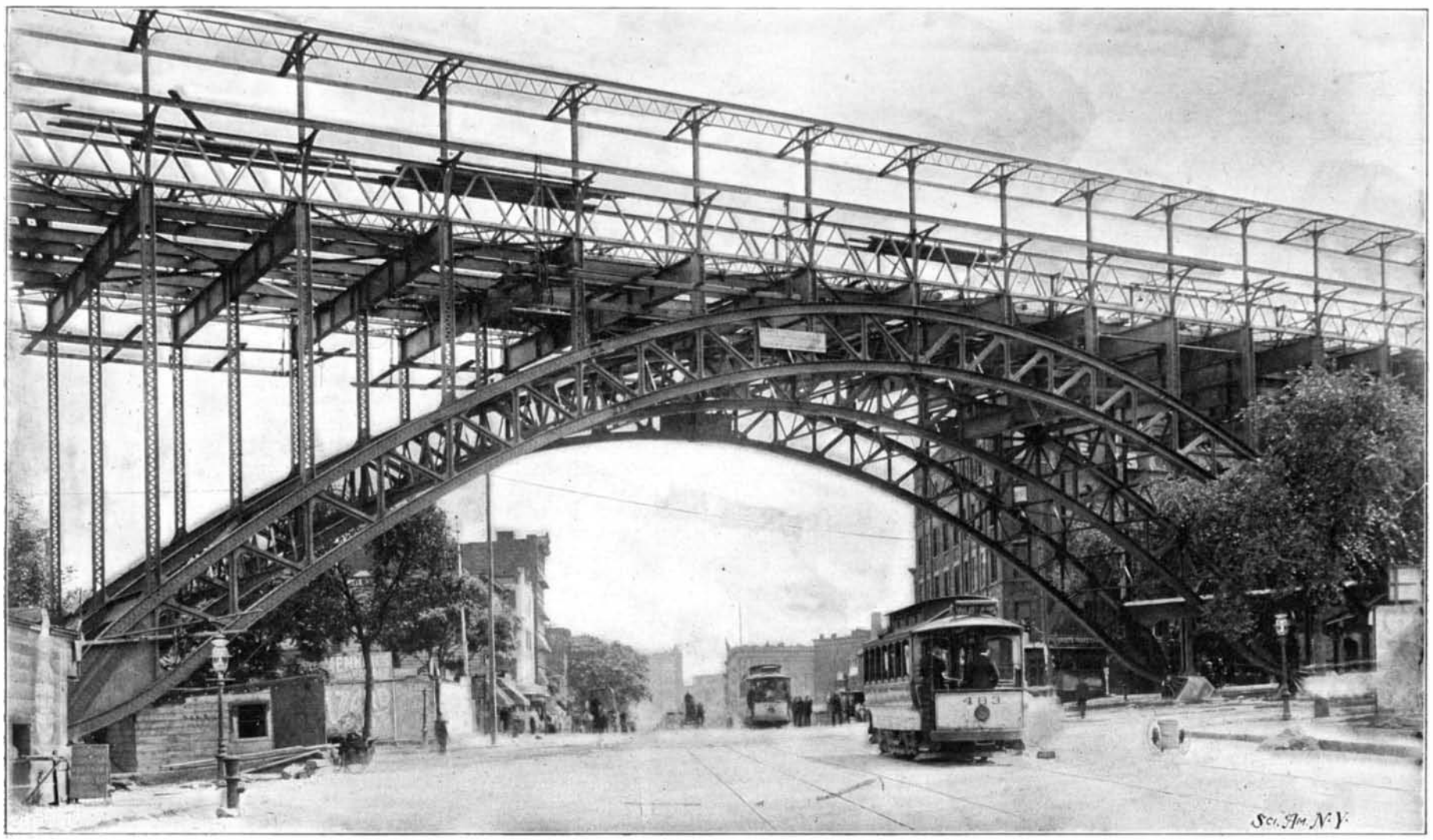
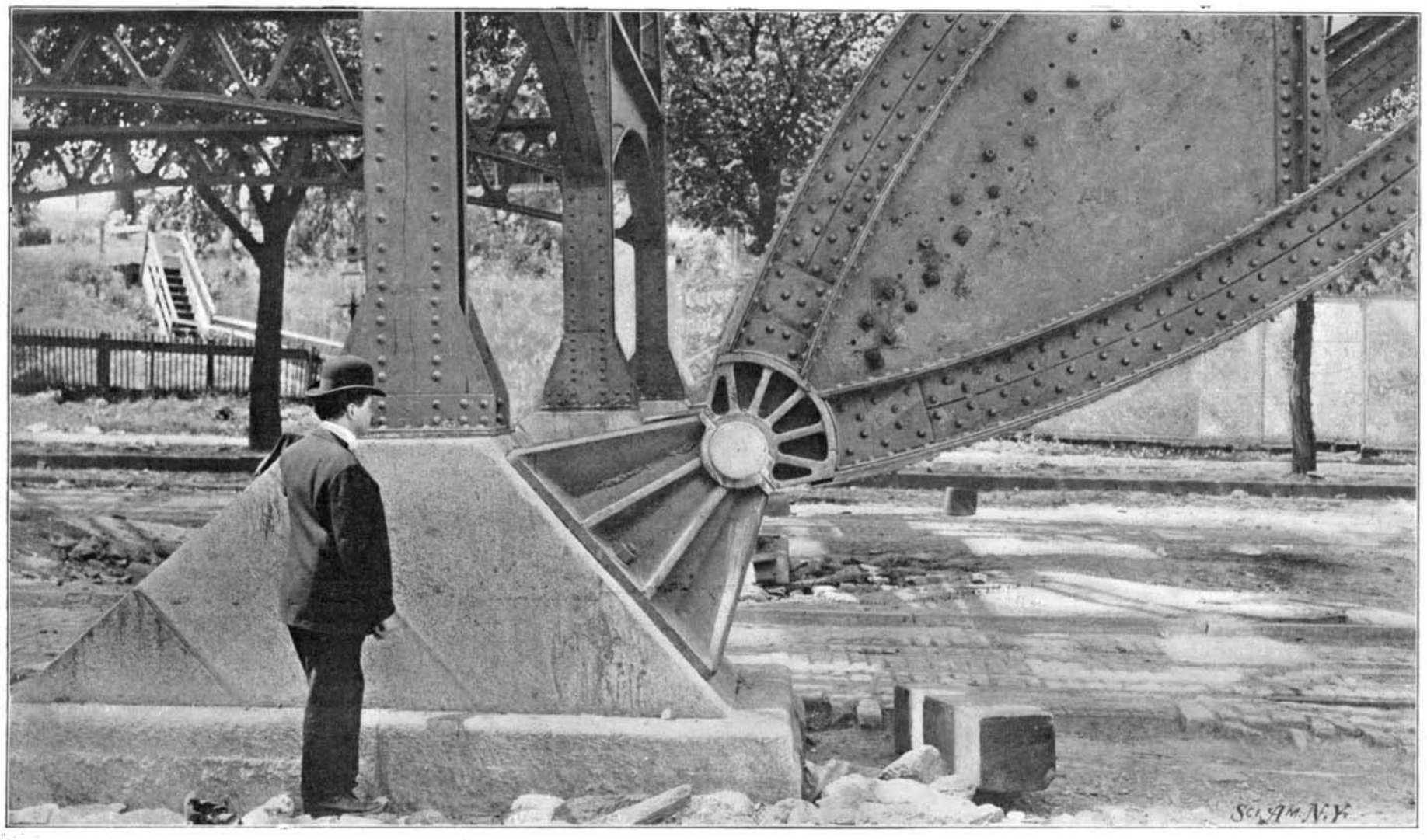


Span of arch, 168½ feet. Maximum rise, 40 feet. Weight of arch and superstructure, 850 tons.

The Arched Bridge and Station at 125th Street.



One of the Skewbacks of the Main Arch.

COMPLETING THE NEW YORK RAPID TRANSIT SUBWAY.—[See page 461.]