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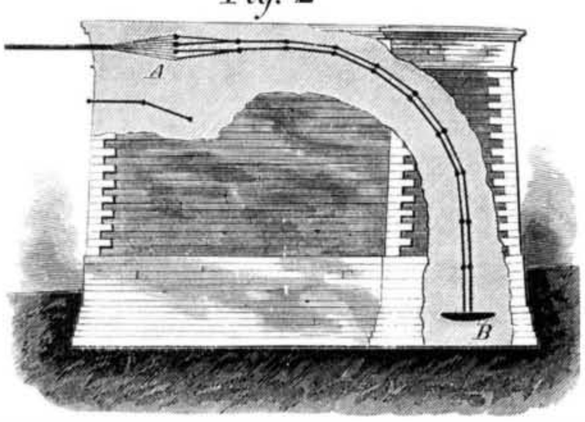
THE NEW YORK ANCHORAGE OF THE EAST RIVER BRIDGE.

Located in New York city, and on the block bounded by Cherry, Dover, Roosevelt, and Water streets, a huge pile of massive masonry, during the past summer, has been rapidly reared. Work upon the structure has been arrested for lack of money and by the setting in of winter, principally from the former cause; and until the opening of spring, it will remain in its present condition. Early summer will, however, find it finished, if New York city responds in furnishing the money for its share of the cost; and the day on which its final stone is laid will mark the completion of the last of the four great monuments which are destined to sustain the wire network of the suspension bridge which will join the metropolis and its sister city, Brooklyn.

Fig. 2

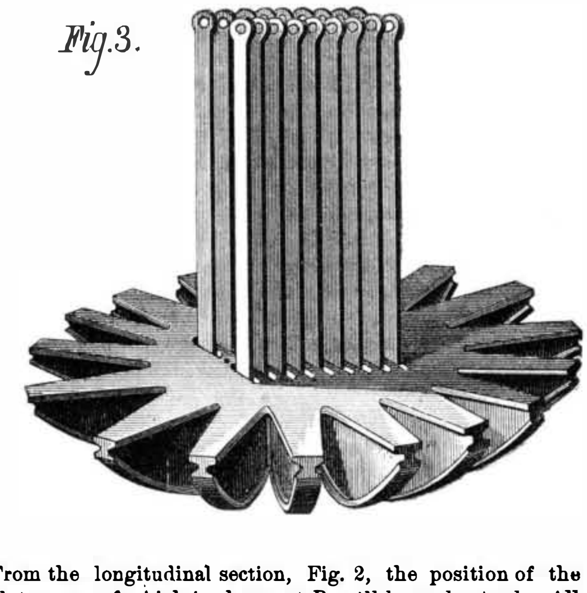


The building of the immense piers, which stand sentinels on the two banks of the East river, has been energetically pushed forward during the year just closed. The tower on the Brooklyn side is entirely finished, save the few cap stones, which cannot be added until after the cables are in place; the summit of the New York pier has reached a hight of two hundred and eight feet, leaving thirty feet yet to be erected. The anchorage across the East river, in Brooklyn, is practically finished. The New York anchorage is the great structure to which we refer in our initial paragraph, and which is represented in completed state in the largest of the engravings given herewith

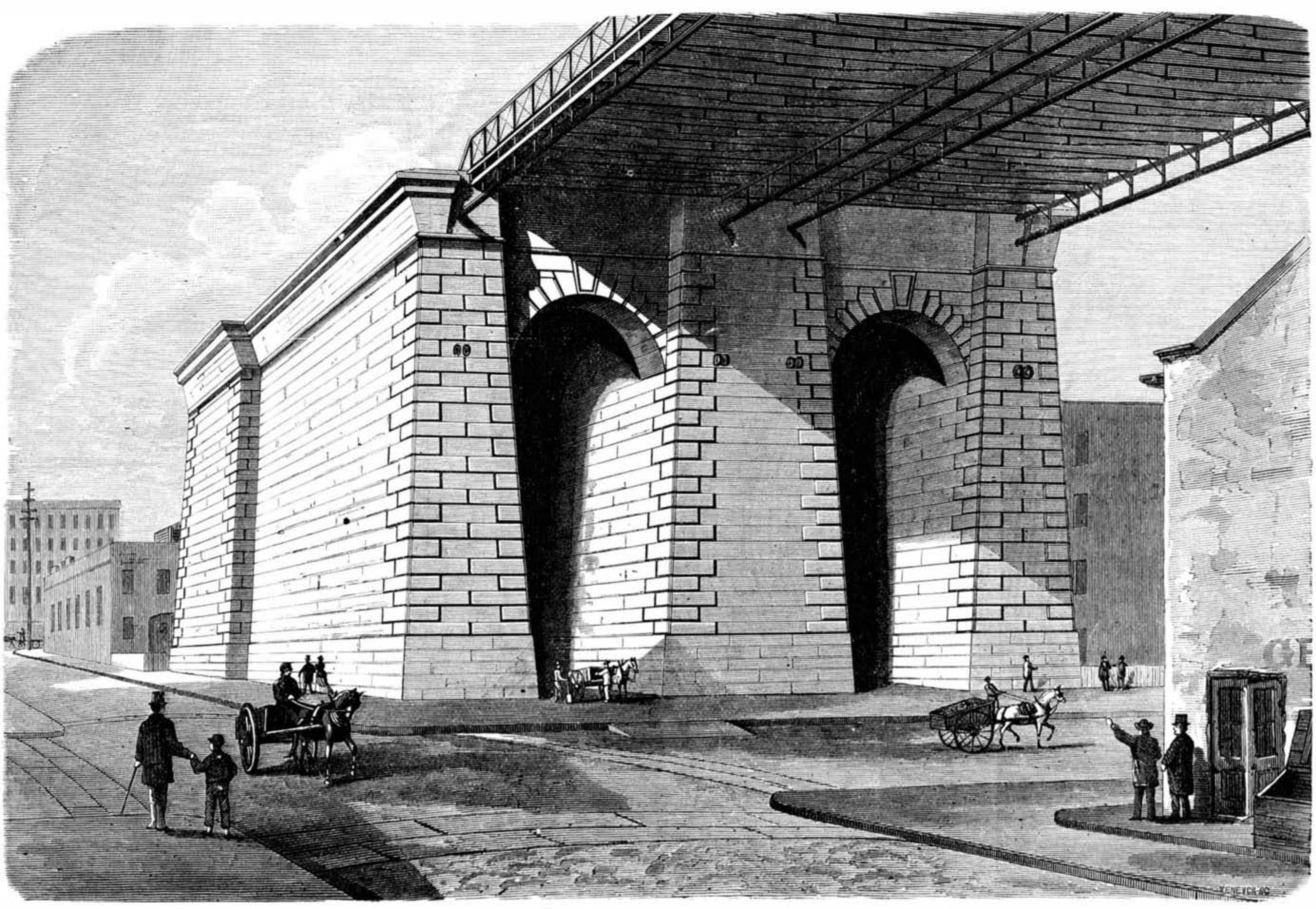
The reader, even if not versed in engineering technicalities, will, without doubt, understand the object and uses of these colossal heaps of stone termed anchorages, from the name alone. Upon them falls the greatest pulling strain of the weight of the enormous wire structure and the traveling weight it is to sustain, since the piers, though withstanding of course a portion of the load, serve primarily to elevate the bridge to the proper hight above the river. Hence the object sought in the construction of the anchorages is extreme solidity and strength, sufficient in fact to enable them to undergo a stress six times greater than that to which, by any chance, they can possibly be subjected. The two structures, located necessarily at each extremity of the bridge, are practically alike, the difference being slight variations in dimensions to suit their respective sites. The New York anchorage is, however, situated in the heart of the business portion of the city, and without doubt will attract a greater share of public attention. For this and other reasons, the following article is devoted to its description.

On the 7th of May, 1875, the pulling down of the warehouses and old rookeries, which covered the ground on which the masonry now stands, began. So rapidly was the work prosecuted that three months later found an excavation, in some places twenty-one feet deep, finished, and 500,000 lineal feet of yellow pine timber foundation in place. This substratum of wood consisted of four layers, placed relatively crosswise, and interspersed with concrete, the whole measuring four feet in thickness. On this was laid the first course of stone, which covered an area 129 feet long by 116 feet 4 inches in width. The material used is a good quality of limestone, obtained from along the Hudson river, parts of New Jersey, and the vicinity of Lake Champlain. As soon as two courses had been set, preparations were made for placing the anchor plates. Of these there are four, each an enormous mass of cast iron weighing twenty-three tuns and made in spider shape, having sixteen radial arms, as shown in Fig. 3 The contract requirements as to the metal were that it should bear a strain of 500 lbs. to the square inch, on a test portion resting on bearings 4½ feet apart. Each plate was cast in a single piece, at Wilmington, Del. To transport such a heavy mass from the pier to the anchorage was a difficult operation, but it was accomplished by suspending the plate by strong bolts from beams of pine extending between two platform cars which traversed tracks laid in the streets. The usual jack screws supplied the lifting power.

Fig.3.



From the longitudinal section, Fig. 2, the position of the plates, one of which is shown at B, will be understood. All are located in the rear of the anchorage, two meeting on the center longitudinal line, and one being disposed at each side. Each plate is embedded in concrete in the third course of stone, the second course being somewhat thinner immediately beneath, so as to form a species of socket. Through the apertures left in the center of the plates, the first set of bars for the chains is placed. Each chain consists of ten sets of links, and two chains lead from each plate. The corresponding links of each pair of chains contain together about nineteen bars. This will be better understood by reference to Fig.



THE NEW YORK ANCHORAGE OF THE EAST RIVER BRIDGE.

3, in which one row of vertical bars make the first link of one of the pair of chains, and the other row of similar vertical bars the other. Each bar at each end has a perforated circular head. The apertures in these heads, when the bars are in place, are in a straight line, so that pins may be put through said holes and also through the openings on the heads of the bars of the next link, when the latter are placed in suitable position, thus connecting the two links and forming a joint. Similarly pins are run through the apertures of the heads, which, in the lowest link, come below the anchor plates, and thus confine the chain to the latter. The heaviest pin used, as above mentioned, measures 7 inches in diameter, and the bars which constitute the links are 13½ feet in length, and vary in area of cross section from from 27 to 21 square inches, according to position. The iron of which they are made has a breaking strength of 50,000 lbs. per square inch.

After the bars which form the first links were in place, the laying of the masonry was continued, and four courses of blocks of granite were built up above the plates, each stone weighing about ten tuns. Then the limestone work was resumed, and this, with appropriate granite trimmings, will be continued through the forty courses, and to a total hight of 89 feet. As the masonry rises, the links of the immense chains will be added, and the latter led in the curve shown in Fig. 2, until they will have extended from the rear and bottom to the top and front of the anchorage. The last links have twice as many bars as the others, but occupy no greater space, as the bars are only half as thick. The bars, moreover, no longer stand parallel to one another, but are set off in pairs, the members of which are at acute angles, so that, along the last pin, half the bars are inclined above the horizontal and half below. To each pair of bars, considered this time in a straight line above or below, a strand of the cable will be attached, so that nineteen strands in all will be fastened to the ends of two chains leading from each anchor plate: and as there are four plates, so there will be four cables, which will convey the strain to the masonry.

A glance at Fig. 2 will show that the effect of the cables, pulling at A, is to upset the anchorage on its front edge. The strain on each cable is estimated at 1,833 tuns, or 7,332 tuns for all four. Against this is the dead weight of the structure, equal to 44,000 tuns. There is, besides, on the masonry a resultant pressure on the joints of the imbedded links of 2,267 tuns; and to meet the pressure at each of these knuckles, a heavy plate of iron is interposed, backed with a large granite block. The strain on each anchor plate is 1,352 tuns.

The general aspect of the structure is excellently shown in the large engraving. It decreases in size toward the top, the area of the summit being 85 feet 3 inches in width by 117 feet in length, and the surface slopes to the rear at the rate of 3 feet in 100. Through the interior of the pile are two arched passages, in front 61½ feet high and 23 feet wide, in rear 22 feet 7½ inches high by 14 feet wide, the difference in size being due to the upward slope of the surface of the ground to the rear. At the present time the structure is 44½ feet above tide, or 35 feet above Water street.

As soon as the New York anchorage is finished, the large unobstructed area of its summit, as well as that of its companion structure in Brooklyn, will be occupied by the machinery for spinning the wire cables, which will be one of the most interesting mechanical features of the whole enterprise. The first cord will probably be thrown across the river sometime next June, and from that time forward the building of the wire portion of the bridge will, it is expected, be vigorously prosecuted.

A NEW USE FOR THE EAST RIVER BRIDGE.

It is a well known fact that, owing to the rapid increase in size and population of the city of New York, the water supply is insufficient to meet all demands. The daily consumption is on an average something over 100,000,000 gallons, a much larger quantity in proportion to the population than is the case with either Paris or London. There is no question but that at the source, the valley of the Croton, into which the watersheds of Putnam county and vicinity direct their streams, there is an abundance of water. The difficulty is found in the aqueduct, which is a brick tube 53·34 square feet in area of cross section, and which is called upon to supply pipes aggregating 57 feet. The friction of the fluid in the smaller tubes and the approximate cessation of drafts on the reservoirs between midnight and morning alone prevent absolute deficiency in the ten days' supply which the Croton Bureau is obliged to keep constantly on hand. The new aqueduct, of which, we understand, the preliminary surveys are begun, will without doubt cure the difficulty; but in the meanwhile a large part of the built-up portion of New York, including the exclusively business section, suffers severely from a lack of water for fire purposes.

How to provide for this want is just at present a mooted question; and among the various plans proposed is one by Mr. A. W. Craven, ex-chief engineer of the Croton Aqueduct, which consists in constructing large storage reservoirs in the lower part of the city and keeping them filled with sea water by powerful pumping engines. The principal objections urged against this project are its expense and the fact that the reservoirs themselves might not be wholly free from danger in case of an extensive conflagration in their vicinity. It seems to us, however, that both of these objections might in a measure be obviated by using as the tanks two enormous ones which are now built and lying empty, and of which no one, so far as we are aware, has hitherto suggested any means of utilization. We mean the hollow towers of the New York pier of the Brooklyn bridge. This immense structure contains within it two watertight cavities 120 feet in depth, or rather in hight above the ground, and 13 by 19 feet in cross section. An approximate calculation of the contents gives about half a million gallons to each; or in both together, over one million gallons of sea water might be stored. It is not assumed, of course, that the supply from these could or would be utilized for up-town districts, and there supply is not so much needed; but it would, in case of a conflagration, offer a valuable addition to the present deficient water facilities down-town, among the warehouses and shipping of the city. Similarly the interior of the Brooklyn pier would offer a reservoir for water for protecting the valuable storehouses and shipping in its vicinity. The hight of the head is fully 60 feet above the tallest buildings, excepting, of course, the very lofty structures recently built by the Western Union Telegraph Company and the *Tribune*, and a few other fireproof structures, and therefore the water could be led under a heavy pressure directly to any story.

ELECTRICITY AS AN EXECUTIONER.

The revolting scenes accompanying the execution of several criminals in this vicinity are well calculated to bring to public notice the disadvantages of hanging as a a mode of capital punishment.

The teachings of Science are heeded and sought for in the building of prisons, in the management and care of convicts, and in every modern correctional system; and yet in so simple and easy a process as the extinguishing of human life, they are utterly ignored.

The most certain and painless death known to Science is caused by the lightning stroke, or by, what amounts to the same thing, the electric shock. When a powerful discharge of electricity is received in the body, existence simply stops, and the reason is obvious. Helmholtz has proved that, for any vibration which results in sensation to reach the brain through the nerves, one tenth of a second of time is required. Furthermore, time is also needed for the molecules of the brain to arrange themselves through the effect of that vibration, through the motions and positions necessary to the completion of consciousness, and for this an additional period of one tenth of a second is expended. Consequently, if, for example, we prick our finger with a pin, it takes two tenths of a second for us to feel and recognize the hurt. It can easily be conceived, therefore, that if an injury is inflicted which instantly unfits the nerves to transmit the motion which results in sensation, or if the animating power is suddenly suspended by an injury to the brain before the latter completes consciousness, then death inevitably follows with no intervention of sensibility whatever.

Now a rifle bullet, which traverses the brain in the one thousandth of a second, manifestly must cause this instant stoppage of existence, and proof of this is found in the placid faces of the dead, and in the fact that there is nothing more common than to find men lying dead on battle fields, shot through the brain, but with every member stiffened in the exact position it was in when the bullet did its work. But a rifle ball is slow beside the electric shock. Persistence of vision impresses a lightning flash on the retina for one sixth of a second; but its actual duration is barely one one-hundred thousandth of a second.

The effect of the shock on the system is excellently described by Professor Tyndall, who, while lecturing before a large audience, inadvertently touched the wire leading from 15 charged Leyden jars, and received the whole discharge through his body. Luckily the shock was not powerful enough to be fatal; but as the lecturer regained his senses, he experienced the astonishing sensation of all his members being separate and gradually fastening themselves together. He says, however, that "life was blotted out for a sensible interval," and he dwells with much stress upon the opinion that "there cannot be a doubt that, to a person struck by lightning, the passage from life to death occurs without consciousness being in the least degree implicated. It is an abrupt stoppage of sensation, unaccompanied by a pang." So much for the death which, by suitable alteration of the law, we would have substituted for slow strangulation. The next point is its practical accomplishment.

Instead of building a gallows and providing rope, the sheriff, advised by a competent electrician, would procure a powerful Ruhmkorff coil and a heavy battery. These instruments would rarely need replacing, and would last indefinitely for other executions. The battery and coil should be of sufficient strength to deliver an eighteen inch spark. In case of their being more than one person to be executed, all of the condemned would be conducted with all due ceremony to the place of execution, the left hand of one man handcuffed to the right hand of his neighbor, and the conducting wire fastened to bracelets on the disengaged wrists of both criminals, if only two are to be hanged, or to the wrists of the outer men, if more than that number are to suffer. The culprits being seated so as to be seen by the legal witnesses, the sheriff presses a button. The current is instantly established from the coil, passes through the bodies of the men, and all is over. With a competent electrician, who might be a member of the police force, and specially charged with the duty, there would be no possibility of mistakes. The same ignominy which attaches to the gallows would be transferred to this mode of destruction, while the peculiar death by lightning, which, among the ignorant of all nations and ages, has been the subject of profound superstition, would without doubt, through its very incomprehensibility and mystery, imbue the uneducated masses with a deeper horror.

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