evident that some other plan must be adopted, and it was equally obvious that the pile foundation first designed could never be relied upon in so treacherous a bottom. It was therefore determined to build a masonry pier in place, sinking it bodily to the rock, and building up as it descended. A timber caisson 70 ft. long, 22 ft. wide, and 12 ft. 6 in. high, was accordingly made on shore. It was built with double walls, the outer vertical, the inner inclining outwards and downwards from the top to the bottom, where both walls met with a sharp cutting edge iron-shod, and transverse walls were also made and protected in a similar fashion. This caisson had to carry the whole weight of the pier, and cut its way through the sand as it descended. There were employed in its construction 60,000 cubic feet of oak and 11 tons of iron. Whilst this work was proceeding on shore, the necessary staging was being completed in its new position in the river. It consisted of sixty piles, carrying seven timber trusses capable of supporting ten or twelve thousand tons. Twenty-four suspension screws, 20 ft. long, and from 2½ in. to 3 in. in diameter, were placed in the tross frame above, and twenty-four 2½ in. rods were built into the caisson in corresponding position, passing through the timber sides from top to bottom, and taking hold below the main sill. In order to launch and guide the caisson properly into position, a false bottom was attached to it, and on the 21st of October it was launched sideways upon iron shoes, so arranged as to lift up the lower side of the caisson as soon as it struck the water, and so prevent it from tilting over. It was then floated into position beneath the timber trusses, to which it was secured by tie rods. The false bottom being then removed, the caisson was lowered through 7 ft. of water on to the sand, and the building of the pier commenced upon it. The caisson was covered with concrete to a depth of 24 ft. From this level the work of the pier was commenced and carried upwards. Care had been taken to leave four wells in the concrete running right through its entire depth, and corresponding in position to the chambers made in the caisson by the three transverse wells. These apertures sufficed for the free working of the dredges by which the sand and soil from beneath the caisson was removed, and its uniform descent secured. In order to obtain sufficient room for the labourers and machinery required, the temporary works around the pier were built in three stories: the lower one was a platform extending round the caisson, the second and third floors were roofed in, and being heated with stoves, were converted into comfortable and commodious machine shops. A line of shafting driven by a steam-engine extended the entire length of the building, and the power was transmitted by means of countershafts and belt to all parts of the building, to drive the four dredges which were kept at work to excavate the sand from below the caisson. Upon the upper floor were the winches by which the position of the dredges was regulated, and their length adjusted as they penetrated deeper into the sand. The dredging machines were, in fact, endless chain elevators, arranged with telescopic frames and adjustable heads, so that they could be readily lengthened as the pier descended from a height of 51 ft. to 85 ft. Duplicates were provided beforehand of all important parts, and a repair shop, offices, &c., were built upon the staging. Two hundred and forty men were placed upon the pier, and when once started work was carried on incessantly. On the 26th of December, 1868, the pier had reached a height of 26 ft., and the work of excavation beneath the caisson was commenced. Contrary to the experience gained from the other piers, the one in hand sank rapidly, 6 in. an hour; or 10 ft. a day being made, a rate much faster than the workmen employed in building the pier upwards could keep pace with. One half the dredging force was therefore dispensed with, and the operation of sinking was carried on at intervals, the length built up during the day being sunk at night, so that the masonry of the pier was apparently always at the same level. In this manner, the sinking was successfully continued, until, on the 6th of February, an obstruction was reached within 4 ft. of the rocks, which brought the pier to a standstill. An examination discovered the existence of a local mass of boulders and blue clay, of which the previous borings had given no intimation, and upon which the dredges employed could make no progress. Divers then had to be obtained to descend the well-holes, and remove the obstruction piece by piece. This was a work of great difficulty, which was increased by the fact that the coldness of the season rendered it almost impossible for the men to work; this trouble was, however, got over by laying on pipes from the steam boilers down the well-holes, and raising the temperature below to the desired degree. It was two months before this thin obstructive stratum was penetrated; the boulders had to be displaced separately, and the clay, which was mixed with fossils, teeth, agates, carnelians, granite, and jasper pebbles, was sent up to the surface by the buckets of the dredging machines. By the 10th of March, the bottom of the caisson had touched the rock, the dredges were taken away, the well-holes were filled with concrete, and the building of the pier was continued until, on the 5th of May, the ultimate level was obtained, and its last stone, which was also the last stone of the bridge, was laid.

Pier No. 6 had exactly similar foundations to No. 7. Both were in a depth of sand too great to reach the rock, and were founded upon piles driven at the bottom of an excavation plumbed over and covered with the