

water jet, by which the sand from the more remote parts of the caisson was fed to the siphon and dredge. To give additional weight, the spaces between the timbers of the upper section were filled with rubble masonry, which was protected from injury by an inside sheathing of thin boards. In order to diminish the external sand friction, a large cast-iron pipe was placed around the caisson above water, from which a series of small gas pipes extended down nearly to the cutting edge, thus forming a line of water jets encircling the caisson, and distributing the discharge of a single pump around the whole surface. An nine-inch Alden pump was attached to this set of pipes, but it proved unequal to the task, and only half of the pipes, those on one side of the caisson, were ever worked together; the force of the stream so widely distributed was also too much reduced for effective work, and it was generally preferred to use a single movable jet, which could be taken in turn to every part of the caisson.

The changes in the bottom during the work on this foundation were very frequent and singular, sometimes causing no small trouble. In November a scour was noticed around the anchor piles, which was accompanied by a deposit at the pier site; the elevation of the sand, which was materially lower on the first of that month than it had been when pile-driving was begun in August, was raised 11 feet in three weeks. On the 2d of December there were 14 feet of water outside of the caisson at the upper end, and 22 feet at the lower end; one week later this was reversed, when the water was found to be 24 feet deep at the upper end and only 12 at the lower. Some of the smaller changes, though less embarrassing, were more remarkable. About the middle of December the river gouged out a hole in the sand, close to the south-west corner of the caisson, extending clear to the rock, which was examined by the diver; the sand was soon filled up to the ordinary level. A similar hole was washed out about a week later, and some pieces of floating ice were sucked under the edge of the caisson and came up inside.

On the 10th of January the descent was stopped by coming in contact with a buried log; this was cut half through by the diver with a handsaw, and then, the saw binding so much as to make its farther use impracticable, a large chisel was mounted with a long handle so as to be worked from above, and the cut finished by striking repeated blows on it; only four days were lost by this ob-