

the estimated daily excavation. 2d. The readings of the gauges, daily progress, and average elevation of the cutting edge. 3d. The soundings opposite each gauge, and average elevation of the sand surrounding the pier. 4th. The displacement and the actual and effective weights of the pier. 5th. The area of the surface in contact with the sand, and the effective weight for each square foot of such surface in contact, with estimated friction.

The material dredged was at first a soft sticky silt, which could be handled only in connection with a large amount of water in the form of a thin, flowing mud. The work was conducted very carefully, the gauges were constantly watched, and the screws were tended continually; with these precautions little difficulty was experienced in keeping the pier true; after it had been sunk ten or twelve feet the surrounding sand answered as a guide, and less care was required to regulate the descent. Owing to the weight of the pier and the care with which the machinery had been arranged, the sinking proceeded at a very much more rapid rate than had yet been accomplished with the bottomless caissons, and exceeded the expectations of the engineers. On the 6th of January, only two days after both shifts of men had been put on, the work had to be suspended, because the beton could not be put in fast enough to keep pace with the descent, and from this time forward the chief difficulty lay in building up the pier rather than in sinking it. The water jets were found to be of less service than had been anticipated, the wedge-shaped edges feeding the sand to the dredges without their assistance; streams of water were occasionally passed through the pipes at the nose and shoulders, and all the outside pipes were lengthened as the height of the caisson was increased, but those in the cross-walls were allowed to be buried up in the beton.

On the 7th the machinery had to be stopped again, and it remained idle nearly a week; on the 8th the beton was nearly all in, reaching to the top of the second section. A third section had meanwhile been added, twelve feet high, the end walls of which were at first made only one-half this height, to facilitate handling the stone. On the 9th the river rose about a foot, causing a strong current on the south side of the works, which was found to have increased the depth of water from nine to seventeen feet, so that the pier began to settle over slightly, till held by the suspension screws; one hundred and fifty gunny