

covering the whole circular area. This was in accordance with the original intentions of the chief engineer, the plan of starting the masonry on the bed rock having been an after-thought, and regarded throughout as an experiment. If precautions of the same kind as at Pier No. 1 could have been taken, this plan would probably have been successful; but it was first determined to make the attempt after the caisson had been placed, when it was too late to arrange the sheet piling which had proved so effective before. In the haste, also, to have this foundation completed, an insufficient time had been given for the beton to harden, showing the danger of haste in work of this kind.

The bulk of the beton in this foundation was laid in a box designed expressly for these works.* It was of rectangular form, having a capacity of half a yard, with a bottom formed of two leaves opening outward from the centre and fitted with a cover of similar construction. On either side two chains, one fastened to each of the lower leaves, were united into one near the top of the box, and those from the two sides were brought together in a ring hung upon a tripping-hook, of no novel form, above; the tripping-hook was permanently attached to a cross-head by a loose chain. When the box had been filled with beton the covers were closed, and it was lifted by a rope attached to the short end of the tripping-hook and lowered into place; the tripping-hook was then raised by a hand-line attached to the long end till the ring dropped from it; on drawing up the main rope the box was lifted by the loose chain attached to the cross-head, the leaves opening freely and discharging the beton. The advantages of this form of box lie in the protection it affords from washing in the descent and discharge, and the ease and certainty with which it may be tripped when once lowered upon a bottom.

On the 24th of January the pump was started and the water in the caisson was lowered rapidly. The following day the tub was pumped out and the beton laid bare; it was found in general to have set satisfactorily, though not perfectly homogeneous, and covered with several inches of *laitance*; but after a few hours the water came in again, probably working its way through fissures in the rock and voids in the foundation. Grout was poured through a funnel into the holes through which the water had come, as far as this was found possible, and six

* This box is shown on Plate VI.