

a half short, to allow for any rendering under a strain; the strength of the current, which was but slightly deadened by the upper rest, was so great that this allowance proved insufficient, and when finally placed, though almost exactly in position on the bridge line, the caisson was found to be about 20 inches too far down stream—an error which, being less than the excess of the radius of the caisson over that of the pier, was of no consequence.

The caisson was now surrounded with a row of gunny bags filled with clay and packed around with hay; the current was too strong to allow a diver to work on the outside except on rare occasions, and the bags were placed by lowering a number of them, united into a string, from above; a joint formed in this way must, however, be very imperfect, and it was but little relied on. An inspection of the cutting edge, made by a diver within the tub, showed that, in consequence of the irregularities of the surface, it was in actual contact with the rock at but few points, while in some places the distance between was as much as 10 inches; it was also found that a cone of sand was left inside of the caisson three or four feet deep at the centre, and which was constantly increasing from the deposits swept under the iron edge. Holes drilled four or five feet into the rock showed it to be perfectly substantial. A circle of gunny bags filled with freshly mixed beton was then placed by the diver against and under the inside edge, over which was spread a ring of beton of triangular section; the beton in this ring was lowered in boxes from above and placed by the diver, who first carefully jetted away the sand remaining on the rock.

On the 29th of December, after waiting two weeks for the beton to harden, an attempt was made to pump out the caisson. The joints were found to be perfectly tight, the subsidence of the water being nearly equal to the discharge of the pumps; but when the water had been lowered nine feet, the outside pressure broke through a fissure in the rock under the beton and forced a leak which exceeded the capacity of the pump. An additional amount of beton was put in, increasing the section of the ring, and the crevice in the rock filled up as well as possible, and after a short delay a second attempt at pumping was made, but with no better results than the first. Not wishing to lose any more time, no further attempts were made to lay bare the rock; after pumping out the sand in the middle of the tub, a beton foundation eight feet deep was put in,