

engine ; it is thought that under this arrangement a sufficient lifting power can be obtained to make the proportioning of the draw sufficiently correct to prevent distortion.

The 130 and 176 foot spans, as well as the little iron span, were raised in the spring of 1868. The 130 foot span was the first erected, the trestle used in building Pier No. 1 being made available for one side of the false-works. The two other spans were over dry land at the time of their erection, and ordinary false-works, resting on the ground, were used for their raising. The remainder of the superstructure was not raised till the spring of the following year, when the first span raised was that between Piers 5 and 6, while the sand bar continued dry. The greatest difficulties occurred in the case of the span between Piers 3 and 4, where the strength of the current and depth of the water, especially near Pier No. 3, would have carried away any common false-works in a very few hours. The distance between the caisson around Pier No. 3 and the false-works at No. 4 was divided into four nearly equal spaces. Between the first and second of these spaces, a cluster of eight piles in two rows eight feet apart was driven in thirty-five feet of water, the piles being kept from washing out by guying them with lines as fast as driven ; a crib of round timber was then built, enclosing the piles, which, on being sunk by filling it with stones, should at once retard the wash and bind the piles together. A precisely similar arrangement was adopted between the second and third spaces. This work was begun on the 10th of March ; on the 14th the weather became very cold, and the ice began to run in large quantities ; the numerous obstructions of the false-works impeded the flow of ice, and in the forenoon of the 16th it jammed at the bridge site and the river became closed. The weather had already begun to moderate, and in the afternoon of the same day the ice moved out ; it was very weak, but the cakes had packed together, forming large thick fields, which, however, were too soft to bear the weight of a man. The sixteen piles of the two clusters had been driven, a crib had been built about the first cluster, though not sunk, and carpenters were at work upon the second crib, when the ice began to move across the whole width of the river at once ; it tore out all of the sixteen piles, taking the cribs with them, and carried along with it the pile-driver, barges and men. The boats moved but slowly, being frequently