

the opposite sides, the cross-bars, B, were swung so that the cages covered the other two quarters, and the riveting was completed.

In this way, this traveling staging, carrying eleven men, went to the top with no trouble whatever, the operations following each other in rapid succession, and within 27 working days from the driving of the first rivet at the bottom, the last rivet was driven at the top, including the hanging of three sets of guys, and painting the chimney inside and out. A cast-iron capping having been put in place, a permanent iron ladder was hung from top to bottom.

The cages were then lowered to the ground and the frame taken apart and dropped, two pieces of timber being laid across the top, from an eye-bolt in which were hung blocks and falls for the purpose of raising a platform which carried the masons and material for putting in an eight-inch lining, which was done in about 20 days. The blocks were then lowered and the cross-timbers dropped, and a completed chimney stood as a testimonial of the quickest time on record for such a job. The total weight of the chimney, including the base, ring, and cap, is 100,105 lbs. The cost for the labor, including punching and rolling the sheets and straps, and all labor incidental to the erection, did not exceed $2\frac{1}{10}$ cents per lb.

DISCUSSION.

Mr. Borden.—There is a chimney at Chester, Pa., similar to the one just described which was built without any staging. The upper course was put together first, then raised sufficiently to put another under it, and so on until the whole was completed. It was lined with a single course of fire-brick laid spirally.

The brick were $12'' \times 6'' \times 4\frac{1}{2}''$, and made to fit the circle of the shaft.

Mr. Kent.—I think the method of building described by Mr. Coggin is practised in other places by the builders of fire-brick stoves for blast furnaces. They require chimneys from 150 to 200 feet high. I have heard of one of that kind being built in Harrisburg.

Mr. Nagle.—The stand-pipe for the Providence Water Works was erected in the same manner. It is 108 feet high. I don't know the cost of it. It was done under contract work.

The Chairman.—The statement made by Mr. Borden is interesting. The courses are laid on a spiral, and one obvious advantage in doing it was, I presume, that the pitch of the screw was the

thickness of one brick, and thereby the cutting of bricks was avoided. The question whether the brick was a true multiple of the circumference of the circle was eliminated.

Mr. Borden.—The first course was laid rising just enough to gain the height of a brick in one course around.

Mr. Durfee.—In this connection I will say that I built one chimney carrying out the idea named, on which I laid the brick in the form of a double-threaded screw. The flue was six feet in diameter and 100 feet high. The bricks were four and a half inches wide and two and a half inches thick.

Mr. Borden.—That chimney had a stone base about fifteen feet high, and the iron tube was one hundred and eighty feet high, the iron in a few of the lower courses being $\frac{3}{8}$ inch thick, then about ten courses each of $\frac{5}{16}$ inch, $\frac{1}{4}$ inch, and $\frac{3}{16}$ inch thick, and a few of the upper courses were $\frac{5}{32}$ inch thick.

The diameter of the flue was nine feet four inches.