The Chicago Water System.

The inhabitants of Chicago consume daily over sixty million gallons of water for domestic and manufacturing purposes, or about one hundred and ten gallons per individual, an average said to be greater than that of any other city in the United States; and yet it has the reputation of being a very dusty, dirty city! The system by which this supply is obtained may be interesting, as it is unusual in some of its principal features.

In 1839, Chicago being a city of about 4,200 inhabitants, a company was formed for the purpose of supplying the city with water, which it pumped from the shore of Lake Michigan into a small reservoir, using for this purpose an engine of 25 horse-power. The rapid growth of the city increased the size and importance of the system; in 1851 (population 30,000) the water was drawn through a pipe from a reservoir six hundred feet from shore, and distributed by a two hundred horse-power engine; in 1866 the population was 138,000, and the engines pumped over 6,000,000 gallons a day, their capacity being 20,000,000 gallons. But by this time the presence of innumerable small fishes in the lake reservoir, and the contamination of the water near shore by distilleries, packing houses and city sewage made the supply dangerous to health; and it was finally resolved, as a means of obtaining pure water, to tap the bottom of the lake, opposite the city and two miles from shore, by a tunnel, through which the water could be brought. Experiments showed that the lake bottom, from the shore to this point, was composed of a layer of sand of varying thickness, below which was a stratum of stiff blue clay, through which the tunnel would pass.

Ground was broken for the shore shaft in March, 1864, but a difficulty was immediately encountered in the shape of a layer of quicksand, which rendered the proposed masonry walls impracticable. After some delay there was substituted a series of cast-iron cylinders, nine feet inside diameter, and one and one half inches thick, in ten-foot sections, and below these the shaft was lined with masonry, its inside diameter being eight feet. On reaching a sufficient depth a turn was made and work was begun towards the east, on the tunnel, its floor being sixty-nine feet below the water level. The line of direction was established by buoys in the lake at the proposed terminus, and below ground by a drift extending westward from the bottom of the shaft, and having at its extremity a chamber, in which a transit was mounted; the line once fixed was extended with some difficulty, on account of the uncertain atmosphere, during the subsequent work, candles being used as points of sight.

Two shifts of miners, the first for rough work, the second for “trimming,” each shift working eight hours, advanced the tunnel about twelve feet per day, the clay being carried on a railroad —mule power — to the shaft, hoisted and carried off; besides clay there were also encountered a few pockets of quicksand, several large boulders, one of which had to be blasted, and numerous leaks of inflammable gas. During the remaining eight hours of each day a shift of masons, following the “trimmers,” lined the part just excavated with eight inches of brick, toothed and cemented, laid by the aid of patterns and arches of iron. Fears were entertained of a break in the roof, in advance of the masonry; but though the paddle-wheels of steamers passing overhead were sometimes heard, no accident happened.

When work had been carried to about 4,000 feet from shore, operations were commenced at the lake terminus. A pentagonal structure of wood, forty feet high and nearly one hundred feet across, called the Crib, was built on shore, floated into the required position, filled with stones and sunk to the thirty-foot bottom; in a well through its centre was placed an upright pipe, composed of iron cylinders nine feet in diameter, two and one-quarter inches thick, and in nine foot sections; the lower edge of this pipe, reaching the bottom of the lake, sank by its own weight and a little additional pressure twenty-three feet farther, and from this point, fifty-three feet from the water level, a shaft of the same diameter as the cylinders was sunk to