

the locality, that the most advantageous site for the necessary work would be on the rivers edge in the rear of the Library, where the point stands furthest out into the current, and the purest water would most likely be obtained.

The cliff being at almost all parts steep to the waters' edge, except at one place, where there was a small surface of flat rock, at a level of about 9 feet above low water, this was selected as the best position for the engine-house.

The river has here a maximum variation of about 24 feet, between its highest and lowest stages; and it was, of course indispensable that the pumps should be so arranged as to be accessible during periods of highest water.

To avoid excavating into the face of the hill, which would have been both unsightly and expensive, it was decided to place the river front of the engine-house, only 14 feet back from the line of low water mark, and carry up the foundation walls to the required height.

For the purpose of admitting water into the receiving well, which is situated under the north part of the engine-house, a trench 8 feet wide was excavated in the solid rock, to a depth of 6 feet under low water line, and carried out to deep water in the river.

On each side of the trench for 15 feet from the front of the engine-house, walls are carried up, and the space between them arched over. Immediately outside of this, lines of cribwork are carried on either side, and the space over the trench covered with timber. At the outer end is a coarse rack to prevent any large pieces of floating timber from entering. Where the stone arch ends, another rack is placed across the trench, the openings being only $\frac{1}{2}$ of an inch between the vertical bars of which it is formed.

Inside the stone arch, and under the front line of the engine-house, there is a filter 6 feet square, formed of two sheets of finely perforated copper, placed 2 feet 3 inches apart, and stayed by angle pieces of brass. This is divided horizontally into four compartments in height. The entire space is filled with clean gravel—the divisions being for the purpose of lessening the great pressure which there would otherwise be at the base. All the water entering the receiving well passes through this filter.

Means are provided for shutting off the water, at a point outside of the fine rack, when access can be had from the receiving well to the covered way, in which the filters, &c., are placed.

During the season for running timber, these outside works are submerged; a strong boom has therefore been provided, and moored in such a position, as to effectually protect them from injury by rafts, &c.; this also serves to keep the entrance clear from pieces of floating timber.

The engine-house is 36 feet square inside, and is divided into two portions by a wall running east and west. In the north compartment the two pump wells are situated. They are 9 feet long, 3 feet 3 inches wide, and 12 feet 6 inches deep. In each of these is placed a double acting, force and lift pump, 6 inches diameter, and 2 feet stroke. The suction pipes are carried under arches through the walls, and dropped vertically into the receiving well, the ends being furnished with large copper roses. The well is accessible either directly from the top, or by means of a stair leading down to it inside of the building.

The exit pipes of the pumps are carried to a cylindrical air vessel, 2 feet 6 inches diameter, and 13 feet high, placed on a foundation of solid masonry, carried up alongside the west wall. This vessel serves, by the reflex pressure of the air contained in its upper portion, to equalize the flow through the main, and prevent damage by sudden jars or sucks to the machinery.

On the exit pipes are stop valves, which permit of one or both of the pumps being used, as may be required.

Immediately outside the air vessel, a reflux valve has been provided and fixed, which relieves the pumps from back pressure when not at work. A 2-inch pipe is led from the underside of the main (just outside the reflux valve), for the purpose of emptying it; on this is placed a safety valve, weighted to about 90 lbs. to the square inch, so as to permit escape of water, should the pressure in the pipe exceed that due to a column of 210 feet high.

The pumps are driven by steam power. For this purpose a horizontal high-pressure steam engine has been fitted up in the southern division of the house. This engine has