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FAIR MOUNT WATER WORKS.

No. 1. 8-1

Having been repeatedly requested by a number of our readers, both in the city and at a distance, to prepare a minute and statistical account of the Water Works of our city, we are now enabled to comply with their request, through the aid extended to us by the gentlemanly superintendent, Frederick Graff, Esq., who has politely furnished us with the necessary facts and documents.

The first steam engine works for the supply of Philadelphia with pure water, were commenced by the city authorities under the superintendence of Mr. Latrobe, in March, 1799, and as the mode was somewhat novel, in comparison to the works at present in use, we present a short description.

A Basin was formed on the Schuylkill, on the upper side of Chesnut street, 84 feet wide and 200 feet long, which was supplied with water by tide gates from the Schuylkill. The bed of the basin was three feet below low water mark. The water passed from thence through an open canal 160 feet in length into a subterraneous tunnel 6 feet in diameter and 300 feet long, cut nearly the whole distance through granite rock, to the shaft in what was called the Lower Engine House, where the pumps were fixed. This shaft or well was 54 feet deep and 10 feet in diameter, 22 feet of which was also cut out of the solid rock. The water was then raised through the shaft, by the engine, into a brick tunnel of 6 feet diameter and 1048 yards in length, which passed under ground, and lead the water up Chesnut street to Broad, and from thence into the Centre Engine House, where it was again raised 36 feet from the surface, and run into a reservoir containing 16,000 gallons. From this it descended to an iron chest, four feet by eight, outside the building to which the different wooden mains that supplied the city were connected. Their cost and support from commencement to 1814, including the purchase of a lease granted to N. J. Roosevelt, of the power of the lower engine for the purpose of rolling and slitting iron, amounting to \$15,886, was \$657,398 91. The amount of water rents received the first year these works were in operation, was only \$537, which increased rapidly, and in 1814 the sum of \$17,883 was paid to the city for permits. The total amount received for the thirteen years was \$105,351 18, thus leaving a balance of expenditures over income, up to that date, of \$552,047 73.

We notice one item of expenses in the construction of these works that we believe has long since been dispensed with in the erection of public buildings, &c., in this city,—that is, \$898 94 cents for whiskey for the workmen.

In the year 1812, the month of August, the steam works at Fair Mount, intended to supply the place of those at Broad and Chesnut street, were commenced, and were started September 7th, 1815. The original cost of these works, including their support, to the year 1818, was \$320,669 84.

The small and expensive supply of water by the steam engines induced the Watering Committee of Councils in the fall of 1818, to inquire into a more economical means of furnishing the city, which it was found could be obtained by the erection of a dam and other works at Fair Mount, if permission could be had from the Schuylkill Navigation Company, who had an act of incorporation for the improvement of that river, and if the right of White & Gillingham, to a water power at the Falls, about five miles above the city, could be purchased.—Both these objects, it was found, could be obtained—the first, by an agreement with the navigation company to erect locks and a canal on the west side of the river, opposite Fair

Mount, at the expense of the city, and the other object by a purchase from Messrs. White & Gillingham, of their water power, for \$150,000. The subject was submitted to Councils, who approved of it, and made an appropriation of \$350,000 to the object.

On the 19th of April, 1819, this important work was commenced by Captain Ariel Cooley, with whom a contract was made for the erection of the dam, the locks and canal, the head arches to the race, and the excavation of the race from a solid rock, for the sum of \$150,000. He had nearly completed it, when he was taken off by disease, supposed to have been contracted by exposure, while attending the work. It will remain, however, a monument to his memory.

For the purpose of showing the difficulties that Mr. Cooley would have to encounter in the construction of a dam across the stream, we will here state the nature of the work that was to be accomplished.

The river at the place contemplated to erect the dam, is nine hundred feet in width, about one-fourth of which, at the bottom, on the eastern side, is supposed to be rock, covered with about eleven feet of mud; the remainder is of rock. The greatest depth in any part, is thirty feet at high water, and it gradually shoals to the western shore, where the rock is left bare at low water. The river, whose average rise and fall is six feet, is subject to sudden and violent freshets.

Mr. Cooley, therefore, determined where rock was to be found, to sink cribs formed of logs, about fifty feet up and down the stream, by seventeen or eighteen wide, which were sunk and filled with stone, and securely fastened to each other above low water, having the up-stream side planked from the bottom to the top; and the space immediately above, filled to some extent with earth, small stones, and other matters, to prevent leakage. In that part where mud was found, the dam is made of quarry spalls and earth, and raised about fifteen feet higher than the other part of the dam, which is an overfall for the water; the base of this mound is at least one hundred and fifty feet, and its width on the top twelve feet; and the whole of the top, and of the up-stream side from the water's edge, is paved to the depth of three feet with building stone, to prevent washing by water, and injury from ice. Between the mound dam and the overfall, there is sunk on the rock, in twenty-eight feet water, a stone pier, twenty-eight feet by twenty-three feet, which supports the end of the mound, and protects it from injury by ice or water. The contraction of the river by the mound dam, suggested to Mr. Cooley the idea of forming the dam in a diagonal line running up stream, and when nearly over, to run the rest of the distance at a right angle toward the shore, so as to join the head pier of the ground lock, on the western side, by which means a large overfall was created, and the rise above the dam, in cases of freshet, considerably abated. The whole length of the overfall is twelve hundred and four feet; the mound dam, two hundred and seventy feet; the head arches, which we shall refer to, one hundred and four feet, making the whole extent of the dam, including the western pier, about sixteen hundred feet, and backing the water up the river about six miles.

On the west side of the river there is erected a head pier and guard locks, where a canal is constructed as per agreement by the city, for the use of the Schuylkill Navigation Company, which extends five hundred and sixty

nine feet to two chamber locks of six feet lift each, by which the boats ascend or descend, and below these locks there is a canal into the river four hundred and twenty feet long. 8-3

On the east side of the river, where the mill houses and race are now situated, the whole of the bank was a solid rock, which it was necessary to excavate to the width of one hundred and forty feet, running parallel with the river, in order to form a site for the former and a place for the latter. The length of the mill race is four hundred and nineteen feet; the greatest depth of the excavation sixty feet, and the least sixteen feet; the gunpowder used, alone cost the contractor upwards of \$12,000. At the upper end of this excavation were erected the head arches alluded to above, three in number, which extend from the east end of the mound dam to the rock of the bank, thus forming a continuation of the dam.

On the west of the excavation are erected the mill houses, forming the west side of the race, which is supported on the other side by the rock rising above it seventy or eighty feet perpendicularly. The south end, or wall of the race, is also of solid rock, and the mill houses are founded on rock, so that nothing can be contrived more secure in all respects.

The race is about ninety feet in width, and is furnished with water through the head arches, which allow a passage of water of sixty-eight feet in breadth and six feet in depth, to which the race is excavated below the overfall of the dam, and of course room is allowed for a continual passage of four hundred and eight square feet of water. These arches are on the north of the race, and the mill buildings being on the west, the water passes from the race to the wheels which discharge the water into the river below the dam. The gate of the centre arch is upon the principle of a lock gate, and admits the passage of boats, &c. into the race; at the south end of the mill-buildings there is a waste gate, eight feet wide, by which, (the upper gates being closed) the water can be drawn off to the bottom of the race.

(TO BE CONTINUED.)

The mill buildings are of stone, two hundred and thirty-eight feet long, and fifty-six wide. The lower section is divided into twelve apartments, four of which are intended for eight double forcing pumps, six of which have been introduced. The other apartments are for the forbays leading to the water wheels. The pump and forebay chambers are arched with brick, and are perfectly secure from the inclemency of the winter. On the east front of the mill buildings, immediately over the pumps and forebay rooms, is a terrace two hundred and fifty-three feet long, and twenty-six feet wide, paved with brick, and railed, forming a handsome walk along the race, and leading by steps at the end to the top of the head arches, mound, dam and pier. Mr. John Moore, was the mason employed to erect the mill buildings, and his care and skill in their construction, are fully evident from one fact alone, it having been ascertained that in the whole extent of the foundation along the race, under a six feet head of water, there is no leak.

The water wheels are formed of wood, and put together with great strength. The shafts are of iron, weighing about five tons each. The great size and weight of the wheel gives it a momentum which adds greatly to the regularity of its motion, so necessary to preserve the pumps from injury under so heavy a head as they are required to work, which is a weight of 7900 lbs., and the height of water forced ninety-two feet. The wheels are all of the same length, fifteen feet, but are not of the same diameter. The first one was put in operation on the 1st of July, 1822. It is fifteen feet in diameter, and fifteen feet long, working under one foot head and seven feet fall. It forces 1½ million of gallons of water to the receiving reservoir in twenty-four hours, with a