

CENTRE ENGINE HOUSE.

This edifice, formerly the "Centre Engine House," in the Centre Square, is an exact square of sixty feet, having a Doric Portico on the East and West fronts in Market or High Street; a circular tower of forty feet rises, terminated by a dome; the whole height is sixty-two feet. The building is faced with white marble; the dome is constructed of brick, laid in cement. The shafts of the portico consist each of one single block of marble, fourteen feet nine inches long, and two feet nine inches in diameter at the base. Since the construction of Fairmount Water-Works this building is in part occupied as a Watch-House for the Western part of the City. The south-east and south-west rooms in the basement story, the passage that leads to the circular parts above the same, and the roof was leased in December, 1817, by the city corporation for a term of seven years, for one dollar per annum, to the Philosophical Society for Astronomical purposes. The Society were permitted by the ordinance to remove and take away at their own expence, the whole or part of the arch forming the ceiling of the south-west in the basement stories, in order to construct a stairway leading to the roof, which roof was to be made a flat terrace, not raised higher than the parapet walls, and in the circular part of the building to construct a floor to be on a level, or nearly so, with the terrace roof. They are to keep the parts demised in repair also at their own expence, and prohibited from making alterations which can change the external appearance of the building.

FAIR MOUNT WATER-WORKS.

To give a description of them, we cannot do better than give our readers an extract from the report of the Watering Committee made to the Select and Common Councils:

"The small and expensive supply of water by the Steam Engines, induced the Watering Committee, 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, on the river Schuylkill, 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 and Gillingham, of their water power, for 150,000 dollars.

“When arrived at this stage, the subject was submitted to the Councils of the City, who unanimously approved the measure and on the 19th of April, 1819, the 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 dollars.

“The river is about nine hundred feet in width; 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 is thirty feet at high water; and it gradually shoals to the western shore, where the rock is left bare at low tide. The river, whose average rise and fall is six feet, is subject to sudden and violent freshets.

“Mr Cooley determined where rock was to be found, to sink cribs, formed of logs, about fifty feet up and down stream, by 17 or 18 feet wide, which were sunk and filled with stone, 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 matter, 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 serves as an over-fall for the water. The base of this mound is at least one hundred and fifty feet, and its

width on the top 12 feet ; and the whole of the top end of the up-stream side from the water edge is paved to the depth of 3 feet, with building stone, to prevent washing by water, and injury from ice. Between the mound dam and the over-fall, there is sunk, on the rock, in 28 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 guard lock, on the western side, by which means a large over-fall was created, and the rise above the dam, in cases of freshet, considerably abated. The whole length of the over-fall is twelve hundred and four feet ; the mound dam, two hundred and seventy feet ; the head arches, which will presently be mentioned, 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. The water power thus created is calculated to be equal to raise into the Reservoir, by eight wheels and pumps, upwards of ten millions of gallons ; the lowest estimate of the quantity of water afforded by the river in the dry season, is four hundred and forty millions per 24 hours, and as it is calculated, allowing for leakage, waste, &c. that forty gallons upon the wheel will raise one into the Reservoir, the quantity raised would be eleven millions of gallons per day.

“ On the west side of the river there is erected a head pier and guard locks, whence there is a canal extending five hundred and sixty-nine feet to two chamber locks, of six feet lift each, by which the boats ascend or descend ; below these locks there is a canal into the river four hundred and twenty feet long. The locks are built of dressed stone ; the upper canal is walled on the east side, and on the west it is rock ; the lower canal is formed of the stiff mud of the river, and covered with stone. The whole of the outer front of the locks and canal is protected by a wall on the upper part, and on the lower with

stone thrown on the bank to prevent washing. On the east side of the river the whole of the bank was a solid rock, which it was necessary to excavate to the width of one hundred and forty feet, to form a race, and a site for the Mill-houses, running parallel with the river. 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 twelve thousand dollars. At the upper part of this excavation were erected the head arches, 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 over-fall of the dam, and of course room is allowed for a continual passage of 408 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 shut) the water can be drawn off to the bottom of the race.

“ The mill-buildings are of stone, two hundred and 38 feet long, and fifty-six feet wide. The lower section is divided into twelve apartments, four of which are intended for eight double forcing pumps. The other apartments are for the forebays leading to the water wheels. The pump and forebay chambers are arched with brick, and are perfectly secure from

the inclemency of the winter. Those now in use are kept warm by means of two large iron stoves, heated with Schuylkill and Lehigh coal. A gallery is erected, extending the whole length of the building, from which all the wheels may be seen at one view. The centre part of the buildings is one hundred and ninety feet by twenty-five feet, with circular doors to the pump chambers, and a range of circular windows over the arch ways of the wheel rooms; on a line with the cornice of the central part is the base course of two pavillions, with Doric porticoes, which terminate the west front. One of these is used for the office of the Committee; and the other is the residence of an old and faithful servant of the Corporation, who has the general care of the property at Fair Mount. On the east front, 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.

“ It being ascertained, that in the whole extent of the foundation along the race, under a six feet head of water, there is no leak, it has been from the commencement determined, for the present, to erect only 3 wheels and pumps, which are now completed. The first of the wheels is fifteen feet in diameter, and fifteen feet long, working under one foot head, and seven feet fall. This was put in operation on the 1st of July last; and it raises $1\frac{1}{2}$ million of gallons of water to the Reservoir in twenty-four hours, with a stroke of the pump of four and a half feet, a diameter of sixteen inches, and the wheel making eleven and a half revolutions in a minute. The second wheel was put in operation on the 14th of September last; and is the same length as the first, and 16 feet in diameter; it works under one foot head, and seven and a half feet fall, making thirteen revolutions in a minute, with a four and a half feet stroke of the pump, and raising 1 1-3 million of gallons in twenty-four hours. The third wheel, which went into operation on the 24th of December, 1822, is of the same size as the second, and works under the same head and fall, making thirteen revolu-

tions in a minute, with a five feet stroke of the pump, and raising $1\frac{1}{2}$ million of gallons in twenty-four hours. The second wheel can be made to raise an equal quantity; thus making the whole supply upwards of four million of gallons, in twenty-four hours.

“The 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 give 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. the height ninety-two feet.

“The wheels being sunk below the usual line of high water, it might be supposed that they would be obliged to stop at that time; but this seldom happens, except in the spring tides, at the full change of the moon, which, upon the average stops them about sixty-four times in a month. It is found that they are very little affected until the back water is about sixteen inches on the wheel.

“The Pumps are placed horizontally, and are worked by a crank on the water-wheel, attached to a pitman connected with the piston at the end of the slides. They are fed under a natural head of water, from the forebays of the water-wheel, and are calculated for a six feet stroke; but hitherto it has been found more profitable to work with not more than five feet. They are double forcing pumps, and are connected each of them with, to an iron main of sixteen inches diameter, which is carried along the bottom of the Race, to the rock at the foot of Fair Mount, and thence up the bank into the new Reservoir. At the end of the pipe there is a stop-cock, which is closed when needful for any purpose. The shortest of these mains is two hundred and eighty-four feet long: the other two are somewhat longer. The Reservoir next the bank is one hundred and thirty-nine feet by three hundred and sixteen feet, is twelve feet deep, and contains three millions of gallons. It is connected at the bottom with the old Reservoir, by two pipes of twenty inches diameter, with stop-cocks. This reservoir

contains four millions of gallons. All the water being raised into the Reservoirs, one hundred and two feet above low tide and fifty-six feet above the highest ground in the City, is thence conveyed to the City.

“ On the 24th of October last, the steam-engines were stopped, and it is believed will never again be wanted. The satisfactory test to which the Dam was exposed, on the 1st of February last, by an ice freshet, which rose eight feet above the over-fall of the Dam, and which is supposed to be the greatest that has been ever known in the Schuylkill, has quieted all fears as to its safety, and done away all the objections that ever could be raised to a resort to Water Power, where Nature had kindly done so much.

“ In another report, the committee will submit the usual estimates for the coming year; in this place, they deem it proper to state the cost of the whole work done since the Ordinance passed, April 18th, 1919:—viz.

Purchase of White and Gillingham,	\$ 150,000
Erection of the Dam; Locks, Head Arches, Race and Piers, including estimate of dam- ages for overflowing by the Dam,	181,000
Three Pumps,	11,000
Mill-houses, Mills, and other work connect- ed with them,	71,250
Iron Raising Mains,	4,480
New Reservoir,	8,600

Amounting together to \$ 426,330

“ The cost of working one steam-engine and pump for one year was 30,858 dollars; and it has been found, that with this expenditure, not more than 1,600,000 gallons could be raised in twenty-four hours; a very inadequate supply for the population of the City, consisting of above sixty thousand souls; without a gallon being afforded to the adjoining Districts, containing an equal number, and for whom until the present period, here was no provision except by means of wells. To raise an equal quantity with that at present afforded by three wheels, the cost would be upwards of 70,000 dollars; but, es-

estimating the cost at only double that of one engine, it will amount to 61,716 dollars. From this is to be deducted the interest on the capital expended in erecting the Water Power and Works, which was 426,330 dollars, and was principally borrowed at an interest of five per cent., and amounts to 21,316 dollars annually, and also the expences for wages, fuel, oil, &c. estimated at 1,500 dollars annually, amounting together to 22,816 dollars, which being deducted from the sum of 61,716 dollars, leaves a clear annual saving of 38,900 dollars, equal at an interest of five per cent., to a capital of 778,000 dollars.

“ The Water Power is sufficient to work five wheels and pumps, in addition to the three in operation, which would raise an additional quantity of more than six millions of gallons.

“ The former inadequate supply of water, derived through the Wooden Pipes or Conduit, from Fair Mount, and the constant vexation and expense, occasioned by the bursting of those the streets, had long turned the attention of the Committee to the propriety of substituting Iron Pipes.

“ Some were procured, and the Council determined to commence the work with laying down a large Iron Main, from Fair Mount to the junction of Chesnut and Broad Streets, for which an appropriation was made of 70,000 dollars: other appropriations have since been added for Iron Pipes.

“ The Work was commenced at the Old Reservoir at Fair Mount, into the bottom of which there was inserted a bell-muzzle pipe of thirty inches diameter, tapering off to twenty-two inches; this size pipe was continued along Hunter Street, which was filled up to a proper level for the purpose, at the expense of the city, and thence on the old Canal Bank, as nearly level as possible, to Callowhill Street, 661 feet; the Pipe was then diminished to twenty inches diameter, and continued along Callowhill Street to Broad Street, and thence along Broad Street to Chesnut Street, 6909 feet. The opening into the Reservoir is closed when required, by a stop-cock. The whole quantity of Wooden Pipes, from Fair Mount and through the City, was about thirty-two miles in extent, all of which, in process of time, will have to be removed, and Iron substituted

but, in the meantime, it has been determined to lay down some important Mains, even where the Pipes do not actually require taking up ; for instance there is placed a ten inch Iron Main on the south side of Chesnut Street, extending from Broad to Water Street, and contracts have been made for Pipes of the same size, to be laid next season on the North side of Chesnut Street, which will thus furnish an ample supply to both the north and south part of the City.

“ In High Street, 6 inch Pipes are laid on the south side, from Broad Street to Water Street, and are nearly completed on the north side, and will be entirely so, early in the Spring. Front Street, from Chesnut Street, with an eight inch Iron Main, is laid to Union Street, and will be completed early in the season from High to South Street,—the Pipes for both the above mentioned sections being all prepared. Walnut from a little west of Sixth Street, to Water Street, is laid with six inch Iron Pipes and some other streets are laid partially, where it was found to be necessary: the whole quantity of Iron Pipes now laid, is 35,205 feet, and in no instance has a leak been discovered.

“ The straight pipes are made in lengths of nine feet each, with what are called spigot and faucet joints: other Pipes of a circular form, to pass round corners, are made of different lengths, as may be required with easy turns, by which it is obvious the passage of water is much facilitated.”

The greater part of the Iron Pipes were made in the United States. Foreign ones only when the contractors failed in their contracts.

NEW JERUSALEM TEMPLE.

[REV. MR. CARLL, PASTOR.]

[STRICKLAND, ARCHITECT.]

This edifice is situated on the South-East corner of Twelfth and George Streets, one of the most conspicuous and respectable parts of the City, being built in the form of a parallelogram, forty-four feet by fifty, and in the gothic style. Both of the exterior sides and Western front are similarly arranged, containing a large door in the centre, ten feet by sixteen, together