

HISTORY
OF
Detroit ^{AND} Wayne County
AND
EARLY MICHIGAN

A Chronological Cyclopedia of the



PAST AND PRESENT

By *SILAS FARMER, City Historiographer*

"native here and to the manner born"

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CHAPTER XIII.

WATER AND WATER-WORKS.—PUBLIC DRINKING FOUNTAINS.

WATER AND WATER-WORKS.

THE first settlers had no need for wells, engines, pumps, or reservoirs. The water along the shore was not defiled by sewers and refuse from shop and factory; instead of containing impurities, it washed and whitened the sandy beach and was everywhere as clear as a diamond.

Each farmhouse had its single rough-hewn log or plank projecting into the stream, and barefooted maidens, morning by morning, "walked the plank," dashed a bucket into the river, and with the rope to which it was attached drew out the water for their daily needs. There were no assessors to inquire how many the family included. "Shut-offs" were unknown. The supply was literally "as free as air," and whosoever would might draw or drink.

As the settlement grew, buckets gave partial place to barrels, therefore the wharf was used, and when the "Bostonians" came they brought "rules and regulations." One of the earliest Acts of the Board of Trustees was the passage on July 16, 1804, of an ordinance requiring each person taking water from the Merchants' Wharf to pay one dollar in advance for the privilege of so doing. This did not please the French and on August 6, the ordinance was repealed. After the fire of 1805 the Governor and Judges concluded that it was not safe to rely altogether upon the river for a water supply, and they undertook to provide public wells. On November 29, 1806, an account was presented by George Huff for "smithwork done at the pumps," and on December 3 following the governor was appointed a committee "to cause the pumps to be stored and painted."

An appropriation bill, passed by the Governor and Judges on March 20, 1807, contains the following item: "For completing wells and pumps in the vicinity of the court-house and prison, \$100 chargeable to Detroit Fund." Their records for March 28, 1807, state that the marshal is "authorized to complete the wells and pumps in the vicinity of the court-house by causing the said wells to be deepened, and walled with bricks or stones, and causing the said pumps to be put in complete order for use." One of the last named wells was on Jefferson

Avenue near Wayne Street. Wells were also provided on the commons back of the town, in the region of the square now designated as the Campus Martius. The digging of wells in this locality gave great offence to the people. Both cattle and persons fell into them, and on May 7, 1808, the Grand Jury presented "the wells on the domain as a dangerous nuisance." In consequence of this action, on December 15, 1808, the marshal was "directed to dispose of the pumps, stone and other articles which have heretofore been furnished for the wells on the commons." On March 7, 1809, W. McD. Scott presented an account of \$134.50 for expenses incurred in digging public wells, which was duly allowed. One of the wells with a pump was located on the north side of Jefferson Avenue between Bates and Randolph Streets. On February 3, 1819, Mr. Stead was paid \$30 for repairing well and putting in a pump. It was worked with a windlass, and was in use for several years. In 1828 the city paid \$2.37 for filling it up.

During these years water was frequently carried in buckets suspended from the ends of a wooden yoke, borne upon the shoulders. It was also hauled in barrels in the old two-wheeled French carts, and sold at sixpence per barrel. Two barrels were considered a load, and from them, as the carts joggled over the rough, unpaved streets, much water was distributed along the way.

The erection of water-works was publicly suggested by the trustees of the city for the first time on February 25, 1820, on which date a notice was published inviting proposals, to be made before June 1, for the exclusive privilege of erecting such works.

The first proposition, from John W. Tompkins, was received March 21, 1820. His offer was not satisfactory, and meantime the authority of the corporation to grant the exclusive right for supplying the city with water having been called in question, on June 1 H. J. Hunt was appointed to examine and report on the subject. His report was doubtless satisfactory, for further proposals were invited, and on July 27, 1820, the trustees voted to meet August 10, to receive them. The proceedings of the trustees do not indicate that any proposals were received

at this meeting, and on October 19 "\$20 was appropriated towards expense of digging a well in Jefferson Avenue already erected near Dr. William Brown's."

The subject of water-works continued to be agitated, and on June 1, 1822, a meeting of citizens was held at the council-house to consider a proposition from George Deming for furnishing the city with water, and on June 4 they resolved that "it is expedient to promote the enterprise of George Deming and his associates for supplying the city with water, and that upon equitable conditions we favor his having exclusive privileges for a certain number of years." The enterprise was "without bottom," or the resolution "leaked," for no water-works were obtained.

The next step in the history of our water supply was the passage of an Act on August 5, 1824, "authorizing Peter Berthelet to erect a wharf on the river Detroit in the continuation of Randolph Street and running to the ship channel of said river," provided "that the said Peter Berthelet, his heirs and assigns, shall at all times during the existence of the above grant, at his own or their own expense, erect, make, and keep in repair, at some convenient place, at or near the end of said wharf, next the channel of the river, a good and sufficient pump, at which all persons who may reside in the city of Detroit shall be at all times free of wharfage or other expenses, entitled to take and draw water for their own use and convenience; and for that purpose a free use of said wharf shall be given, for carts, wagons, sleighs, or other machinery to be used in drawing and carrying away the water." The dock and pump were duly erected, and the pump remained until March 19, 1835, when it was removed by the City Council.

The pump, although an improvement, was still an unsatisfactory method of obtaining water, and occasioned much complaint. The same year that Berthelet's pump was authorized, the father of Jacob S. Farrand, Bethuel Farrand, having a friend engaged in the manufacture of pumps at Aurelius, Cayuga County, New York, learned of the condition of affairs, and conceived the idea of getting the right to erect water-works at Detroit. He came on foot to the city, and submitted his proposition to the council on February 16, 1825, and on February 19 a meeting of citizens was held to consider his offer. It met their approval, and on February 21 the council appointed a committee to conclude the contract. The next day they passed an "Act granting to Bethuel Farrand and his legal representatives the sole and exclusive right of watering the city of Detroit and for other purposes." Mr. Farrand went home, and in May, accompanied by Rufus Wells, he again arrived in Detroit. He at

once commenced operations, spending the summer in cutting and rafting tamarac logs from the Clinton River for the purpose of making pipes. Before the works were fairly established, Mr. Wells purchased Mr. Farrand's interest, and on March 31, 1827, an ordinance was passed "granting to Rufus Wells, or his legal representatives, the exclusive right of supplying the city of Detroit with water." A further ordinance, passed October 10, 1827, granted additional rights.

The pump-house was located on the Berthelet Wharf. It was a frame building, twenty feet square, with two pumps of five inches bore. By means of horse-power the water was forced into a forty-gallon cask, located in the cupola of the pump-house, which was forty feet above the wharf, from where it was conveyed by wooden logs to the reservoir located on Randolph Street, at the rear of the lot now occupied by Firemen's Hall. The reservoir was sixteen feet square, built of white oak plank, two inches thick and six feet long, caulked with oakum; it rested on a frame of timber sixteen feet high, was covered with a shingle roof, and had a capacity of 9,580 imperial gallons. A few wooden logs conveyed water through portions of Jefferson Avenue, Larned and Congress Streets. All the arrangements were very primitive; upon one occasion a wooden plug at one of the houses on Larned Street was carelessly knocked out, and the cellar was soon filled with water, and the reservoir nearly emptied, causing almost every pen-stock to fail. The company were required to put in service pipes, and for both pipes and water families paid but \$10 per year in quarterly instalments.

After a few years, other parties became interested with Mr. Wells, and in June, 1829, as it was evident that works of greater capacity were needed, the Hydraulic Company, as the association was called, received from the city a grant of the south end of Lot 8,—the second lot from the southeast corner of Wayne and Fort Streets. On this lot they were to erect a new reservoir, and bore for water, the idea having gained prevalence that water could be had more easily from a well than from the river. On August 6, 1829, The Gazette contained this item:

The Hydraulic Company of this city are boring for water on the site of the old fort, the highest ground within the limits of the corporation. They have penetrated one hundred and twenty feet and are still going on with their labor.

After boring a hole four inches in diameter to the depth of two hundred and sixty feet, one hundred and forty-four feet of which was tubed with cast-iron tubing, the pebbles and quicksand accumulated in the pipe, and early in April, 1830, the project was abandoned. The chief engineer of the company, at this time, was Mr. Failing, who seems to have been appropriately named.

The company now determined to again erect pumping works and resort to the river, and in view of the greater expense that they must incur, they sought to be relieved from furnishing service pipes and pen-stocks, to obtain an extension of the time during which they were to have the exclusive privilege of supplying water, and also to be released from the obligation of surrendering their works without compensation at the termination of their charter. After various meetings and excited discussions, their demands were granted, and in 1830 new works were constructed.

The reservoir, located on the Fort Street lot, was of brick, eighteen feet square and nine feet deep, enclosed with wood; it held 21,811 gallons. On August 4, 1830, the company commenced laying water-pipes from the river to Jefferson Avenue, just above the Mansion House; their new works went into operation at 2 P. M. on Saturday, August 21, 1830. A large crowd gathered at the engine-house to witness the letting on of the water. The water was distributed through wooden pipes of only three inches bore, which were put together with iron thimbles, and these pipes could hardly be called prophetic of the iron pipes nearly four feet in diameter now in use. Governor Cass, who was present, was called upon for a speech. Mounting a barrel near by, and casting his eye on the route of pipe, he began by saying: "Fellow-citizens, what an age of progress!" No one then thought his words sarcastic. The pumping was done by a ten-horse power engine belonging to the Detroit Iron Works, located on the southwest corner of Jefferson Avenue and Cass Street. The engine did double duty, supplying power for its owners as well as for the Hydraulic Company. In consequence of a defect in the boiler, during a whole week in November, 1831, no water could be pumped. At this time there were but two lines of wooden logs of three inches bore.

In 1831 an additional reservoir was constructed, adjoining the old one; it was built of oak plank, was forty feet square, ten feet deep, and held 119,680 gallons. The reservoir first built remained in use until 1839, when it was sold and taken down. The other one was used occasionally up to 1842, during which year the logs were relaid, many of them having been impaired by frost in the winters of 1830 and 1831. At the same time a twenty-horse-power engine was built, and located in a building erected for it on the north side of Woodbridge Street, between Wayne and Cass Streets.

The company supplied water until 1836, losing money each year, and hearing constant and well-grounded complaints that the water was neither clear, pure, nor wholesome, and very uncertain as to quantity. Finally a Committee of the Council was

appointed to examine the matter. They reported that the company had failed to fulfill their contract, and that their charter was null and void. After much discussion, it was decided that the city would buy the works, and on May 18, 1836, a Committee of the Council reported that they had purchased all the real and personal estate of the Hydraulic Company for \$20,500, the property to be surrendered June 1, 1836, and to be paid for in city bonds bearing six per cent interest, due on June 1, 1856. A special session of the council was next held on June 9, when it was

Resolved, that Noah Sutton be, and he is hereby appointed, as agent for this Board, to proceed to the cities of Pittsburg, Philadelphia, New York, to examine the water-works in those cities, and obtain all needful information in regard to the construction and operation thereof; and the said agent to be authorized and empowered to contract in the behalf of the corporation of this city for cast and wrought iron pipes for conducting the water into the city.

Resolved, that the sum of \$150 be appropriated for the defraying the expenses of the agent of the corporation, and that a warrant for that amount be issued on the Treasury.

A committee was also appointed to purchase a water lot above the city, upon which to erect works. On June 15, 1836, the recorder reported that they had "purchased from Major Antoine Dequindre three water lots in front of the Dequindre Farm, with a front of 350 feet on the river, for \$5,500." The work of building was begun at once, and on June 30, 1836, John Farrar was appointed to superintend and inspect the erection of the wharf. It is evident that there were some misgivings as to the success or desirability of the plan for obtaining water from the river, for on the same day the council proceedings show the passage of the following resolution:

Resolved, that David French and H. Wilmarth be appointed a committee to examine the several springs in Northville and Southfield, also others in the vicinity, to ascertain if a sufficient quantity of pure water can be obtained from them to supply this city, and the probable cost of conveying it hither.

On August 3 Mr. French reported that by a concentration of several springs in the town of Farmington an abundant supply of pure water could be obtained. Nothing further came of this report, and, in the light of later experiences, one cannot help wondering whether the members of the council had not been drinking something besides water when they adopted the resolution.

Meantime the newly purchased works continued to be used, and in 1836 an ordinance was passed "that, on application, water may be conveyed 50 feet from front line of lots to be kept flowing at least twelve hours out of the twenty-four, provided the corporation does not have to make more than 100 feet of new pipe to supply any one applicant."

In 1837 work was begun on the reservoir at the foot of Orleans Street. In 1838 iron pipes, the first

in the city, were laid on Jefferson Avenue, from Randolph Street to Woodward Avenue. In 1840 a contract was made with Charles Jackson and Noah Sutton to build an engine-house, lay nine miles of tamarack logs four and one half of iron pipes, furnish a forty-five-horse-power engine, erect the iron reservoir, and finish its tower. The plan of the reservoir, or round-house, was copied by Noah Sutton from the old Manhattan Works of New York City. William Burnell was the contractor for the brick-work, which was completed in 1838. John Scott superintended the construction. The brick part was fifty feet high, surrounded by a wooden top twenty feet in height. The iron tank, twenty feet high and sixty feet in diameter, was located in the upper portion of the building, resting on numerous brick piers and arches. A narrow, crooked, and winding stairway, with a rough, wooden platform extending out over the reservoir, led to the top of the building, from which a fine view could be obtained; in the olden time a visit to this reservoir was one of the things to be enjoyed by all visitors.



OLD ROUND HOUSE, FOOT OF ORLEANS STREET.

The reservoir had a capacity of 422,979 United States standard gallons, and weighed one hundred and forty tons. It was in constant use until 1857 and in partial use until 1860. In 1866 the round-house was torn down. The work was begun on March 27, and the old land mark soon disappeared. Meanwhile the rapid growth of the city made it apparent that more extensive works were needed, and in anticipation of the erection of reservoirs outside of the city, a charter amendment of March 16, 1847, gave control over any works that should be established.

In 1850 an additional pumping engine of one-hundred-and-fifty-horse-power was set up. Even

with these additional facilities, the supply of water was uncertain, and in 1851 four acres of land on the Mullett Farm were purchased as a site for a new reservoir. This investment gave rise to much discussion, and in the winter of 1851 and 1852 the papers were filled with arguments and communications for and against proposals to sell the water-works to a private corporation. Finally, by ordinance passed February 24, 1852, the management of the works was vested in a board of five trustees, and a year later, on February 14, the same trustees, by Act of the Legislature, were constituted a Board of Water Commissioners. From this time the board had control of all the property of the water-works, which, on December 30, 1862, was conveyed to them by deed of the council.

The continued increase of the city and its prospective wants led the commissioners to dispose of the four acres on the Mullett Farm; and in 1854 they purchased ten acres on the Dequindre Farm, a mile and a half from the river, at a cost of \$7,363. This ground, the highest in the city available for the purpose, is twenty feet higher than the level at the corner of Jefferson and Woodward Avenues.

A new reservoir was begun upon this site in 1854. It was first used in November, 1857, but was not fully completed until 1860. It is bounded by Wilkins, Calhoun, Riopelle, and Dequindre Streets, and consists of two basins enclosed by a sloping embankment thirty feet high, composed principally of clay. The embankment is one hundred and three feet thick at the base and fifteen feet wide at the top. The outside is handsomely sodded. The basins were originally lined with brick. After a few months' use, heavier and more durable material was deemed necessary, and stone, with brick for a few feet at the top, was substituted. Steps lead from the northwest corner to the top of the embankment, upon which there is a gravel walk 1,003 feet long. The two basins are surrounded by a neat fence, and a flight of steps from top to bottom of the interior of each affords easy access for cleaning or repairs. The dividing wall between the basins contains a stairway leading to the shut-offs, so that water can be let on or shut off from either basin without interfering with the other. Each basin is two hundred feet square at the top, one hundred and fourteen feet square at the bottom, and twenty-eight and one half feet deep; and together they cover an area of 530 x 320 feet, or nearly four acres. The capacity of the two is 9,000,000 gallons. The water is forced in and distributed through pipes two feet in diameter. The total cost of the reservoir, aside from the ground, was \$116,287.58. A keeper resides on the grounds, and on week-days from April 1 to December 1, from 9 A. M. till sunset, and on Sundays from 2 P. M. to sunset, the grounds are open to visitors.

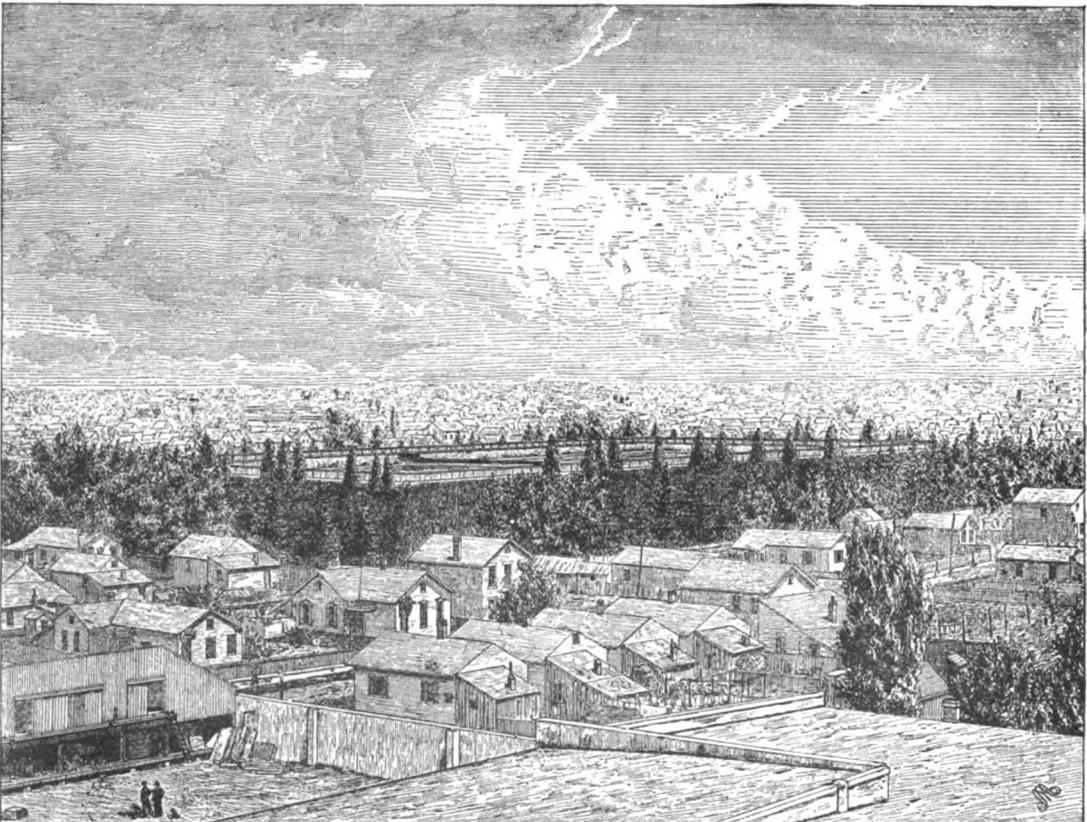
As the top is seventy-seven and one half feet above the river, it commands an extensive view of the northeastern portion of the city.

The various extensions and enlargements demanded increased expenditures, and the commissioners were authorized by Act of February 6, 1855, to borrow \$250,000, and an Act of February 10, 1857, gave power to borrow an additional \$250,000. In July, 1858, a new pipe was sunk in the river, the inlet end being one hundred and seventy-five feet from the wharf-line, and the quality of the water obtained was greatly improved.

In 1856 a new engine was contracted for, to be built in New York. It was completed and delivered, but failed to do the work agreed upon, and was rejected by the commissioners, who refused to pay for it. A suit was instituted against them, and a decision rendered under which the contractors recovered \$26,500. In 1862 a new engine was procured, which cost \$25,000. Again it became necessary to enlarge the capacity of the works, and on February 17, 1869, the Legislature authorized the

board to borrow \$250,000. A further Act of April 5 gave power to levy a tax of three cents a foot frontage on all vacant lots passed by the supply pipes, with power to sell the lots after a certain time if the taxes were not paid. Comparatively few persons paid the tax, and in June, 1876, the law was decided to be illegal, and all moneys collected under it have been, or are liable to be, refunded.

During 1870 many persons who lived adjoining the city petitioned to be served from the water-works, and in October the pipes, for the first time, were extended outside the corporation. In this same year the ever-recurring consideration of enlargement was again a prominent theme, and the question of an entirely new location occasioned much research and investigation. Various plans and locations were discussed by city officers, private citizens, and the Water Board. The Legislature, on March 8, 1873, gave the board power to borrow \$1,000,000 for the purpose of erecting new works, and the Act provided for the raising of \$75,000 yearly by direct tax, the surplus over the necessities of the board to be



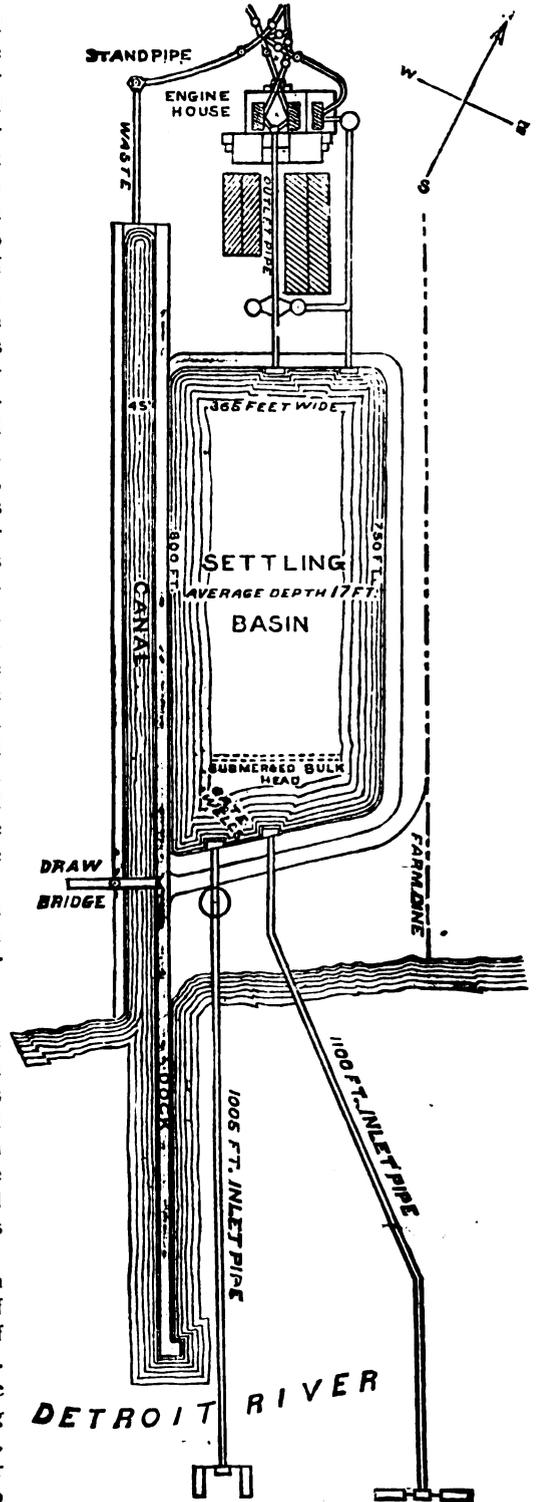
RE-VOIR AND EMBANKMENT BETWEEN RIOPELLE AND DEQUINDRE STREETS.

set apart as a sinking fund. A further Act of April 12, 1873, defined with much detail the powers of the board, provided for condemning private property for their use, and gave them power to erect and control works outside the city. In furtherance of plans for enlargement, the board, in January, 1874, bought seventy acres for \$35,000 of Robert P. Toms as a site for the new works. The land has a frontage on the Grosse Pointe Road of 967 feet and extends to the river, a distance of 2,715 feet; it covers parts of Private Claims Nos. 337 and 257 in Hamtramck, about four miles from the City Hall. The wisdom of the location was called in question, and Generals G. W. Greene and G. Weitzel were appointed by the mayor and the Board of Public Works to investigate the subject of location and of the proposed works. Their report was presented in August, 1874. They approved of the location purchased, and advised the erection of works substantially as recommended by D. Farrand Henry, the engineer of the board. The bill of General Greene for his services on this occasion was \$1,134 and that of General Weitzel, \$1,074.35. These bills were presented August 18, and ordered paid on August 24, 1874. The reasons given in favor of the new location were that the works would be beyond the reach of fire from adjoining premises, and would be accessible at all seasons of the year; the water would be obtained from a river channel seldom or never contaminated, and, by means of settling basins, could be freed from impurities. Proposals for constructing the settling basin, docks, and a short slip or canal were invited, and the contract was let to Messrs. Lacey, Walton, & Walker for \$106,130. Work was begun in December, 1874, the works were completed in three years, and on December, 15, 1877, water for the first time was supplied therefrom.

The first inlet pipe was laid in about twenty-seven feet of water, and at right angles with the current; it is of wrought iron, one fourth of an inch thick, five feet in diameter, made in lengths of twenty-five feet, and extends eleven hundred feet into the river, where it is enclosed by a crib in twenty-two feet of water. The strainer boxes are of plate iron, six feet high, five feet wide and thirty feet long. They are fastened to oak timbers laid on the bed of the river.

The opening for the admission of the water is on the westerly side, and is two feet above the bed of the river, the water being admitted between slats of hard wood. A second inlet pipe was laid in 1884.

The water is forced by gravity through the strainer, influent pipe, and gate-well into the settling basin, thence, intercepted by submerged bulkhead, into effluent gate-well, effluent pipe, and strainer wells to the pump wells, whence it is pumped into the forty-two-inch mains; these are so connected



PLAN OF DETROIT WATER-WORKS.

that either or both can be used; they run by different routes, one 16,000 feet in length, the other 28,000 feet, to the supplying mains.

The settling basin is three hundred and sixty-five feet wide and the two sides measure seven hundred and fifty and eight hundred feet respectively. It varies in depth from thirteen feet at the channel or south bank to seventeen feet on the north or engine side at low-water mark; it is separated from the river by a natural bank of solid earth two hundred feet in width; on the other three sides there are plank walls supported by piles driven seven feet in blue clay; outside of the plank walls there are solid embankments of blue clay, puddled in by hand, from eleven to fourteen feet wide. On the west side the embankment, which is covered with plank, connects with and leads to the dock, which is nineteen hundred feet long and twenty-five feet wide. West of the embankment is a canal forty-five feet wide and seventeen feet deep. About seventy-five feet from the north bank of the settling basin is a submerged breakwater, which prevents a direct current from the inlet to the outlet pipe, and facilitates the deposit of any sedimentary matter. The basin has an area of something over six acres, and the pipe conveying the water from it to the well in the engine-house, like the inlet pipe, is six feet above the bed of the basin, thus allow-

ing all sediment to fall below the mouth of the pipe.

The upper portion of the grounds is occupied by coal-house, settling basin, and canal; the lower portion is reserved for the site of an additional basin, should it be required. The grounds adjacent to the street are graded, seeded, and ornamented with shrubbery and two small lakes; driveways lead to the engine-house.

The engine-house, of brick, stands nearly in the centre of the upper half of the grounds, eight hundred feet from the front line. The height of the building to the top of the main walls is forty feet, to the peak of the roof seventy-five feet, and to the top of the tower one hundred and fourteen feet. The engine-room proper is 140x69 feet, and is open to the roof. Two boiler-houses join the rear, and are each fifty-three and six tenths by forty-seven and four tenths feet inside measurement, with a height of forty feet. A space of thirty-seven feet between them is used as store-room, wash-room, and workshop. The brick chimneys on the outer wall of each boiler-room are five feet in diameter inside, and one hundred and twenty feet high. There are three compound-beam pumping engines, all designed by John E. Edwards, and each of them capable of pumping 24,000,000 gallons daily. All of them are models of strength and beauty.



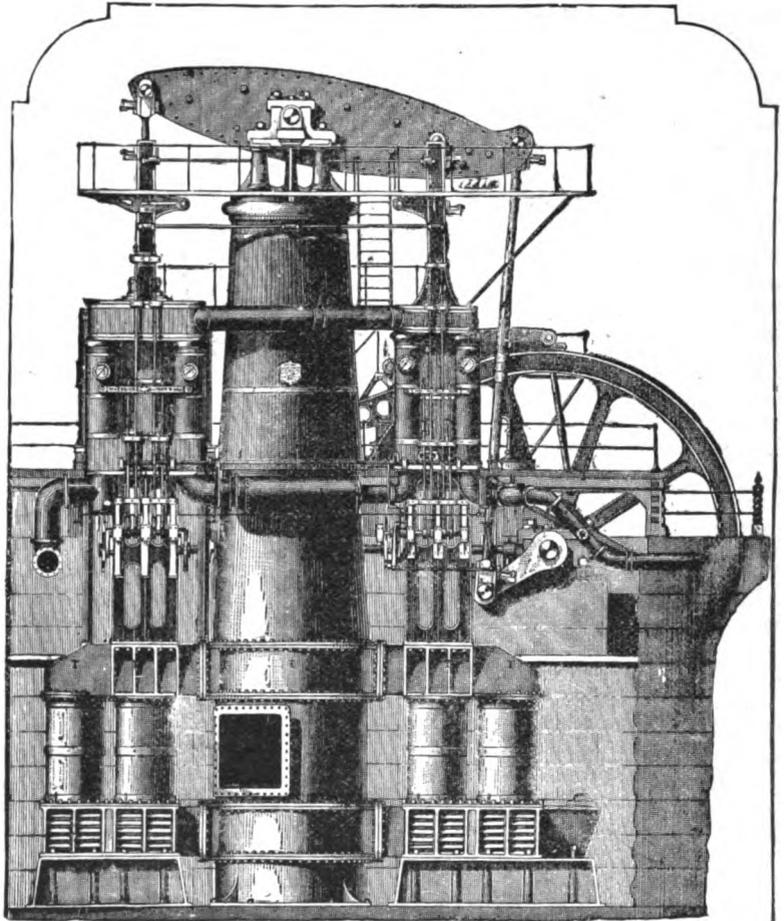
THE NEW WATER-WORKS ENGINE HOUSE, AND TOWER OF STAND PIPE.

One of the engines was first used in 1877, and was built by the Detroit Locomotive Works; another was completed in 1881 by S. F. Hodge, at the Riverside Iron Works, and in 1885 they finished a third.

The engine built by the Detroit Locomotive Works has a high steam cylinder, forty-two inches in diameter, and a low steam cylinder, eighty-four inches in diameter, with six-foot stroke. The beam is composed of six half-inch steel plates, twenty-five feet long by five feet six inches wide. The centre column, which supports the beam and forms the air vessel, is forty-four feet high, ten feet in diameter at the base, and seven feet five inches at the top. The total height from base plate to top of beam is fifty feet three inches. The fly-wheel is twenty-four feet in diameter, and weighs about thirty tons; the crank shaft is fifteen inches in diameter.

The engine built by the Riverside Iron Works differs slightly from that built by the Detroit Locomotive Works. The high steam cylinder has four inches more, and the pump three fourths of an inch more diameter. The beam of this engine is composed of four three-fourth-inch steel plates, twenty-five feet four inches long by five feet six inches wide, weighing 3,350 pounds each. The fly-wheel is twenty-four feet four inches in diameter and weighs nearly forty tons. The pumping wells are forty-one feet long, twenty-one feet wide, and twenty-two feet deep, with walls about four feet thick. Each engine with its air-pumps weighs nearly five hundred tons. There are eight boilers, usually called marine boilers, each of them eight feet in diameter by nineteen feet six inches long; height from bottom of furnace to top of shell, eight feet eight and one half inches; weight of each boiler, seventeen and one half tons; heating surface, 1,364 square feet. The stand-pipe is made

of boiler iron and has a diameter of five feet at the base and thirty inches at the top. It has a height of one hundred and thirty-two feet from the foundation upon which it rests. Since November 7, 1886, the pumping has been done by its aid alone, and water is delivered one hundred and ten feet above the level of the river. The tower which encircles it is built of the best quality of pressed



ONE OF THE ENGINES.

brick; the base or lower section is extended outward from the main shaft to allow of a passageway or vestibule to the winding stairway one hundred and twenty-four feet high, which leads to an observatory at the top. There are two hundred and four steps.

An analysis of the water by Professor Douglass in 1854 showed the contents of 1,000 grammes to be: sulphate of potassia, .00283 grammes; sulphate of soda, .0075; carbonate of lime, .033; phosphate of

lime, .0311; alumina, .0105; silica, .005; and carbonate of iron, .00814; or a total of .09807 grammes of solid matter in 1,000; in other words, a gallon of water contained only 5.722 grains of solid matter, and this of such minerals, in such proportions, as to be of no real detriment. The iron pipe from which the water for analysis was taken extended only twenty-five feet beyond the wharf-line. An analysis of a gallon of water by Professor A. B. Lyons in September, 1879, from water obtained at the new works gave the following result: potassium, trace; sodium chloride, .229; sodium carbonate, .394; calcium sulphate, 1.043; calcium carbonate, 3.353; magnesium carbonate, 1.209; alumina, .241; ferrous carbonate, trace; silica, .306. Total, 6.775 grains.

The cost of the new works, including the grounds, up to January, 1887, was \$1,448,053.

All general distribution pipes are laid at the expense of the city as fast as the commissioners deem necessary; and all applications for extensions made at the office are carefully considered. Service pipes are required to be put in by a licensed plumber, at the expense of the individual. Plumbers pay five dollars a year to the board as a license fee. A contrast between the methods and facilities of the past and the present is suggested in the following item from a daily paper of July, 1850:

Plumber.—Why is it that in a city of 25,000 inhabitants, with one Hydraulic Works, and the very extensive improvements everywhere going forward, that we have no professional plumber among us?

Petitions to make connections with the water-pipes must be made at the office, on blank forms there furnished, and a charge of \$1.75 to \$3.00 for service cock and for connecting must be paid when the permit is granted. Between the first day of December and the first day of March no connections are allowed to be made without special permit.

Up to January 1, 1887, there were 23,297 service connections in the iron pipes, and 7,265 in the wooden logs; there was a total of two hundred and thirty-six miles of iron pipe, and sixty-four miles of wooden logs. The iron pipe varies in size from three to forty-two inches in diameter, and the bore of the wooden logs from two and one quarter to four inches. The winter of 1874-1875 being remarkably cold, the water-pipes were more generally affected than ever before, and many of the street mains froze and burst, causing serious inconvenience.

In 1827 the force mains, or main pipes, delivering to the supply pipes consisted of tamarac logs of four-and-one-half-inch bore. In 1830 three-inch iron pipes were used, in 1840 ten-inch pipes, in 1854 twenty-four-inch pipes, and in 1875 pipes of three feet six inches in diameter were first employed.

The following table gives a good idea of the growth and extent of the water-works:

	Value of Works.	Amount of Debt.	Interest paid.	Cost of operating.
1853	\$ 355,240	\$ 252,771		\$13,356
1860	689,751	650,000	\$43,837	14,513
1870	1,176,676	850,000	54,757	35,109
1880	2,750,700	1,593,000	99,610	45,732
1886	3,885,240	1,447,000	91,862	71,176

	Water Rates.	No. of Families.	Gallons pumped.	Miles of Pipeage.
1853	\$ 25,482	4,283	303,531,743	6½
1860	49,434	6,950	870,036,451	63
1870	127,143	14,717	1,866,060,068	129
1880	227,452	22,733	5,552,965,310	209
1886	314,952	33,904	10,576,571,254	301

The office was at one time located in the old City Hall. In 1852 it was removed to the old Firemen's Hall, on the corner of Bates and Larned Streets. In July, 1862, it was moved to a store in the Biddle House Block, and in May, 1872, to the north side of Jefferson Avenue, between Bates and Randolph Streets. In 1877 the office was moved to Griswold Street, between Michigan Avenue and State Street, and in 1887 it was permanently located in the building formerly known as Fireman's Hall, which was purchased at a cost of \$40,000.

Under ordinance of 1836 the water rates were as follows: Each common dwelling-house, \$10 yearly; each dwelling "larger than common," with one horse or cow, \$12; each family in house with several families, \$8; each livery with four horses, \$10; each store, \$6; each office, \$5. The tax was to be paid six months in advance, and no water supplied for less than six months. As at present managed, in May and June of each year personal inspection and inquiry is instituted throughout the city; and from facts thus obtained a list of consumers is made. On the last business day in June the rolls are confirmed, and are final and conclusive except as additional assessments may become necessary by increased use of water. Any reduction claimed by reason of diminished use of water can apply only to the succeeding quarter. The present rates for each house range from five dollars upwards, with special rates for varying circumstances and particular kinds of business. If not paid within the first month of the quarter, five per cent is added; if not paid before the expiration of the quarter, ten per cent is added; and if not then paid, the supply of water is shut off, and before it is let on again, not only the water tax but an extra charge of fifty cents for turning on the water must be paid.

A law of 1873 required the board to charge for the pipes, and double rates for water supplied to persons living outside of the corporation. After ten years, trial, in 1883, discretionary power was given to the board as to the amount to be charged.

Water meters were tested in 1854, but can hardly be said to have been in use until 1874, and in 1883 there were but thirty-two meters and twelve water-indicators in the city. The rate in 1875 was two cents, in 1883 one cent for each one hundred gallons registered.

When the city took charge of the works, the superintendent had charge of assessments and collections. In 1845 the rates were collected by the city collector. The following advertisement indicates the sternness of municipal management in that day

PAY YOUR WATER TAXES.—I will be at the Common Council Room every morning from ten until half-past twelve o'clock to receive the delinquent water-taxes. Every man and woman who does not pay up by Monday, the 21st instant, will be reported to the Council, and the water in every case shut off. I am not joking.

MORGAN BATES, *City Collector.*

DETROIT, April 10, 1845.

In 1848, under a permissive ordinance of 1842, assessors of water-rates were appointed by the council. At the present time, and since the creation of the Water Commission, the board appoints the collectors.

The assessors of water-taxes appointed by the council were as follows: 1848, W. Barclay, E. Benham; 1849, N. B. Carpenter, G. Spencer; 1850, L. D. Clairoux, John E. Norton; 1851, N. T. Taylor, Francis McDonald.

From 1836 to 1849 the council appointed the superintendent of the works. The salary in 1839 was \$500 a year. By charter of 1849, it became an elective office, and so remained up to the creation of the Water Commission in 1853.

The following persons served as superintendents: 1827-1833, A. E. Hathon; 1833-1837, David French; 1837, Sanford Brittain; 1838-1840, Edward M. McGraw; 1840-1843, William Barclay; 1843, B. B. Moore; 1844-1846, David Thompson; 1846-1848, James Stewart; 1848, Washington Burley, N. Greusel; 1849-1851, David Edsall; 1851-1854, E. McDonald.

The engineers have been as follows: 1830-1840, Charles Howard; 1840, E. H. Rees; 1841, Benjamin Keeney; 1842-1861, F. M. Wing; 1861- , J. E. Edwards. In 1853 Jacob Houghton was appointed general superintendent and engineer and served until 1861. In 1872 D. Farrand Henry was appointed chief engineer. Under his supervision the new works were carried into successful operation. B. B. Moore was appointed Superintendent of Extension and Repairs in 1850, and continued to serve until his death. In April, 1877, he was succeeded by Henry Bridge, who became also Chief Engineer and Superintendent of Construction. Robert E. Roberts was appointed secretary on the organization of the board, and continued in office until 1872,

when he was succeeded by Henry Starkey. George E. Kunze, the receiving clerk, has been in the office since 1872.

The Act creating the Water Commission named five commissioners, who were to serve for three, four, five, six, and seven years respectively; and in April, 1856, and yearly thereafter, one was to be elected annually by the Common Council for the term of five years. They were to serve without compensation. Under law of 1879 their terms were to begin on the first Tuesday of May, and by Act of 1881 members of the commission can be appointed only on the nomination of the mayor. The board organized May 16, 1853, and consisted of S. Conant, president; J. A. Vandyke, W. R. Noyes, E. A. Brush, and H. Ledyard. In 1855 James A. Vandyke died, and A. D. Fraser was appointed to fill his place. At the expiration of the term of S. Conant in 1859, he was succeeded by J. D. Morton, and the same year John V. Ruehle was appointed successor to Henry Ledyard, who removed from the city. In 1861 J. V. Ruehle entered the army, and his place was filled by Chauncy Hurlbut. His term expired in 1863, and S. G. Wight was appointed. In 1865 W. R. Noyes resigned, and the vacancy was filled by the appointment of Jacob S. Farrand. In the same year the vacancy occasioned by the decease of J. D. Morton was filled by the appointment of John Owen. In 1868 E. A. Brush resigned, and Caleb Van Husan was appointed, and the term of S. G. Wight having expired, Chauncy Hurlbut was again appointed a member of the board. The term of A. D. Fraser closed in 1871, and Samuel F. Hodge succeeded him, and the next year Elijah Smith took the place of Caleb Van Husan. He was succeeded in 1877 by Michael Martz. In 1879 James Beatty was appointed in place of S. F. Hodge, and John Pridgeon in place of John Owen. In 1885 S. G. Caskey took the place of C. Hurlbut, and E. F. Conely was appointed in place of J. Beatty. Mr. Conely soon resigned, and in 1886 was succeeded by M. H. Godfrey.

Mr. Hurlbut, who died in 1885, left to the board a valuable library and an estate of about a quarter of a million, which was to be devoted to the increasing and care of the library, and the improvement of the grounds.

The work of the board is systematized by the appointment of various committees, and regular meetings of the commissioners are held monthly on the Wednesday after the first Saturday in each month. About forty persons are constantly employed by the board, with salaries varying from \$100 to \$2,200 yearly. During the summer season, when new pipes and extensions are laid, from seventy-five to one hundred and fifty additional men are employed, and \$60,000 is yearly paid out for salaries and labor.

PUBLIC DRINKING FOUNTAINS.

Both citizens and dumb animals are indebted to Moses W. Field for the suggestion of public drinking fountains. He petitioned the council in regard to them on May 23, 1871. On the 30th a committee reported favorably, and on June 27 the comptroller was directed to advertise for seven. Nine more were ordered in July, 1874. They are generally placed at the intersection of streets. In 1887 fountains were located at the corner of McDougall and Jefferson, Orleans and Franklin, Riopelle and Gratiot, Gratiot and Randolph, Congress and Bates, foot of Woodward, First and Jefferson, Twenty-first and Woodbridge, Twelfth and Fort. Fourteenth and

Michigan, Twenty-fourth and Michigan, Cass and Ledyard, Grand River and Trumbull, Twelfth and Baker, and at East and West Hay and Wood Markets. It is the duty of the gas inspector to care for them.

The Bagley fountain, which is by far the most elegant of any in the city, is located at the intersection of Woodward Avenue and Fort Street, and cost upwards of \$5,000. Its erection was provided for by the will of the late John J. Bagley. It was unveiled on May 30, 1887, and during the same year over \$1,500 was raised by private subscription to add to it a bronze bust of the donor.