

THE  
Patent Water & Gas Pipe Company  
OF JERSEY CITY, N. J.

INCORPORATED BY THE GENERAL MANUFACTURING LAWS OF THE STATE OF NEW-JERSEY.

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*Capital Stock, . . . 250,000 Dollars,*

WHICH ENABLES THE COMPANY TO EXECUTE LARGE CONTRACTS.

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DIRECTORS.

WM. H. TALCOTT,  
NATHAN STEPHENS,  
JONATHAN BALL,  
SILAS FORD,

JOSEPH BATTIN,  
JUSTUS SLATER,  
WM. BEARD,  
NATHAN HEDGES.

Officers.

WM. H. TALCOTT, PRESIDENT.

JUSTUS SLATER, VICE PRESIDENT.

WALTER HARRIS, SECRETARY & TREASURER.

McREE SWIFT, ENGINEER & SUPERINTENDENT.

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1857.



# CIRCULAR.

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THE PATENT WATER AND GAS PIPE COMPANY OF JERSEY CITY, New Jersey, are now laying their pipe extensively in various towns and cities throughout the country.

This Pipe is made of sheet iron, of any required thickness, formed by machinery, and firmly rivetted into pipe of any needed diameter—and of sufficient strength to resist any head of water or pressure to which it may be subjected. It is also lined by machinery, with mortar made of *Rosendale hydraulic cement*, and laid in a bed of mortar made of the same material, the entire outside being perfectly covered with the mortar. The cement soon becomes hard like stone, and perfectly protects the metal from the action of air or water, and consequently, prevents either corrosion or incrustations, and enables the pipe to deliver the water to the consumer as pure as it is at the fountain head.

The sections of pipe are connected by means of a sleeve over the joints, made large enough to allow a filling of mortar between the pipe and the sleeve; the whole being also covered externally with mortar, thereby making the joints stronger even than the rest of the pipe.

The following are some of the towns and cities that have used the "Wrought Iron and Cement Pipes" in the construction of their Water Works, viz:—

Saratoga Springs, N. Y. ....	Works laid in 1846.
Cohoes, N. Y. ....	" " " 1847.
Rockland, Maine, ....	" " " 1851.
Watertown, N. Y. ....	" " " 1853.
Bridgeport, Conn. ....	" " " 1854.
Pittsfield, Mass. ....	" " " 1855.
Plymouth, " ....	" " " 1855.
Elizabeth, N. J. ....	" " " 1855.
Paterson, " ....	" " " 1856.
Jersey City, " ....	Extended " '55, '56 & '57
Toronto, Canada ....	" " 1856.

The following extracts and testimonials, from Engineers who have had the opportunity to judge of the merits of the Wrought Iron and Cement Pipes, as compared with cast iron pipes, and from Directors and other persons having charge of water-works constructed with our pipes, show the efficiency and durability of this kind of pipe, and its *great economy*, as compared with cast iron pipes, both in the first construction of the works and in subsequent repairs.

It is a matter of much satisfaction to the Company, that notwithstanding the opposition it has encountered from interested parties, and the natural aversion of the community to any radical change in an article which has been long in general use, our pipe is steadily gaining favor with the public.

In every instance where a careful investigation has been made, the parties have arrived at the conclusion that it is the best pipe known for conveying water.

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#### EXTRACT FROM THE REPORT OF THE WATER COMMISSIONERS OF PLYMOUTH, MASS., FOR 1856.

"The most important question to be decided by the Commissioners, because involving an appropriation of money equal to all other parts of the work combined, was the kind of pipes through which the water should be conveyed. The largest experience in this country, as well as in Europe, pointed to cast iron, as the principal material used in the construction of water pipes. But the experience of the last few years has shown, that where water approximates in any considerable degree to purity, the iron pipes through which it has been conveyed, have become coated with rust, or tubercles—in some instances diminishing the size of the pipes as much as fifty per cent.—and the iron couplings used for connecting the wooden logs of the old aqueduct in this town, in some instances, were found to have been diminished in their capacity for conveying water more than *seventy-five per cent.*, by the accumulation of these tubercles. The analyzation of the waters of South Pond, by Professor Horsford, of Harvard University, having shown them to be of unsurpassing purity, and all experience having proved that the



injury to iron pipes is increased in proportion as the water is pure, the Commissioners were decided to look for other material than iron for the construction of the pipes.

“The report of a committee of the town in 1854, having presented some important evidence relative to the use of an article called ‘Ball’s Patent Indestructible Cement Pipe,’ the Commissioners decided to test that evidence by inquiries in places where this pipe had been introduced. For this purpose, Messrs. Lane and Davee visited the city of Rockland, in the State of Maine, where this pipe has been some three years in use, and Mr. Sherman visited the establishment in Jersey City, N. J., where the pipe is manufactured; and the result of all their inquiries was so entirely corroborative of the facts presented by the committee of 1854, (provided a proper degree of care is observed, and a suitable material used in its construction,) that an adoption of this pipe was decided upon; and on the 29th of March a contract was concluded with the ‘Jersey City Patent Water and Gas Pipe Company,’ under which 57,679 feet, or nearly eleven miles, of main and distributing pipe have been put down, besides a corresponding amount of service pipe of the same material.

“And so far as we can form an estimate of the value of this pipe by our experience thus far, it has been in the highest degree satisfactory. The water has been flowing through a considerable portion of the pipes since the 15th of August, and through all of them from South Pond since the 29th of October, during which time very few leaks have appeared, much less indeed than might have been anticipated in the same number of connections of iron pipe, while the water appears to flow with perfect purity and freedom; and where occasions have been presented for disturbing the pipe, it has been found in a condition to warrant a belief that it will be, what the manufacturers claim for it, INDESTRUCTIBLE.”

CHAS. O. CHURCHILL,  
M. BATES, Jr.,  
JOHNSON DAVEE,  
DANIEL J. LANE,  
E. C. SHERMAN,  
WILLIAM HALL,  
SAMUEL H. DOTEN,  
DAVID DREW.

*Plymouth, March 1, 1856.*

*The following is an extract from the REPORT OF W. S. WHITWELL, ESQ., (former Chief Engineer of the Cochituate Water Works, Boston, Mass., and also former Chief Engineer of the Jersey City Water Works, New-Jersey,) to the BOARD OF WATER COMMISSIONERS OF PLYMOUTH.*

\* \* \* "The next question was, the kind of pipe to be used.

"Two kinds of pipe were proposed—the cast iron pipe and the iron cement pipe, known as 'Ball's Patent.' With the latter I had been acquainted for several years, and from its cleanliness, cheapness and durability, I was much inclined to advise its adoption without any qualification. As a precautionary measure, I proposed that a committee of your Board should visit Rockland, in Maine, where these pipes had been in use for nearly two years, to learn there if any objections existed to their use, and if they had answered the expectations that had been formed of them. Your committee returned so well satisfied with the report received of them, that they were adopted without further hesitation.

"The great objection to the iron pipe is found in the rapid incrustation which takes place on the inside of the pipe, and very soon seriously diminishes its capacity: this becomes a matter of much more consequence with the small pipes than with those of a larger size, and while in a thirty-inch pipe the diminution of capacity would be scarcely perceptible for seven or eight years, in a pipe of ten inches diameter, the incrustation of four years would, probably, reduce the capacity one-fifth. The 'iron and cement pipe' is free from this objection; the bore remains always of the same diameter, always clean, and becomes harder and more durable by age. With proper care in selecting the best quality of cement, in the manufacture of the pipes, and in making the joints, I consider this as the best water pipe now in use for the supply of towns and villages, and it may yet be found to succeed quite as well in large cities.

"The Board have reason to be satisfied with the decision they have made, as they have materially decreased the cost of the work by the use of this pipe, and owing to the care and superintendency of Mr. Bates and Mr. Davee, together with the earnest desire of the Pipe Company to have the work done in a thorough and careful manner, there is every reason to believe that the expense for repairs will be unusually small.

Respectfully submitted,

W. S. WHITWELL,  
Consulting Engineer.

Boston, Feb'y, 1856.



*The following is from the Water Commissioners and Trustees of the Village of Saratoga Springs, N. Y.*

"In answer to the numerous inquiries in relation to J. BALL & Co's INDESTRUCTIBLE WATER PIPE, composed of iron and cement, and in use in our village, the undesigned, water commissioners, trustees, and late trustees of the village of Saratoga Springs, take this method of saying, that we have perfect confidence in the utility, goodness, and durability of said pipe. The village of Saratoga Springs has some 20,000 feet of this pipe, varying from  $6\frac{1}{2}$  to  $1\frac{1}{2}$  inches in diameter, under a head of about 80 feet. It has been laid since the fall of 1846. Since it was fully completed, it has cost nothing comparatively to keep it in repair; and although some portions are exposed to the frost, it seems to stand well the test, and answer all the purposes for which it was designed and constructed. We believe it preferable to iron pipe—is much cheaper and more durable; and we would not exchange it for any other kind of pipe yet invented, if we could without any additional expense or inconvenience. The water comes through clear and pure; and where we have had any occasion to take any part of it up to improve or alter the grounds, it appeared to be just as sound and imperishable as the moment it was laid down. This testimony is entirely disinterested, and is now given to avoid the necessity of answering the many calls upon us for information upon this subject. We have witnessed, and many of us have superintended the laying down of the pipe in this village, and watched its operations since, and are perfectly satisfied that we have the best water-pipe ever presented to the public.

*Saratoga Springs, December, 1849.*

S. CHAPMAN,

J. A. COREY,

W. S. ALGER,

WILLIAM COOK,

*Late Trustees.*

R. GARDNER,

H. P. HAYDE,

J. L. PERRY,

J. D. BRIGGS,

*Trustees.*

G. M. DAVIDSON,

R. PUTNAM,

N. B. DOE,

*Water Commissioners.*

"I certify that I was Chief Engineer of the above work in charge, and fully concur in the foregoing statement.

*Dec. 1849.*

"S. R. OSTRANDER, Civil Engineer."

SARATOGA SPRINGS, MARCH 30, 1857.

*To the Public :—*

The undersigned, Trustees of the village of Saratoga Springs, hereby certify, that in the year 1846, Messrs J. Ball & Co., laid down for this village about four miles of water pipe, made of wrought iron lined with and laid in hydraulic cement; that this work was done in a most satisfactory manner, and the pipe has given entire satisfaction ever since, the repairs of the same costing less and less each succeeding year. The total cost in the last eleven years being \$15 per annum, cost for the year 1856 being \$13. 25. We consider this pipe as perfect and durable now as when first put down, and even more so, as the hydraulic cement continues to grow harder and harder each succeeding year. The water is delivered through the pipes as clear as at the fountain, and there are no incrustations from rust as with cast iron.

The process of tapping is simple and perfect, and can be done as well with a head of water in the pipes as when they are empty.

In re-grading one of our streets in 1856, we were obliged to take up and re-lay a portion of the main pipe, and we found it as perfect as when laid five years ago. It seemed as imperishable as the rock. Such is the condition of all the water pipes laid in this village, and we prefer it to any other now in use.

J. A. COREY,  
W. J. HENDRICK,  
A. S. MAXWELL,  
E. R. STONET,  
P. H. GREEN,  
W. S. BAULCH,

*Trustees of the Village of Saratoga Springs.*

CAMBRIDGE, Sept. 28, 1853.

I have examined, somewhat in detail, the pipe manufactured by Ball & Co., for conveying and distributing water. I have repeatedly attended upon their manufacture, and the inspection preparatory to use. I have further attended upon the laying down of the pipes, and observed the mode of imbedding in and coating with



cement, the connection of sections of pipe, the piercing for lateral service pipes, and, I believe, all the the various processes by which the pipes are fitted for use.

With strict fidelity on the part of the workmen and engineer, the above kind of pipe may be made and laid down so as satisfactorily to fulfil the general purpose of water distribution.

The advantage of the pipes of Ball & Co. are, that, after a few days of use, the water is transmitted entirely unchanged ; the pipes do not corrode and encrust so as to diminish the service capacity ; the strength increases with age ; and the cheapness will make it possible to introduce water into places where the cost of cast-iron pipes would leave it impossible.

E. N. HORSFORD,  
*Rumford Professor, Harvard University.*

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ROCKLAND MAIN, MARCH 31, 1857.

The undersigned, having had the care of the Works of the Rockland Water Company for the past four years, hereby certifies that said corporation contracted with Messrs. J. Ball, and N. Stephens, of New-York, to furnish said works with the Patent Indestructible Water Pipe, and that in the summer of A. D. 1851, they laid in this CITY sixteen miles of pipe of the different sizes, from nine to two inches diameter, of wrought iron pipe lined and laid in hydraulic cement, since which time it has been under a pressure of ninety feet head, and has given perfect satisfaction.

The cost of repairs has been very small and decreasing, so that in A. D. 1856, the whole repairs amounted to but twenty-five dollars.

We would recommend this pipe to Towns and Cities contemplating constructing Water Works, as far superior to cast iron in the purity of the water, and costing much less at first, and for repairs afterwards.

W. FARNSWORTH,  
*President Rockland Water Co.*



BRIDGEPORT, CONN. APRIL 1st, 1857.

The undersigned, Superintendent of Water Works in Bridgeport, hereby certifies, that in 1854, Messrs Ball and Stephens executed a contract for supplying this City with water pipe, made of wrought iron, lined with and laid in Hydraulic Cement, and known as Ball's Patent Indestructible Water Pipe.

Under this contract about 12 miles of pipe were laid, varying from two to twenty inches in diameter. This pipe has been in constant use since 1854, and has given entire satisfaction; I would therefore *recommend* its adoption by all Towns and Cities contemplating *Water Works*, as being preferable to cast-iron pipe, inasmuch as it delivers the water as pure as when it enters the pipe; furthermore, it is not at all liable to incrustations from rust, which is very objectionable in other cast-iron pipes. It costs much less originally, and in current repairs, which last expense is constantly diminishing. It can also be tapped readily and even better than cast-iron, either with the pipe full or empty of water.

HENRY EDWARDS,  
*Sup't Bridgeport Water Bend Co.*

WATERTOWN, JEFFERSON Co., N. Y., April 24, 1857.

*To the Patent Water and Gas Pipe Company,  
Jersey City, N. J.:*

In the year 1853, Messrs. J. Ball & Co., of New-York city, took the contract to construct our water works, and laid down in this town about ten miles of wrought iron water pipe, lined with and laid in hydraulic cement, the diameter of pipe varying from three to ten inches. The work was executed in a skillful and satisfactory manner, and under a five year guarantee, and has been in constant use since completed. The water is forced  $1\frac{1}{4}$  miles, and to an elevation of 200 feet, and delivers water under an extreme head of 240 feet. The cost of repairs of this pipe has been very light, and is less each year as the pipe grows older. We, with three and one-half years experience, consider the pipe superior to any other in the conveyance of water, as it delivers the water as pure and clear as when it enters the pipe; and from what we can discover, appears to be entirely exempt from liability to incrustation from rust. The first cost of this pipe is from 20 to 25 per cent. less than cast iron, and we believe it to be more durable, as the older it grows, the more

perfect it appears to become. We unhesitatingly recommend it to towns and cities about constructing water works. We will cheerfully answer any reference that may be made to us on the subject.

J. L. BAKER,  
G. C. SHUMAN,  
J. W. FISK,  
HOWELL COOPER,  
WM. H. ANGEL,  
*Water Commissioners.*

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OFFICE OF PLYMOUTH WATER COMMISSIONERS,  
PLYMOUTH, MASS., April 3, 1857.

*McRee Swift, Esq., Jersey City, N. J.:*

Sir—The pipe laid by the “Jersey City Patent Water and Gas Pipe Company” for the town of Plymouth, during the year 1855, has thus far given perfect satisfaction. Wherever the pipe has been exposed to view by the laying of service pipe, it is in appearance as designated, by the name “Indestructible.” There is a head of water of one hundred and five feet, and it is undoubtedly capable of sustaining a far greater pressure. To the present time there has been laid from eleven to twelve miles of pipe of the following sizes:—

18,226 feet of 10 inch.	20,341 feet of 4 inch.
4,050 “ “ 8 “	13,547 “ “ 2 “
3,984 “ “ 6 “	

A careful inquiry was made previous to commencing the works, for the purpose of ascertaining the best material for pipe, as to strength, durability and cheapness. The result of the investigation was the adoption of a resolution to use the “Iron and Cement Pipe,” and our experience thus far has shown that the selection was judiciously made. This pipe was also found to be much cheaper than cast iron, but would be preferable on the score of economy, if the cost were the same, as it is entirely free from incrustation, presenting a smooth surface on the inside, and no reduction of the quantity of water delivered being apprehended. Pipe of smaller size can be used than of a material that will diminish in size, by coating of rust.

But little expense has been incurred by repairs of leakages, the whole cost to the present time having been but \$138.07, most of which was incurred within six months from the time the water was



first let on, and for a year past the cost of repairs has not exceeded \$40, and will undoubtedly continue to decrease.

We find no difficulty in tapping the pipe with the head of water on, and consider it preferable to shutting off the water and draining the pipe for that purpose.

From the experience thus far, we can recommend the use of the pipe made by this Company for conducting water, and in fulfilling the terms of the contract between them and the town, no pains were spared on their part to perform the work creditably to themselves and satisfactory to the Commissioners.

JACOB H. LOUD,

JOHNSON DAVEE,

CHAS. O. CHURCHILL,

*Water Commissioners of Plymouth.*

PITTSFIELD MASS., April 29, 1857.

In the year 1855, the Patent Water and Gas Pipe Company laid for the Fire District of this town, between nine and ten miles of water pipe, made of wrought-iron lined and laid in hydraulic cement ; with diameter varying from three to ten inches. The pipe delivers the water in as pure a state as when it enters the pipe, under a head varying from 136 to 180 feet. The pipe does not incrust or fill up like the cast-iron pipe, and costs much less. The pipe as a water conductor, gives great satisfaction. The repairs are not costly and are decreasing each year. We unhesitatingly recommend the pipe to Towns and Cities about to use water pipes, and we take pleasure in saying that we have found the Company prompt and just in their dealings with us.

E. H. KELLOGG,

THOMAS F. PLUNKETT,

*Water Commissioners.*

PATERSON, N. J., March 25th, 1857.

This may certify, that the Passaic Water Company, in July 1856, contracted with the Jersey City Patent Water and Gas Pipe Company, to lay down supply pipes for said Company for the City of Paterson.

The work was commenced by the Jersey City Company the eleventh of August, and was, so far as the same is now done, completed on the third day of November following.

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JERSEY CITY, N. J.

The length of the pipe has been  $10\frac{1}{2}$  miles ; the size of pipes, 12, 10, 8, 6 and 4 inches, in about equal proportions of each size.

The water was let into the pipes the first of December ; the greatest pressure one hundred feet ; the average about seventy feet.

The pipe has proved satisfactory : it has not in a single instance burst in the length of pipes, and but few leaks have occurred at the joining of the pipe under the sleeve, which have been speedily and economically repaired. These leaks have occurred in my opinion from imperfect construction at the joint, at the time the pipe was originally laid. Our Company will complete their work this spring, consisting of say 14 miles of pipes, 64 stop gates and 130 hydrants.

This pipe can be readily tapped with water in the pipe and faucets inserted. The pipe I regard in durability and strength equal to iron, while it possesses this advantage, of being free from oxydization, which iron is not. We have found the President and Directors of the Jersey City Patent Water and Gas Pipe Company prompt in their undertakings, and faithfully abiding their contracts.

THOMAS D. HOSSEY,  
*President Passaic Water Co.*

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JERSEY CITY, March 23, 1857.

*W. H. Talcott, Esq., President*  
*Jersey City Water and Gas Pipe Co. :*

Dear Sir—During the past three years there has been laid, as a part of the distribution of the Jersey City Water Works, upwards of one mile of wrought iron and cement pipe, manufactured and laid by your Company, of four, six and twelve inches diameter. The first was laid as an experiment, and with the hope of finding in it a proper substitute for the cast iron pipes in general use.

The first year's trial was sufficient to set at rest any doubts as to its strength, and showed its adaptation to the conveyance of water under great head ; for, with a head of 120 feet, it has stood, and continues to stand, as well as any pipe in the city.

In order to test its strength and power to resist the tendency to settle and break, so common in many of our streets, a considerable portion was laid on meadow ground recently filled in. The pipe in Greene Street was laid on such ground, and being in the neighborhood of several foundries and machine shops, is subject to considera-



able jarring and vibration from the passage of loaded vehicles. Not a leak has occurred in it, and all the pipes in such localities have been remarkably free from leakage.

So far, therefore, as the strength of the pipe and its application to all situations are concerned, I consider the test we have made a severe one, and am perfectly satisfied with the result.

The durability of the pipe was next in question. We might safely infer that the causes that give it strength and stability for a limited time would preserve it for an indefinite period, and setting aside any loss there might be by the attrition of the water, say that it is indestructible. For myself, after the trial to which the pipe had been subjected, I had no doubt of its durability, and only waited for an opportunity to make it a matter of positive proof.

In the month of April, 1856, I was present at the hat factory of Messrs. Rankin, Duryea & Co., in the city of Newark, where a piece of cement pipe, three inches in diameter, was taken up, which had been used for conveying water for ten years.

Within a few days I have been called upon to be present at the taking up of another piece of this kind of pipe, for the purpose of examination. It was three inches in diameter, and laid in 1845, for conveying water to the rolling mill at North Point, in this city, and for supplying the locomotives of the New Jersey Railroad. It was laid on meadow ground, which has been filled in from time to time five or six feet, and being near the railroad track, was subject to the chances of settling and the constant vibration of the ground by the passing trains.

In this case, as well as at Newark, the pipes were found in a perfect state of preservation. The cement covering had set as hard as stone, and the iron was as fresh and bright as if just out of the shop. The lining of cement showed no signs of wear, and was free from tubercles or accretions, such as are always to be found in cast iron pipes after they have been used several years, the effect of which is, a rapid depreciation of the strength, and a constant diminution of the capacity of the cast iron pipes.

That the cement pipe is absolutely imperishable, when properly laid, there seems to be no doubt, and this, together with its economy, strength and adaptation to all situations, should be sufficient to secure its general introduction.

Respectfully, yours,

GEO. H. BAILEY,

*Sup't and Engineer on J. C. W. W.*

ENGINEER'S OFFICE, NASSAU WATER CO.,  
355 Fulton St., Brooklyn, March 25, 1857.

Sir—I have examined, at your request, a specimen of wrought iron and cement pipe of three inches bore, and one of cast iron pipe, of three inches bore; the former laid in 1845, and the latter in 1842, in Washington Street, near the corner of Wayne, Jersey City, being part of two lines laid under the track of the New-Jersey Railroad, near the turn-table, and connected so as to pass the same supply of water. The inspection was made on the ground, March 20th, with the pipe just taken from the trench, and subsequently with the specimens in this office.

The exterior of the cast iron pipe, except at the joint, which is much corroded, is in very good condition. The entire interior is coated with tubercles, in some cases separate, but generally in groups, varying from a quarter inch depth on the upper side of the tube to five-eighth inch in the lower. A large proportion of those on the lower side extend horizontally across the tube, reducing its vertical height to two and one-eighth inches, where the upper tubercles occur.

The exterior coating of cement of the wrought iron pipe, I find very solid, requiring considerable effort with a hammer and cold chisel, to remove it to the iron tube. The lining has also set very compactly, so that in cutting through the pipe with the chisel, very little is broken away from the edges of the cut. There is a slight discoloration on the lower side of the interior, owing to the sedimentary deposit of its contents, but the entire interior is as perfect in form and smoothness as when first laid down.

Examining the iron, (which is about twenty to twenty-two wire guage,) especially with regard to the joints, rivets and sleeves, I find no traces of oxydization whatever, the iron in these several parts retaining its freshness of color and perfection of form, as if newly laid. (At the time of laying the pipe, a piece of twine, not quite one-sixteenth inch thick and two feet long, was imbedded in the cement, the preservative influence of which is singularly illustrated in the fact that the twine still keeps its original color, and when tested with a spring balance, stood for sometime a regular strain as high as twelve pounds.)

This examination simply confirms, by its clear and forcible testimony, a conclusion at which I arrived on this subject, several years ago, having taken pains to study the character of this pipe, since it first attracted my notice at Albany, in 1847. Cast iron pipe is objectionable, in my opinion, from its costliness and weight, its



losses of length at the joint, its discoloration of the water by oxydes, its reduction of area by tubercles, and the difficulty of making and *keeping* tight and strong joints; points in which the superiority of the other pipe is clearly demonstrated.

Very respectfully, yours,

SAMUEL McELROY,

*Assistant Engineer Brooklyn Water Works.*

W. H. TALCOTT, Esq.,

*Pres't Water and Gas Pipe Co., Jersey City.*

OFFICE NASSAU WATER COMPANY,

Brooklyn, April 25, 1857.

*McRee Swift, Esq., Engineer Patent*

*Water and Gas Pipe Co.*

My dear Sir—In compliance with your request, I make the following memorandum in regard to the places visited by me, where the Patent Wrought-iron and Cement Pipes are used in the water distribution.

Although I did not feel satisfied that the amount of information attainable in these visits, sufficiently indoctrinated me in the peculiarities of the pipe, to warrant my recommending it for general adoption in a *large City*, nor that it had been yet subjected any where for a sufficient time to a severe CITY TEST, I was yet very favorably impressed with its powers to resist a high pressure, and with the remarkable purity of the water delivered by it.

I visited four places last season, in which the wrought-iron and cement pipes are used entirely, viz.: Watertown and Saratoga, in the State of New York; Pittsfield, in Massachusetts; and Paterson, in New Jersey; and one place, Buffalo, where they are used partially.

In Watertown (7,000 inhabitants) the wrought-iron cement pipe was laid in 1853, and has been in use since November, 1853; eight to nine miles of the pipe are laid, subject to a head of water varying from 187 feet in the Public Square to 247 feet in the lowest streets in the place. During the first winter and spring there was considerable leakage at the joints; this was corrected, and there has been very little leakage since. The two Water commissioners, whom I met, expressed themselves entirely satisfied with the pipe. The wa-

ter for the supply of Watertown is *pumped* from Black River into a reservoir, situated one and a quarter miles from the pump, and 200 feet above the pump well, an eight inch wrought-iron and cement pipe conducts the water from the pumps to the reservoir. I could not ascertain that the pipe failed in any way to fulfil the duties required of it.

At Saratoga, the cement pipe has been in use eleven years. The supply is brought from a small reservoir, situated three miles from the village. The water is brought in a six inch main, and distributed through the streets of the place by six inch and three inch pipes. The head of water is (75) seventy-five feet, opposite the Congress Springs House, and will average fifty and sixty feet through the village. I met two of the Water Commissioners and the gentleman in charge of the repairs, &c. The parties expressed themselves highly satisfied with the pipe.

At Buffalo, the distribution of water is made by iron pipe, with the exception of three thousand feet of cement pipe, of six inch diameter. The Superintendent of the Water Works there, informed me that this pipe was laid on made ground, where it was supposed that it would be subjected to unequal strain from the settlement of the new embankment. The cement pipes have been laid four years, and the Superintendent states that they have had no difficulty with them.

At Pittsfield there are ten miles of cement pipe laid. The water is brought in from a point about three miles distant, in a ten inch main; at the "Green," the head of water on the pipe is one hundred and forty (140) feet, and in the lowest portions of the village one hundred and seventy (170) feet. The supply is distributed through the streets of the village in seven, six, four and three inch pipes. I met two of the Water Commissioners and the person in charge of repairs. This was the first season of the supply there. When the water was first let into the pipes, some of the joints were found to be defective and leaky; now they have been made entirely tight, and seem to give perfect satisfaction; there have been no pipes broken except by frost. The water was hard for three weeks after it was let on, but this effect of the cement is not perceived now.

In the city of Brooklyn, as a test of the sufficiency of this kind of pipe, the Water Commissioners have, at my recommendation, agreed to lay 21,000 feet of the wrought iron and cement pipe, of 20 inch, 12 inch, 8 inch and 6 inch diameters, connecting it with the general distribution.

I am, sir, respectfully,  
Your ob't servant,

JAMES P. KIRKWOOD.

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JERSEY CITY, N. J.