

1872.]

NORTHAMPTON WATER WORKS.

[No. 1.]

REPORT

OF THE

Board of Water Commissioners

TO THE

TOWN OF NORTHAMPTON,

ON THE

INAUGURATION AND CONSTRUCTION OF THE
WATER WORKS.

First Annual Statement of their Doings.

NORTHAMPTON, MASS.:
METCALF & COMPANY, PRINTERS.
1872.

Vote of Town.

At a meeting of the Town holden on the 18th day of February, A. D. 1871, to take action under the Act of the Legislature approved by the Governor February 11, 1871, entitled "An Act for supplying the Town of Northampton with pure water," the following vote was passed:

Voted, That the town take the water from "Roberts' Meadow Brook," at or near the place where the new highway from the village of Leeds to Roberts' Meadow crosses said brook, and also any land necessary for raising, holding and preserving such water, and conveying the same to such parts of the town as the Board of Water Commissioners to be hereafter appointed may deem expedient, for the purpose of supplying the inhabitants with water for the extinguishment of fires, generating steam, and for domestic and other uses. That a Board of Water Commissioners, consisting of six persons, be chosen, whose duty it shall be to carry into effect the votes of the town in relation to supplying water as aforesaid, to purchase materials, lay pipes, and do any and all acts necessary in order to supply said inhabitants with water for the purposes aforesaid, and to make all needful rules and regulations in regard to the use of the same. That two of said Water Commissioners be chosen to hold their office till the annual meeting of said town for the year A. D. 1872, and two till the annual meeting for the year A. D. 1873, and the other two till the annual meeting for the year 1874; and that they choose from their number a President, Clerk and Treasurer. The Treasurer so chosen shall give bonds to the town in such sum and with such sureties as the Selectmen shall approve; that said Board of Commissioners make an annual report to the town of their doings, which shall be printed and circulated among the voters of said town. That at said annual meetings of the town and at each succeeding annual meeting there shall be chosen by ballot two persons as Water Commissioners to hold office for the term of three years, or until others are chosen in their place. And in case vacancies occur in said board, by death, resignation or otherwise, the same may be filled by a concurrent vote of the Selectmen and the remaining Water Commissioners, in joint con-

vention. That for the purpose of paying all necessary expenses and liabilities incurred by said Commissioners, in such work, they are hereby authorized to issue the bonds of the town, to be denominated "Northampton Water Bonds," to be signed by the Treasurer of the town and the President of said Board, to an amount not exceeding Two Hundred Thousand Dollars, payable at a period not exceeding twenty years from the date thereof, with interest payable semi-annually, at a rate of interest not exceeding seven per cent. per annum; and they are hereby authorized to sell said bonds at public or private sale upon such terms and conditions as they may deem proper.

WATER COMMISSIONERS CHOSEN AT SAID MEETING.

D. W. BOND,	}	till annual meeting 1872.
OSCAR EDWARDS,		
J. S. LATHROP,	}	" " " 1873.
LUCIUS DIMOCK,		
LUKE LYMAN,	}	" " " 1874.
M. M. FRENCH,		

Commissioners' Report.

By virtue of the power conferred by the foregoing vote, and votes of the town passed at meetings holden on the 8th and 31st days of May, 1871, the Board of Water Commissioners organized by the election of D. W. BOND, President, OSCAR EDWARDS, Treasurer, and LUKE LYMAN as Clerk of said Board, and proceeded to construct the Water Works as contemplated by said vote, and make the following report of their doings to said town:

ENGINEERS.

The Board made choice of Messrs. WELTON and BONNETT, of Waterbury, Conn., who made the preliminary examination and survey for the works, as the engineers in the construction of the same.

PIPE.

The Commissioners, while acting as a committee, at the time of the preliminary report made in 1870, contemplated the use of cement pipe in the construction of the works. Upon further examination, in which several places were visited where such pipe was in use, and correspondence had with various persons, engineers and others, as to their opinion of the utility of such pipe, and it being ascertained that iron pipe could be procured for the works at such price as to enable the works as contemplated to be completed for the amount of the appropriation, the Board decided to use iron pipe. By such course it was believed that the works would be more durable, and would remove all feeling that would otherwise exist as to the bursting of pipes.

WEIGHT OF PIPE.

The pipe used is of two classes denominated "A" and "B," and the pieces 12 feet in length over all. The following are the average weights of the pipe:—

Thickness of Joint for Coupling.	Diameter. Inches.	Weight per pipe.	
		Class A	Class B
5-16 to 3-8	4	222	264
5-16 to 3-8	6	360	420
5-16 to 3-8	12	900	1080
3-8 to 7-16	16	1260	
3-8 to 7-16	24	1800	

LEAD JOINTS.

The joints of the pipe are secured with lead and so thoroughly was this work done that when the water was let on, in but few instances was a joint found to leak from defective work.

COATING TO THE PIPES.

The objection to the use of iron pipes, aside from their greater cost, is with reference to their filling up, in time, from incrustation. The best known method of preventing such incrustation, at present, is by the use of Dr. Smith's coal tar varnish. The Board found that this had been used in various places, and that pipe which had been in use several years had undergone no apparent change from the condition in which it was when first put down. They therefore feel that the town has no reason to fear any trouble from the filling up of the pipes from incrustation.

SURVEY.

The survey made by the engineers at the time of the preliminary examination, was sufficiently accurate to require no further survey to be made, and the Board proceeded at once to prepare specifications for the construction of the reservoir, the furnishing of pipe and connections, and laying the same.

PROPOSALS AND SPECIFICATIONS.

These proposals and specifications were printed in convenient form, and the Board advertised and circulated the same in various localities asking for sealed bids for furnishing pipe and connections, laying the same and building the reservoir and necessary appurtenances, as set out in the specifications. The Board reserved the right to reject all bids.

The bids for the reservoir and appurtenances were all rejected, believing that the work could be done lower than any sum named in the bids, and the result proved that in this they were correct.

The contract for laying the pipe was awarded to C. L. Goodhue, of Springfield, he being the lowest bidder therefor.

A contract for furnishing the pipe and connections was made with Messrs. S. Fulton & Co., of Philadelphia. The cost of the pipe was somewhat enhanced by the coal strike, as it was during the excitement resulting from that event that the contract was made.

SIZE OF PIPE.

The testimony of all who have had experience in water works was that the main pipes were apt to be too small for the growth of the places where the water was put in. The Board believe that this has been avoided by the laying of 16 inch pipe to Florence, and 12 inch from Florence into Northampton. This gives a full supply to Florence, and also a sufficient amount of water in addition for the 12 inch pipe to Northampton. The distribution pipes are believed to be ample for any demand which will be made.

ROUTE TAKEN.

At the time of the preliminary survey, it was contemplated laying the pipe on the road from Florence to Elm street, *via* Dr. Denniston's. It was found that the flat near the brickyard of Mr. Nutting was sufficiently hard for the purpose of laying the pipe, and as this would bring the main pipe

nearer the villages of Bay State and Paper Mill, where the water will undoubtedly be called for at some future time, and was considerably shorter than the first one mentioned, this one was finally adopted.

The only other place where a choice of routes was presented was at the village of Leeds. It was finally decided to take the shorter one, through the cut in the hill made for the railroad of the New Haven and Northampton Company, and following the line of the railroad to the highway. This gives a good opportunity to supply all that portion of the village of Leeds which can be supplied with the water, and to provide in connection with the means already existing there, a good protection against fire.

SALE OF THE BONDS.

The Board were unable to borrow the money necessary for the completion of the works at less than six and a half per cent. per annum. It was found that by having the Bonds engraved and issued in sums of \$1,000 each with six per cent. interest coupons attached, payable \$50,000 in ten years, \$50,000 in 15 years, and \$100,000 in 20 years from date, that a sale could be made of them at a price which would be equivalent to a loan at six and a quarter per cent. At one quarter of one per cent. upon the amount issued for the average time of about 17 years the saving would amount to about \$8,500. The cost of engraving, printing, &c., did not exceed \$1,000. The engraved plates from which the bonds were printed are the property of the town, but by the rules of the American Bank Note Co., by whom they were engraved, they are to be deposited with that Company at Boston. They can be used for printing any other bonds which the Town may desire to issue with but a slight alteration.

DELAY IN FURNISHING PIPE.

Under the contract with Messrs. Fulton & Co., the first cargo of pipe was to be delivered on or before the first day of May, but it was not furnished till almost one month later.

Not only was there this delay at the outset, but they failed throughout the entire season to furnish the pipe according to the contract. Fears were at one time entertained that the main pipe could not be obtained in time to be laid before the ground was frozen. Some of the pipe, under this contract, was furnished very satisfactorily by the Warren Foundry Company of Philipsburg, Pa. But by constant exertions to obtain more pipe from Messrs. Fulton & Co., and by making purchases to the amount of about 400 tons from J. M. Starr & Son, of Camden, N. J., and R. D. Wood & Co., of Philadelphia, the works were substantially completed just as the cold weather came on. Owing to this delay the roads were kept obstructed much longer than anticipated, and were not left in as good condition as they would have been when the ground froze at the approach of winter. Had the pipe been furnished as contracted for more distribution pipe could have been laid and a greater amount of service pipe been put in by consumers.

DEPTH OF PIPE.

The pipe is covered four and a half feet deep above the top. The winter just passed has been one in which the ground has frozen to an unusual depth, but in no instance has the water in the main or distribution pipes frozen, (and it will be less liable to freeze when there are more consumers.) In some instances the water in the service and hydrant pipes has frozen. It is believed that the hydrant pipes can be so protected as to prevent all freezing in the future, and the service pipes, in some parts of the town, if not in all cases, will need to be protected.

SERVICE PIPE.

Owing to the objection to lead or galvanized iron pipe, and the expense of other kinds, the Board adopted for service pipe common gas pipe which is lined with a substantial coat of water cement. This pipe is sufficiently strong and is without objection as to its effect upon the water, while its cost is less than any other kind suitable for the use.

The tapping of the main pipe was awarded to N. B. Hussey & Co., they being the lowest bidders for tapping, furnishing pipe and other fixtures and laying the same. This contract expired on the first of January last.

In the future the main pipe will be tapped by the superintendent of the works, and the laying of service pipe will be done by such parties as the consumer employs, the whole to be paid for by the consumer.

RESERVOIR.

The reservoir as at present constructed covers about three acres, and contains about 4,000,000 gallons. Sufficient land was purchased at this place to permit the dam to be raised ten feet higher, in case it should be found necessary.

COST OF WORKS.

The entire cost of the works up to the present time is \$166,009.29, for a detailed statement of which, with the amount of money on hand, reference is had to the Treasurer's report hereto annexed.

DETAILS OF WORKS.

For a detailed statement of the works, reference is had to the report of the Engineers hereto annexed, showing the amount and size of pipe on each street, the number and location of each fire hydrant, and the location of each gate, also other facts of interest as to the construction of the works.

C. L. GOODHUE.

As already stated, the contract for laying the pipe was awarded to Charles L. Goodhue of Springfield, he being the lowest bidder therefor. He was unable to work to good advantage on account of the delay in furnishing the pipe and special castings, but notwithstanding this, he prosecuted the work with energy, and, as the result showed when the water was let on, with honesty and good faith.

SUPPLY AT LEEDS.

The delay in furnishing the pipe made it impossible to lay the distribution pipe at Leeds till Spring. It is proposed to lay a six-inch pipe in the street near the river, connecting it at each end with the pipe at present connected with the force pumps of the Nonotuck Silk Company and that of George F. Warner. There will be a gate at the main pipe where this branch is taken off, so that all connection with the main pipe can be shut off in case of the use of the pumps in times of fire. Hydrants are to be placed at proper distances on the street, and in time of fire with both pumps in readiness for use a stream of water can be thrown through any hydrant sufficient to insure to this part of the town as good a protection from fire as to any other.

CONSUMERS.

The number of consumers, as already suggested, is not nearly as large as it would have been had the pipe been delivered in time to complete the works in September, as they were contracted. It is expected that a large number will take the water in the Spring, as soon as the frost is out of the ground. At present the whole number is about two hundred, and it is believed that during the year this number will be more than doubled.

EXTENSION OF DISTRIBUTION.

There are several streets in Northampton where the water is needed, and where distribution pipe should be laid, and it is recommended that the board be authorized to expend the income derived from the works in extending the same in such manner as in their judgment shall be most beneficial to the town, and that the town raise by taxation a sufficient sum to pay the interest on the bonds. It is believed that this will be good economy for the town, as it will add largely to the income in proportion to the

outlay, and, in the meantime, the town gets some return for the money so raised by a saving in the amount which would be needed, if it were not for the water works, to sustain an adequate fire department.

SETTLEMENT WITH MILL OWNERS.

Satisfactory terms have been agreed upon between the Board and all but one of the mill owners on Mill River below this stream, and this arrangement will shortly be carried into effect by the execution of necessary writings. The cause of the long delay was the desire on the part of the mill owners to limit the use of the water. The use now proposed as a basis of settlement is for the extinguishment of fires, generating steam, domestic purposes, and for such other uses as water is ordinarily used for from city or town water works, or the works of Aqueduct companies.

ROUND HILL RESERVOIR.

In case of an accident upon the Main pipe beyond Elm street, the supply of water would be limited to the water in the pipe below the gate nearest to the break. It is not improbable that at some future time it will be thought best to build a small reservoir on Round Hill to furnish a supply of water during the repairing of such a break in the main pipe. With this view the main pipe at the foot of Round Hill was so laid as to permit this plan to be carried out without relaying the pipe at that point.

PURITY OF THE WATER.

The Board, judging from the expressions of those who have used the water, believe that the expectations of the public in respect to its purity, have been fully realized. For the convenience of those who may desire to preserve it, we reprint the certificate of Prof. Gaessmann of the result of his analysis of a sample of the water taken from the Brook in September, 1870:—

Quantitative results of an analysis of a sample of Water, marked No. One.

(WATER FROM ROBERTS' MEADOW BROOK.)

One United States Gallon of that water contains 3.400 grains of solid residue at 212 deg. Fahrenheit. This residue consists of

Sulphate of Lime, - - - - -	0.346 Grains.
Bicarbonate of Lime, - - - - -	1.746 "
Bicarbonate of Magnesia, - - - - -	0.544 "
Bicarbonate of Protoxide of Iron, - - - - -	0.243 "
Silica, - - - - -	0.513 "
	3.392 "

With but a trace of Organic matter.

This water is remarkably soft, and is thus well suited for domestic and manufacturing purposes.

CHARLES A. GAESSMANN,

Prof. of Chemistry, Mass. Agricultural College.

AMHERST, Oct. 5, 1870.

We also reprint the table giving the quality of water used in various places:—

SOURCE.	Supplied to or Proposed for.	Grains of Solid Matter in Wine Gallon.
Pawtuxet River,	Providence,	2.14
Connecticut River,	Hartford,	2.56
Mystic Pond,	Charlestown,	{ 4.08, (1859)
		{ 3.22, (1862)
Lake Cochituate,	Boston,	3.37
Roberts' Meadow Brook,	Northampton,	3.39
Mill River,	New Haven,	4.00
Pine River,	New Haven,	5.60
Jamaica Pond,	Brooklyn,	4.40
Lake Ontario,	Rochester,	4.16
Patron's Creek,	Albany,	4.72
Hudson River,	Albany,	7.24
Schuylkill River,	Philadelphia,	5.50
Jones's Falls,	Baltimore,	5.85
Potomac River,	Washington,	5.59
Detroit River,	Detroit,	5.72
Fresh Pond,	Cambridge,	6.32
Ohio River,	Cincinnati,	6.74
St. Charles River,	Quebec,	6.75
Burlington Bay,	Hamilton, C. W.,	7.03
Ottawa and St. Lawrence,	Montreal,	7.04
Passaic River,	Jersey City,	7.44
Mohawk River,	Troy,	7.88
Lake Michigan,	Chicago,	8.01
Croton River,	New York,	10.60
Genesee River,	Rochester,	11.21

It is believed that an analysis of the water running in the stream now when it is full, would be more favorable in its results than the one made of the water taken from the stream when it was so low, and that such an analysis would place the water of Roberts' Meadow Brook at the head of the list. Be that as it may, the citizens of Northampton have every reason to be satisfied with the unusual purity of the water now at their command.

QUANTITY OF WATER.

Fears have been expressed by some during the progress of this enterprise, that the supply of water in this Brook will not be sufficient during the dry season, for the use of the town when it shall have become what it is destined to be.

About the first of September 1870, after the long and unusually severe drouth of that season, the water flowing in the stream was carefully measured, and found to be about 800,000 gallons in 24 hours. It has been ascertained by experience in other places, that the amount of water used for all purposes is equal to from 40 to 60 gallons to each inhabitant within reach of the water. For a population of 20,000 we should need from 800,000 to 1,200,000 gallons per day. With the present capacity of the reservoir, there can be no doubt but what the supply will be abundant for years to come, and with the opportunity to increase that capacity to at least three times the present limits, there will be an ample supply in reserve for any dry season. Should the growth of the town extend beyond the power of such a reservoir to supply, it will be but a small matter to build other dams farther up the stream to supply any demand.

People who have visited Northampton and have seen this stream, and who were acquainted with the quantity of water required to supply places in the manner proposed here, have unhesitatingly said that there will be abundant water for all future demand.

AS A FIRE EXTINGUISHER.

FLORENCE.—There are twenty-one fire hydrants set in Florence about six hundred feet apart, and at such places as

are most convenient to the neighboring buildings. From the hydrants near the largest buildings which are three story high, a stream of water was thrown, at the trial, last fall, over each of these buildings. Five or six streams were thrown from different hydrants at the same time without diminishing the force. This test was sufficient to demonstrate that the protection from fire is ample at this village, and better than was anticipated.

NORTHAMPTON.—Here there are fifty-seven hydrants. The efficiency of the works at Florence renders it unnecessary to add more than a reference to the head at Florence, which is about ninety feet, and that at Northampton of being about two hundred and forty feet. At the trial already referred to, streams of water were thrown from one hundred and fifty to one hundred and eighty feet. The trial between the steamer and the water works, satisfied all that in case of fire the works were the most efficient, although the steamer under one hundred and twenty pounds pressure threw a stream of water from ten to twenty feet farther than the works.

Scarcely had the works been completed before they were called into use at the Eagle Hotel fire, and their effectiveness there fully sustained the report of the committee appointed to recommend some plan for supplying the town with water. All, we think, will now agree with the statement in that report "*That no fire department ever was organized, or ever can be organized, which will be as efficient as the plan now proposed for the protection of property from fire.*"

CONCLUSION.

In concluding this report, the commissioners feel that the people of Northampton may well congratulate themselves on the short time taken to carry out the enterprise which was inaugurated by a vote of the town at a meeting held on the 20th day of July, 1870, appointing a committee to examine and report to the town at some future meeting, the best method of supplying the villages of Leeds, Florence and Northampton with pure water, with power to employ a competent engineer to assist them in such examination, and appro-

priating \$1,000 to pay the necessary expense. The plan which the committee recommended was practically the one adopted by the town at a subsequent meeting, and which is now substantially executed.

By this plan the use of the water commences at Leeds, within half a mile from the reservoir, and is continued along the entire length of the main pipe on its route through Florence to Northampton. The pipe passes within a short distance of the Bay State and Paper Mill villages, thus bringing an ample supply of the purest water within the reach of at least nine-tenths of the inhabitants of the town.

The universal expressions of satisfaction on the part of the people, now that the work is so far completed, and the full realization of the highest expectations of the commissioners and friends of the enterprise in its results, enable the board to make this, their first annual report, with the assurance that the people of Northampton will never have reason to regret but abundant reasons to be satisfied with a work, which for all future time will promote the comfort and prosperity of its inhabitants.

D. W. BOND,
OSCAR EDWARDS,
J. S. LATHROP,
LUCIUS DIMOCK,
LUKE LYMAN,
M. M. FRENCH.

NORTHAMPTON, March, 1872.

TREASURER'S REPORT.

Oscar Edwards, Treasurer, In Account with Northampton Water Works.

DR.

1871.		
Apr. 1.	For Cash received of Blake Bros. & Co., for Bonds, \$200,000 00, net,	\$195,000 00 192 00
Sept. 26.	For Cash received by sale of oxen,	
1872.		
Jan. 4.	For Cash received of S. L. Asylum, one four-inch valve and setting,	25 00
Feb. 24.	For Cash received of N. H. Gas Light Company, for pipe and lead,	27 51 5,213 81
March 1.	For Interest due from N. N. Bank, For Cash received for filling eight cisterns,	24 00
		<u>\$200,482 32</u>

CR.

By Cash paid S. Fulton & Co., pipe,	\$70,394 13	
" Warren Foundry, pipe,	15,566 52	
" R. D. Wood & Co., pipe,	2,037 09	
" R. A. Brick & Co., pipe,	16 46	
" C. L. Goodhue, pipe,	24 67	
" Jesse W. Starr & Sons, pipe,	14,404 60	
" R. D. Wood & Co., hydrants,	3,397 73	
" Boston Machine Co., Lowry hydrant,	252 70	
" Ludlow Valve Company, gates,	1,967 11	
" C. L. Goodhue, labor,	24,221 50	
" Building reservoir, labor, materials,		
etc.,	6,640 68	
" C. L. Goodhue, freight,	7,510 00	
" N. H. & N., & C. R. R. R., freight,	354 69	\$146,787 88
Amount carried forward,		<u>\$146,787 88</u>

Amount brought forward,	\$146,787 88	
By Cash paid, inspecting pipe, Welton & Bonnett,	450 00	
" J. Martin,	123 00	
" Welton & Bonnett, engineers,	3,250 00	
" J. M. Colley, superintendent,	988 55	
" Brooks & Ball, attorneys,	100 00	
" American Bank Note Company, engraving and printing bonds,	635 00	
" Printing and advertising,	150 00	
" C. H. Dickinson, rent,	87 50	
" Real estate, lands, land damages, etc.,	792 35	
" Interest, bonds, etc.,	7,950 00	
" Northampton Gas Light Company, laying pipes, etc.,	88 00	
" N. B. Hussey & Co., stop cocks, pipe laying, etc.,	1,252 26	
" C. C. Smith, labor,	191 82	
" Water Commissioners, traveling expenses,	710 63	
" C. L. Goodhue, lead,	144 17	
" B. M. Couch, patterns,	63 40	
" For oxen,	251 44	
" Expenses, incidentals,	493 29	
" Water Commissioners, services rendered,	1,500 00	\$166,009 29
Balance in hands of Treasurer, March 12, 1872,		\$34,473 03

There is now on hand pipe material, etc., amounting to Four Thousand Five Hundred Dollars, (\$4,500.00).

OSCAR EDWARDS, *Treasurer.*

March, 1872.

We hereby certify that we have examined the accounts of the Treasurer of the Northampton Water Board, and find his vouchers to agree with his accounts, leaving a balance in his hands March 12, 1872, of Thirty-four Thousand Four Hundred Seventy-three and $\frac{3}{10}$ Dollars.

N. B. HUSSEY, }
WM. H. TODD, } *Auditors.*

Engineers' Report.

To the Board of Water Commissioners of the Town of Northampton:

GENTLEMEN:—Herewith please find final report of work done for the purpose of supplying the town of Northampton with water. The work consists of a Reservoir, covering about three acres, on Roberts' Meadow Brook at Leeds; a main pipe extending therefrom to the intersection of Bridge, Hawley and Market streets in Northampton, and distribution pipes with proper gates, fire hydrants, &c., in Florence and Northampton.

The construction of the Reservoir was commenced in the latter part of April, 1871, and completed and the Reservoir filled September 11, 1871. An earth dam is built across the stream at the point where the new highway crosses it. The dam is about seventeen feet high at the center of the brook, and joins the bank on either side. The land covered by the Reservoir was thoroughly cleansed from all vegetable matter.

A trench was excavated in the sides and bed of the stream about the centre of the dam, to a firm foundation, consisting in the most part of rock, from which a wall of clay and gravel was carried above the water line. This wall (12 feet wide at bottom and 6 feet at top) was well puddled, water having been conducted in pipes from the stream above, in sufficient quantity to make thorough work. The remainder of the dam is formed of good material, well compacted. The upper face of the dam is sloped two to one, and faced with rough stone to prevent washing. On the lower face, about five feet below the top of the dam, and at the ordinary water level of the Reservoir, it is widened so as to give sufficient space for the road which passes over it.

The wasteway, to carry off the surplus water of the stream, is excavated through the side hill about 150 feet north of the end of the dam, and discharges into the original bed of the brook about 500 feet below. It is of sufficient capacity to dispose of any ordinary freshet without allowing the water to rise materially at the dam.

At the foot of the upper slope is built a brick well-house, about fourteen feet square, with a perpendicular opening, three feet in width, from the bottom above the surface of the water, in each side. These openings are protected by double wire screens. From the interior of the well-house two pipes are laid through the dam, one of 24 inches diameter for a waste, and the other of 16 inches diameter, with the opening protected by a screen, which is the commencement of the main. The walls of the well-house are carried up to a height of about 16 feet above the water, and roofed, forming a room which gives access to the screens, &c. At the foot of the lower slope is built a brick gate-house, covering the gates on the two pipes above mentioned. The main and distributing pipes are of cast-iron which, to prevent corrosion, are coated with coal pitch varnish, by Dr. Smith's process. They vary in size from 24 inches to 4 inches diameter. Most of these were purchased from Messrs. S. Fulton & Co., of Philadelphia. The gates in the pipes are of the kind known as the "Ludlow valve." The fire-hydrants are with one exception, those known as the Matthews hydrant, manufactured by R. D. Wood & Co., of Philadelphia. The exception is a "Lowry hydrant," with six hose attachments, made by the Boston Machine Co.

The work of laying the pipes was performed under contract by C. L. Goodhue of Springfield. Ground was broken for the pipes in Bridge street, May 22, 1871, and the first pipe laid May 23, from which time the work was carried on continuously till November 29, when it was stopped by frost. The pipes were not received with the regularity anticipated, and at one time fears were entertained that the work could not be completed this season. The main was filled with water, to Florence, November 7, and the entire length, November 10. The distribution pipes were all filled by November 30. Very few defects were discovered in filling the pipes, and these were promptly repaired.

The work has, in general, been very well done. The quantity

of pipe of different sizes laid is about 13 $\frac{3}{4}$ miles, requiring about 1800 tons of pipe, with 49 gates and 75 fire hydrants. The following is a summary of this part of the work as now completed:

STATEMENT OF PIPE LAID.

	Feet.
MAIN.	152 $\frac{1}{2}$
24 inch waste pipe at Reservoir, - - - - -	14,471 $\frac{1}{4}$
16 inch pipe from Reservoir to Florence, - - - - -	12,973 $\frac{1}{2}$
12 inch pipe from Florence to Bridge street, Northampton, - - - - -	
DISTRIBUTION IN FLORENCE.	2,115 $\frac{1}{2}$
6 inch, Park street, - - - - -	1,167 ft.
4 inch, Chestnut street, - - - - -	1,352 $\frac{1}{4}$
High street, - - - - -	1,951 $\frac{1}{2}$
Maple street, - - - - -	3,127 $\frac{1}{2}$
Pine and Beacon streets, - - - - -	32
Park street, - - - - -	1,104
Prospect street, - - - - -	601
Nonotuck street, - - - - -	830 $\frac{1}{2}$
Center street - - - - -	324 $\frac{1}{2}$
To Williston's Factory, - - - - -	10,490 $\frac{1}{4}$

DISTRIBUTION IN NORTHAMPTON.

	Feet.
6 inch, Bridge street, - - - - -	1,108
Hawley street, - - - - -	1,780 $\frac{1}{2}$
Market street, - - - - -	1,565 $\frac{3}{4}$
Pleasant street, - - - - -	1,570 $\frac{1}{2}$
King street, - - - - -	2,489 $\frac{1}{2}$
Gothic street, - - - - -	214 $\frac{1}{2}$
South street, - - - - -	1,973
Prospect street, - - - - -	2,430
West street, - - - - -	65
Round Hill street, - - - - -	67
Main street, - - - - -	75
	13,338 $\frac{3}{4}$
4 inch, Bridge street, - - - - -	1,958
Main street, - - - - -	472
Hawley street, - - - - -	262
Phillips street and Place, - - - - -	1,537
Amount carried forward, - - - - -	4,229
	4,229

Amount brought forward,	-	-	-	4,229
Market street,	-	-	-	57 $\frac{1}{4}$
Union street,	-	-	-	1,063 $\frac{1}{4}$
Strong avenue,	-	-	-	601 $\frac{1}{2}$
Pleasant street,	-	-	-	50
Holyoke street,	-	-	-	382
King street,	-	-	-	40
Gothic street,	-	-	-	14
Center street,	-	-	-	1,026 $\frac{1}{2}$
Masonic street,	-	-	-	648
State street,	-	-	-	782 $\frac{1}{2}$
South street,	-	-	-	3,551 $\frac{1}{2}$
Maple street,	-	-	-	1,048
Spring street,	-	-	-	1,142 $\frac{1}{2}$
Prospect street,	-	-	-	70 $\frac{1}{4}$
West street,	-	-	-	1,213 $\frac{1}{2}$
Green street,	-	-	-	1,466 $\frac{1}{2}$
Round Hill street,	-	-	-	1,226 $\frac{1}{2}$
Edwards street,	-	-	-	471 $\frac{1}{2}$
				<hr/> 19,084 $\frac{1}{4}$

SUMMARY OF PIPE.

24 inch,	-	-	-	-	Feet.
16 inch,	-	-	-	-	152 $\frac{1}{2}$
12 inch,	-	-	-	-	14,471 $\frac{1}{4}$
6 inch, in Florence,	-	-	-	-	12,973 $\frac{1}{2}$
6 inch, in Northampton,	-	-	-	-	2,115 $\frac{1}{2}$
					13,338 $\frac{3}{4}$
4 inch, in Florence,	-	-	-	-	10,490 $\frac{1}{4}$
4 inch, in Northampton;	-	-	-	-	19,084 $\frac{1}{4}$
					<hr/> 29,574 $\frac{1}{2}$
Total length,	-	-	-	-	72,626

STATEMENT OF GATES.

- One 24 inch at Reservoir.
 One 16 inch at Reservoir.
 Four 12 inch : One on Main near Pine street, Florence.
 One on Main, near Round Hill street.
 One on Main, opposite Edwards Church.
 One on Main, east of King street.
 Thirteen 6 inch : One in Village of Leeds.
 One on Park street, Florence.

- One on Waste in Nutting's Flat.
 One on Prospect street near Elm street.
 One on Prospect street near Park street.
 One on South street near Main street.
 One on Gothic street near Main street.
 One on King street near Main street.
 One on King street near Spring street.
 One on Pleasant street near Main street.
 One on Market street near Bridge street.
 One on Hawley street near Bridge street.
 One on Bridge street near Hawley street.

Thirty 4 inch : One on Waste at Leeds.

- One on Warner's branch at Leeds.
 One on Chestnut street near Main street, Florence.
 One on Pine street near Park street, Florence.
 One on N. Maple street near Main street, Florence.
 One on S. Maple street near Main street, Florence.
 One on High street near Maple street, Florence.
 One on Center street near Maple street, Florence.
 One on Prospect street near Pine street, Florence.
 One on Prospect street near Nonotuck street, Florence.
 One on Nonotuck street, Florence.
 One at Williston's Factory, Florence.
 One on Washington ave. near Main street, Northampton.
 One on Round Hill street near Elm street, Northampton.
 One on West street near Elm street, Northampton.
 One on Green street at Hoe Factory, Northampton.
 One on Green street near Hoe Factory, Northampton.
 One at Hospital, Northampton.
 One on State street near Main street, Northampton.
 One on Masonic street near Main street, Northampton.
 One on Center street near Main street, Northampton.
 One on South street River Crossing, waste, Northampton.
 One on South street near Starkweather's, Northampton.
 One on Maple street near South street, Northampton.
 One on Strong avenue near Main street, Northampton.
 One on Holyoke street near Pleasant street, Northampton.
 One on Holyoke street, waste, Northampton.
 One on Spring street near Prospect street, Northampton.
 One on Union street near Market street, Northampton.
 One on Edwards street near King street, Northampton.

SUMMARY OF GATES.

On Main, 24 inch,	-	-	-	-	-	-	-	1
On Main, 16 inch,	-	-	-	-	-	-	-	1
On Main, 12 inch,	-	-	-	-	-	-	-	4
At Leeds, 6 inch,	-	-	-	-	-	-	-	1
At Florence, 6 inch,	-	-	-	-	-	-	-	1
At Northampton, 6 inch,	-	-	-	-	-	-	-	11
At Leeds, 4 inch,	-	-	-	-	-	-	-	13
At Florence, 4 inch,	-	-	-	-	-	-	-	2
At Northampton, 4 inch,	-	-	-	-	-	-	-	10
								18
Total,-	-	-	-	-	-	-	-	30
								49

STATEMENT OF HYDRANTS.

One single at Warner's houses, Leeds.
 One double on Main near E. C. Davis's, Florence.
 One double on Main near C. C. Burleigh's, Florence.
 One double on Main near Maple street, Florence.
 One double on Main near Fruit street, Florence.
 One double on Main near Chestnut street, Florence.
 One double on Main near Pine street, Florence.
 One single on Main near Silk Factory, Florence.
 One double on High street near Fruit street, Florence.
 One single on Maple street near High street, Florence.
 One single on Maple street near Centre street, Florence.
 One single on Maple street near Pine street, Florence.
 One double on Pine street near Park street, Florence.
 One single on Park street near West Centre street, Florence.
 One double on Pine street near Prospect street, Florence.
 One double on Pine street near Brush Factory, Florence.
 One double on Prospect street, Florence.
 One double on Nonotuck street near Silk Factory, Florence.
 One double on Nonotuck street, Florence.
 One at Williston's.
 One on Beacon street.
 One on Centre street.
 One double on Bridge street corner Lincoln avenue, Northampton.
 One double on Bridge street near Cemetery, Northampton.
 One double on Bridge street near James Wright's, Northampton.

One double on Bridge street near Mrs. Hunt Wright's, Northampton.
 One double on Hawley street near Bridge street, Northampton.
 One double on Hawley street near Phillips place, Northampton.
 One double on Hawley street near S. M. Smith's, Northampton.
 One double on Hawley street near Arms & Bardwell's, Northampton.
 One single on Market street near Cherry street, Northampton.
 One double on Market street near Union street, Northampton.
 One double on Market street near Edwards street, Northampton.
 One double on Union street near Jail, Northampton.
 One single on Phillips street near O. Baker's, Northampton.
 One single on Phillips place near W. L. Smith's, Northampton.
 One double on Phillips place near T. W. Meekins, Northampton.
 One double on Main street near Strong avenue, Northampton.
 One double on Strong avenue near C. R. R. R. depot, Northampton.
 One double on Pleasant street near River street, Northampton.
 One double on Pleasant street near Wm. Kingsley, Northampton.
 One double on Pleasant street near Holyoke street, Northampton.
 One double on King street near Geo. L. Loomis's, Northampton.
 One single on King street near Park street, Northampton.
 One double on King street near Edwards street, Northampton.
 One single on King street near Spring street, Northampton.
 One double on Gothic street near Court house, Northampton.
 One double on Main street near Centre street, Northampton.
 One double on Main street near Town Hall, Northampton.
 One double on Main street near Masonic street, Northampton.
 One double on Elm street near L. Maltby, Northampton.
 One double on Centre street near Masonic street, Northampton.
 One single on State street near Centre street, Northampton.
 One double on South street near Main street, Northampton.
 One single on South street near Railroad, Northampton.
 One double on South street near Fruit street, Northampton.
 One double on South street near School-house, Northampton.
 One double on South street near Leonard Day's, Northampton.
 One double on South street near Lemuel C. Ferry, Northampton.
 One double on South street, corner Olive street, Northampton.
 One double on South street near Wm. D. Clapp's, Northampton.
 One single on South street near Day Brothers, Northampton.
 One double on Maple street near Ansel Wright's, Northampton.
 One double on West street near Samuel Parsons's, Northampton.
 One single on Green street near Hoe Factory, Northampton.

One double on Green street near Hoe Factory, (private), Northampton.
 One double on Prospect street near Elm street, Northampton.
 One single on Prospect street near Talbot's, Northampton.
 One double on Prospect street near Park street, Northampton.
 One single on Prospect street near Summer street, Northampton.
 One single on Prospect street near Spring street, Northampton.
 One double on Spring street near State street, Northampton.
 One double on Round Hill street near Elm street, Northampton.
 One single on Round Hill street, Northampton.
 One double on Elm street near Demond's, Northampton.
 One single on Elm street near Washington avenue, Northampton.
 One single on Elm street near Paper Mill Road, Northampton.
 One Lowry on Main street corner Pleasant and King, Northampton.

SUMMARY OF HYDRANTS.

One single at Leeds.
 Eight single at Florence.
 Thirteen double at Florence.
 Fifteen single at Northampton.
 Forty-one double at Northampton.
 One Lowry at Northampton.
 Total, 24 single, 54 double, 1 Lowry—79.

WELTON & BONNETT.

NORTHAMPTON, December 27, 1871.