Tariff of Water Rents.

	Per annum
Banks, - - - -	$10 to 15 00
Bakeries, - -	10 to 25 00
Barber Shops, one chair,	8 00
" " each additional chair, - -	3 00
Bathing Houses per tub,	10 to 15 00
Blacksmith shops one fire,	3 00
" " each additional fire, - -	1 00
Building purposes, per M brick, - - - -	10
Building purposes, per perch stone, - -	06
Building purposes, plastering per 100 yards, -	40
Breweries and Malt houses per M gallons, - -	15
Distilleries per M gallons,	15
Foundries and machine shops per M gallons,	15
Gas Works per M gallons,	15
Locomotives per M gallons,	15
Soap Factories per M gallons, - - -	15
Tanneries per M gallons,	15
Dwelling houses not exceeding 4 rooms, -	5 00
" " each additional room, to 9, -	1 00
" " each room above 9, - -	50
Fountains private, - -	5 to 25 00
Hotels & Boarding houses, per room, - -	1 00

	Per annum.
Offices, each, - - -	1 00
Printing offices (Engines extra), - - -	10 to 20 00
Saloons, Groceries and Eating houses, - -	15 to 40 00
Stables, Livery per stall up to 6 stalls, - -	3 00
" " each additional stall, - - -	1 50
Stables, Hotels, to be assessed.	
" private per horse,	1 00
Steam Engines, where water is not taken by assessment, per horse power, - - -	3 00
Stores up to 20 feet front. -	8 00
" up to 20 to 30 feet front, - - -	10 00
Water for sprinkling lots up to 50 feet front, $\frac{3}{8}$ tap,	1 00
Water for sprinkling lots up to 50 feet to 100 feet front. - - -	2 00
Water for sprinkling lots above 100 feet front, to be assessed.	

Public Buildings, Churches, Theatres, Steam Heating Apparatus, and all uses not stated to be assessed.

The Trustees reserve the right to alter and amend the above Schedule of Rents as it may become necessary.

JACOB HAWK, President.

LOUIS SCHAEFER, Secretary.

REPORT OF TRUSTEES

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P5-928
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OF

CANTON CITY WATER WORKS,

AND REPORT OF

J. L. PILLSBURY, Engineer,

TOGETHER WITH REPORT OF

MESSRS. C. AULTMAN, E. BALL AND JOHN LAIRD,

AND

RULES AND REGULATIONS.

CANTON, OHIO:
HARTZELL & SAXTON, PRINTERS.
1870.

TRUSTEES' REPORT.

To the President and Members of the City Council of the City of Canton.

On the 27th day of March 1869, you instructed and authorized us to proceed in the construction to the completion of the Canton City Works; the history of its progress, has by reports by us made, from time to time been briefly stated to you. On the second Tuesday of Oct., 1869 for the purpose of complying with the requirements of the Statute on that subject, a vote was taken of the electors within the city limits for three Trustees, which resulted in the unanimous choice of every member of your Committee.—For the trust and confidence you reposed in us, we tender you our heartfelt thanks, and for the unanimous endorsement of our action by the citizens of Canton, we offer them our grateful acknowledgements with the assurance that as their servants we at least endeavored to discharge our whole duty, and are prepared this day to present them with the Canton City Water Works complete. We may be permitted to add that its entire cost exceeds from ten to fifteen thousand dollars the amount of one hundred thousand dollars, but the works as originally designed and contracted for, on which the estimate of one hundred thousand dollars cost was based, did not exceed the sum of about ninety-three thousand dollars.

Its increase from fifteen to twenty-eight thousand feet of Pipe, the seventy-five Fire Plugs; the cost of digging to lay the Pipe and setting the Plugs together with additional gates, valves &c., created an increased expenditure of from fifteen to twenty thousand dollars; a minute estimate of dollars and cents *mathematically exemplified* cannot be made. Your committee can also further add that the laying of Pipe from Meyer's Lake to the City, and the distribution of its water through some of our principal streets as represented in the Report made to you by Mr. Schaefer in May 1868, could have been done for the amount as by him then stated in his Report and sustained by the estimate of our Engineer. In regard to the beginning, prosecution and final completion of the works, together with a full scientific statement of its character and attributes, we take pleasure in referring you to the able Report of J. L. Pillsbury, Esq., our Chief Engineer of the works, whose undivided attention, scientific ability and indomitable perseverance, through good and evil reports, during the progress of the work, has been unexceptionable, we cheerfully award to him our full endorsement, and say to him: "Well done good and fathful servant," and feel it our duty to recommend his services to all whom it may concern, in the spirit above expressed.

Annexed we also present you with the amounts of monies deposited, bonds negotiated, and monies paid and to whom, the statement is divided into monthly payments ending the 12th of each month from May 1869 to February 1870, how much has been paid in the aggregate, and the probable amount yet to be paid, and for what purpose.

Library Historical Society

BANK REPORT.

SAVINGS' DEPOSIT BANK,			Dr.
1869, May 10,	To Deposit,		$6,500 00
" May 11,	do		4,000 00
" May 12,	do		4,000 00
" May 20,	do		800 00
" May 24,	do		1,600 00
" May 29,	do		650 00
" June 7,	do		5,000 00
" July 1,	do		5,000 00
" July 3,	do		10,000 00
" Aug. 1,	do		4,000 00
" Sept. 6,	do		2,000 00
" Sept. 15,	do		5,000 00
" Dec. 3,	do		1,300 00
1870, Feb. 4,	do		400 00
" Feb. 10,	do		1,000 00
" Feb. 15,	do		2,000 00
			$53,250 00

SAVINGS' DEPOSIT BANK,			Cr.
1869,			
May 10,	Paid for Revenue Stamps		$8 50
" 12,	" " "		2 00
" 13,	" Perkins & Weston		2 60
" 21,	" T C Nighman		11 17
" 21,	" Raynolds & Saxton		79 45
" 22,	" Diggers		122 00
" 24,	" Revenue Stamps		80
" 28,	" do do		11 50
" 29,	" Railroad Freight		50 00
" 29,	" Diggers		11 50
" 31,	" do		660 00
June 2,	" P H Blake		10 00
" 4,	" Engineer Corps		206 50
" 5,	" Diggers		9 00
" 7,	" do		630 00
" 8,	" P H Blake		20 00
" 10,	" Diggers		16 00
" 10,	" Express Co		90
" 11,	" Diggers		6 00
" 12,	" Express Co		90
	Total paid last month		$1,849 82
June 14,	" Diggers		750 00
" 14,	" Railroad Freight		618 00
" 15,	" T C Nighman		75 00
" 15,	" George Voelker		12 00
" 21,	" Diggers		743 00
" 22,	" George Voelker		17 75
" 22,	" Railroad Freight		449 14
" 26,	" P H Blake		40 00
" 26,	" T C Nighman		97 50
" 28,	" Diggers		550 00
" 30,	" Jacob Sprankle		100 00
" 30,	" Railroad Freight		81 87
July 12,	" Diggers		735 00
	Total paid last month		$4,269 26
July 15,	" Railroad Freight		418 53
" 16,	" P H Blake		53 00
" 17,	" T C Nighman		100 50
" 19,	" Diggers		770 00
" 22,	" H R Beeson		495 61
" 24,	" T C Nighman		42 00
" 24,	" Poyser & Campbell		200 00
" 26,	" Diggers		940 00
" 31,	" G C Nichols		64 50
" 31,	" A Kitt		71 25
Aug. 2,	" Diggers		1100 00
" 2,	" T C Nighman		56 50
" 6,	" Gunnery & Son		300 00
" 9,	" Peter Numan		72 00
" 11,	" C Schulze		13 75
	Total paid last month		$4,697 54
Aug. 16,	" Diggers		1030 00
" 16,	" Poyser & Campbell		250 00
" 18,	" Peter Numan		57 00
" 20,	" Railroad Freight		389 83
" 23,	" Diggers		1160 00
" 23,	" Peter Numan		67 50
" 28,	" J Laird & Co		175 41
" 28,	" A Kitt		41 50
" 30,	" Diggers		1125 00
Sept. 1,	" A Lothammer		20 00
" 6,	" Diggers		1440 00
	Total paid last month		$5,756 24
Sept. 14,	" Baily, Farrell & Co		137 23
" 14,	" P Haubert		30 00
" 20,	" Peter Numan		125 00
" 20,	" Diggers		1500 00
" 21,	" Kearns & Warner		40 50
" 23,	" Hill & Adams		300 00
" 27,	" Diggers		1345 00
" 27,	" Railroad Freight		469 22
" 28,	" Kearns & Warner		34 65
" 30,	" J Laird & Co		125 70
Oct. 2,	" Engineer Corps		278 50
" 2,	" Peter Numan		77 00
" 2,	" H Erstine		1 15
" 4,	" Diggers		1300 00
" 4,	" Wm Smith, Iron Pipe		2966 05
" 5,	" Kearns & Warner		22 47
" 5,	" Kuhns & Buchtel		20 65
" 9,	" Jersey City Pipe Co		300 00
" 11,	" Diggers		1610 00
	Total paid last month		$10,683 12
Oct. 13,	" Poyser & Campbell		136 65
" 13,	" J L Pillsbury		20 00
" 13,	" George Rank		6 13
" 14,	" Peter Numan		30 00
" 15,	" Bailey, Farrell & Co		50 57
" 15,	" J L Pillsbury		10 00
" 21,	" Peter Numan		51 00
" 21,	" J Boyer		25 00
" 23,	" Lloyd & Black		12 00
" 25,	" Diggers		1236 00
" 25,	" Buckius & Bro		18 80
" 26,	" Peter Marks		6 48
" 27,	" Peter Numan		30 50
" 29,	" Jersey City Pipe Co		300 00
Nov. 1,	" Diggers		1554 00
" 2,	" Lewis Hahn		19 25
" 2,	" Jesse Duell		69 00
" 3,	" A McGregor		18 00
" 3,	" J L Pillsbury		253 00
" 3,	" Peter Numan		32 00
" 4,	" Snyder & Shanafelt		30 00
" 4,	" Bockius & Son		40 00
" 4,	" Campbell & Poyser		587 33
" 5,	" Jersey City Pipe Co		4739 68
" 5,	" Holly Man Co		20 00
" 9,	" Kearns & Warner		2 50
" 11,	" H Harold		4 75
" 11,	" G B Leigenhalter		20 00
	Total for last month		$9,322 64
Nov. 13,	" Holly Man Co		78 68
" 15,	" J L Pillsbury		100 00
" 15,	" Diggers		1644 50
" 15,	" Vesseriat		4 37
" 22,	" Correll & Son		186 57
" 22,	" Railroad Freight		498 01
" 23,	" Kearns & Warner		354 82
" 24,	" Peter Numan		159 50
" 25,	" Carting, &c		59 20
" 25,	" Saylor & Shanafelt		45 00
" 26,	" Pipe Layers		113 50
" 26,	" C C Snyder & Co		373 67

Nov 27,	" John Laird & Co		179 34
" 27,	" Kitt & Kitt & Co		29 50
" 29,	" Diggers		1673 00
" 29,	" Geo Williams		7 00
" 30,	" J L Pillsbury		171 00
Dec. 1,	" Peter Numan		108 25
" 2,	" Telegraph Office		7 76
" 4,	" David Smith		21 00
" 6,	" Diggers		662 30
" 8,	" Peter Numan		22 00
" 10,	" Kuhn & Seiberling		45 39
" 10,	" Holly Man Co		2500 00
" 10,	" Jacob Sprankle		22 50
" 11,	" J L Pillsbury		200 00
" 11,	" Jesse Duell		82 50
	Total for last month		$9,349 45
Dec. 20,	" W F Funk		29 70
" 20,	" Jersey City Pipe Co		250 00
" 20,	" Diggers		1403 00
" 20,	" N Huberty, jr		100 00
" 20,	" H Thurston		1 25
" 20,	" Peter Numan		97 25
" 22,	" Baily, Farrell & Co		35 82
" 23,	" Jesse Duell		69 70
" 25,	" N Huberty, jr & Co		198 00
" 25,	" John Betterman		14 00
" 29,	" Kearns & Warner		250 00
" 31,	" Diggers		402 00
1870,			
Jan. 7,	" Express Office		2 53
" 7,	" Bockius & Son		29 00
" 7,	" Peter Numan		52 97
" 8,	" Fred Stone & Co		1638 70
" 8,	" Telegraph office		4 60
" 12,	" J Conway		17 50
	Total for last month		$4,593 02
Jan. 12,	" H R Beeson		168 75
" 15,	" Campbell & Poyser		50 00
" 18,	" Diggers		620 00
Feb. 1,	" Camp & Cook		162 80
" 5,	" J L Pillsbury		225 00
" 11,	" Holly Man Co		775 20
	Total for last month		$2,001 75
	Total payments for the year		$52,522 94

RECAPITULATION.

Amount Savings' Deposit Bank		$53,250 00
Received from do do		52,522 00
Balance		728 00
Accruing interest when added.		

FIRST NATIONAL BANK,			Dr.
1869, May 11,	To Deposit.		$1,600 00
" June 3,	do		15,000 00
" June 18	do		500 00
" July 1,	do		20,000 00
			$37,100 00

FIRST NATIONAL BANK,			Cr.
1869,			
May 11,	Paid Revenue stamps		80
June 1,	" Holly Man Co		4000 00
" 1,	" Exchange		4 00
	Total paid to this time		$4004 80
June 23,	" Engineer corps		200 00
" 23,	" Expense to Phil. & stamps		75 00
" 23,	" Campbell & Poyser		941 22
" 23,	" D Worley, ex of stamps		13 94
July 2,	" Raynolds & Saxton		31 50
" 3,	" A Kitt		14 25
" 3,	" Jesse Miller		8 50
" 3,	" J L Pillsbury		173 17
" 3,	" Telegraph office		1 80
" 5,	" Diggers		634 00
" 6,	" Jesse Dewell		26 00
	Total paid for the month		$2,119 38
July 20,	" C Schulze		8 50
" 20,	" Hill & Adams		1000 00
" 31,	" Rail road Freight		225 75
" 31,	" do do		84 98
Aug. 2,	" Engineer corps		311 29
" 3,	" Poyser & Campbell		1358 16
" 4,	" Kuhn & Buchtel		75 64
" 5,	" Railroad Freight		492 97
" 5,	" Discharged strikers		160 00
" 6,	" Perkins & Weston		19 12
" 8,	" French diggers & Jones		1200 00
	Total paid for the month		$4,936 41
Aug. 13,	" F J Meyers		50 00
" 14,	" Jersey City Pipe Co		2568 75
" 14,	" Mrs Cassilly		57 50
" 17,	" Correll & son		125 84
" 19,	" Hill & Adams		2000 00
" 20,	" H R Beeson		506 25
" 26,	" F J Meyers		52 00
" 30,	" Railroad Freight		150 53
" 31,	" do do		17 64
Sept. 1,	" Telegraph office		6 80
" 2,	" Peter Numan		54 25
" 2,	" J L Pillsbury		339 79
" 3,	" Poyser & Campbell		1664 18
" 7,	" Kearns & Warner		11 00
" 8,	" Sand, Shulze		2 50
" 8,	" Jersey City Pipe Co		3877 00
" 10,	" Peter Numan		68 25
	Total paid last month		$11,532 28
Sept. 13,	" Fred Stone & Co		495 50
" 13,	" Diggers		985 15
" 18,	" Jersey City Pipe Co		105 00
" 21,	" Raynolds & Saxton		33 76
" 22,	" Express Co		1 35
" 22,	" Mrs Cassilly		25 00
" 24,	" H R Beeson		675 00
" 25,	" T C Nighman		15 00
Oct. 5,	" Railroad Freight		51 19
" 6,	" Telegraph office		3 60
" 6,	" Schilling & Herbruck		23 52
" 7,	" Poyser & Campbell		1392 33
" 7,	" Peter Numan		31 50
" 12,	" Jersey City Pipe Co		3220 50
	Total paid last month		$7,058 40
Oct. 18,	" Diggers		1855 00
" 25,	" Jersey City Pipe Co		210 00
" 27,	" Railroad Freight		452 72
" 28,	" Kearns & Warner		2 25
" 29,	" Carts & Scrapers		282 00
Nov. 6,	" Gibbs Bro & Co		25 00
" 8,	" Diggers		1592 00
" 9,	" Peter Numan		42 00
" 9,	" Holly Man Co		75 00
" 9,	" A Daniels		102 50
" 10,	" H R Beeson		337 50
" 10,	" Horse hire for foreman		36 00
	Total paid last month		$5,011 97
Nov. 23,	" Diggers		1268 61
Dec. 6,	" Lloyd & Black		168 25
	Total paid last month		$1,436 86
Dec. 23,	" Thos Lennon		88 80
" 23,	" N Huberty, diggers		298 00
" 24,	" Hartzell & Saxton		12 00
" 30,	" Railroad Freight		62 45
" 30,	" J Laird & Co		294 45
" 30,	" Express Co		3 00
" 31,	" Lawrence Bechel		79 00
1870,			
Jan. 1,	" J L Pillsbury & Moore		77 50
" 3,	" Diggers		461 05
" 7,	" George Wolf		7 00
" 11,	" Holly Man Co		51 00
	Total paid last month		$1432 25
Jan. 13,	" Kuhn & Seiberling		72 22
" 15,	" George Morrell		35 00
" 15,	" John Moore		49 00
" 18,	" Huberty diggers		80 00
" 19,	" D Ely, board		36 85
" 22,	" Bucher, Gibbs & Co		25 00
" 29,	" Peter Numan		50 30
Feb. 2,	" Diggers		450 00
" 3,	" M Leonhardt		1 85
	Total to this date		$800 22

RECAPITULATION.

Am't on Deposit in First National Bk	37,100 00	
Drawn from First National Bank	38,332 57	
Overdrawn		1,232 57
Total amount of City Water Works:		
Bonds negotiated,		$90,350 00
Am't. of bonds applied on Pipe and Machinery	5,000 00	
Jacob Sprankle,	3,500 00	8,500 00
		98,850 00
Of general City funds,		4,000 00
Total		102,850 00

As we cannot name the precise sum in dollars and cents of what is yet to be paid, we leave its statement for our final Report. We have not yet arranged the amount of interest on monies deposited to be paid by the Banks, and other items the amounts of which are not yet specifically ascertained, we trust, however, to be enabled in a short time to lay before you a complete final Report, and hope by so doing to meet your approbation.

JACOB HAWK, Pres.
LOUIS SCHAEFER, Sec'y.
DANIEL WORLEY.

CORRESPONDENCE.

CITY WATER WORKS OFFICE,
CANTON, FEB. 17th, 1870.

Messrs. C. Aultman, E. Ball and John Laird:

GENTLEMEN:—The Trustees of Canton City Water Works desire you to visit the Water Works Dam, Canal and Engine House, and make a thorough examination of the entire Hydraulic apparatus and structures; in behalf of the people, and report your opinion, as practical mechanics of the general style of execution and suitableness of the works.

JACOB HAWK,
LOUIS SCHAEFER,
Board of Trustees.

To the Board of Trustees of the City Water Works:

GENTLEMEN:—We the Committee to whom was referred the examination of the Dam, Canal and Hydraulic Machinery of the City Water Works, beg leave to report that we have this day examined the Dam, Canal, Machinery, &c., and would say, we consider the Dam more than an ordinary structure of this kind, built strong, and will withstand more than an ordinary flood. The Canal is well made, wide, capacious, and well adapted for the purpose for which it is intended, and is well guarded against injury from high water, by water weir, and drain valves, the embankments however are new, and not yet fully settled, and will require more or less attention for several years. The Wheel House which contains the machinery, pumps, &c., is a good substantial building, well adapted for the purpose for which it was designed. The machinery, and arrangement of pipes in Wheel House, is certainly highly creditable to the enterprise, every part of it is strong, substantial, and firmly put together, the arrangement of the valves, and connection of pipes to increase the pressure by the application of power to the Holly pumps, is certainly very simple, and reliable. The swing valve, and supply pipe in the head of bay, which supplies any failure of water from the lake is a distinctive feature of these works, and cannot be too highly valued, duplicating the sources of supply, and making a failure of water almost impossible, for in the event of any accident to, or failure of, the lake pipes by which the supply of lake water was diminished, or cut off, this valve will open of itself, and furnish an unintercepted supply to the pumps. The Turbine wheels, and rotary pumps, we think are, fully adequate to the use for which they were designed. The Automatic Regulator is a most ingenious arrangement for governing the power, and is certainly a masterpiece of invention, by it any desired pressure can be maintained in the pipes.

A relief tower is placed between the terminus of the stone, or earthen; and the commencement of the iron cement pipes, the object of which is to relieve, and absorb the excessive pressure, or concussion caused by sudden closing of valves, in the main pipe, and is a necessary and important structure. There is connected with the Water Works a Cushman Fire Alarm Telegraph by which instant notice can be given to the Engineer at the Wheel House to increase or diminish the pressure in pipes, or other orders desired.

Two safety valves are also placed in the line of pipes in the city, whereby the pipes are relieved from any excess of pressure. After thoroughly examining the various parts pertaining to the City Water Works, as to strength, durability, simplicity, and adaptation, we are happy to say, that the work in all its parts, is highly creditable to the executors thereof, and the citizens of Canton have reason to congratulate themselves upon the achievement of so valuable an improvement to the city. and much credit is due the Board of Trustees, and Engineer, for the energy and economy with which the work has been prosecuted. Respectfully submitted.

C. AULTMAN.
JOHN LAIRD.
E. BALL.

ENGINEER'S REPORT.

CITY WATER WORKS,
ENGINEER'S OFFICE.
CANTON, Feb'y 22, 1870.

Messrs. Jacob Hawk, Louis Schaefer and Daniel Worley, Trustees of Canton City Water Works:

GENTLEMEN:—On the 18th day of August, 1868, I was engaged by your city Council to make the necessary surveys and examinations, and to furnish plans and estimates, for supplying the city of Canton with water. After organizing a corps of Engineers, the survey was commenced, and in company with members of the Council and citizens interested in the project, we visited and examined the possible sources of water supply near your city, and after careful comparison of the respective advantages and disadvantages of each, I made a report to the Council recommending Myers' lake as the best source, and gave an approximate estimate of the cost of bringing the water to the public square; considering it as the conventional centre of the city.

This report was made in September, but the Council requested me to visit several eastern cities, and examine their reservoirs and obtain any facts that might be of use to our project, and in pursuance of their order, I visited Lockport, New York, and fully investigated the Holly System in use there. On my return I asked the Council to permit me to amend my former report, by striking out all that pertained to the Reservoir system and inserting in place of it a recommendation that they should adopt the "Holly System of Water Supply and Fire Protection." Upon a full explanation of what that system embraced, the general sentiment of the Council was in its favor and accepted the amended report on the 14th day of October, 1868. Soon after this, on motion of Louis Schaefer, Esq., a survey of all the streets was ordered by the Council for the purpose of adopting a general grade system by which the water pipes should be laid, and furnish the notes for a system of sewerage when needed, and this duty occupied most of my time until the following January. I may here remark that although the introduction of water into most cities compels the almost immediate construction of extensive sewers, to carry off the great additional amount of water delivered, which would otherwise cause too moist an atmosphere for the health of the people; yet I think owing to the porous, gravelly strata underlying your city, such will not be the case with you. Cesspools will work effectively almost everywhere within yonr corporate limits, and most lots have wells upon them which the owners may turn into cesspools and on account of their great depth will make the best kind, and it is believed that the amount of water finding its way into the street gutters will not be materially increased for many years, and will be as it has heretofore been, storm water, pure and unobjectionable. But when sewers are built the general grade will favor the construction of an effective sewer system on the plan of the survey made by your City Engineer, Captain Williams, from the north part of Walnut street to the South Creek, which gives a fall of over thirty feet.

January 22, 1869, a Council meeting was held at the Engineer's office, and on motion of Mr. Schaefer it was unanimously voted to adopt the Holly system, but on his offering the second motion to make a contract for the Holly machinery it was violently opposed; the motion finally prevailed with but one opposing vote, and a contract was made with Messrs. Holly & Keep (who were present by appointment) for a set of their Hydraulic machinery. The principal stipulations on the part of the city being, that the water engines should be capable of throwing 2,000,000 gallons in 24 hours—that with ten feet head on the turbine wheels, the engines should throw three simultaneous one inch streams eighty feet high through hose attached to hydrants 5,000 feet distant from the works, and that the machinery should be delivered by June 1st, 1869, the price for which was to be $12,146 when set up in the engine house and proved equal to contract stipulations.

On the 11th day of May, a contract was made with McRee Swift, Esq., Engineer of the Patent Water and Gas Pipe Company, of Jersey City, for 15,000 feet of main pipe for the principal streets.

On the 16th day of May a contract was made with the Hill & Adams, Sewer Pipe Co., of Akron, Ohio, for 7,500 feet of eighteen inch drain tile, to be used on the lake division of the aqueduct; there being no place over ten feet below the lake level, it was decided by the Committee on Water Works to use tile and by the successful working of this plan a saving of over $20,000 has been made which suitable iron pipe would have cost more than tile.

On the 17th day of May, 1869, the first ground was broken on the line. A large procession of citizens, preceded by the City Council and a band of music marched to the spot selected and Louis Schaefer, Eso., was requested by a unanimous vote to deliver the opening address; after which he proceeded to excavate the first spadeful of earth and the work was actually begun, the other members of the City Council present assisting by turns in the shovel duty. Citizens present took their turns and the work was finally continued by the regular laborers engaged. The work thus begun, was continued under very many discouragements from the excessive rains which deluged the country nearly all the months of June and July following. The loose gravelly soil filled with boulders crumbled and slid, and as the trench was deep it was at times almost impossible to lay the pipe in the lake division. Extreme precautions had to be taken to save the workmen from being crushed by the falling earth, yet we have to be thankful that during the progress of the work no man was seriously injured. By persevering efforts this division was finally completed, but I estimate the extra expense of the work was not less than $5,000.

In the meadow opposite the farm house of the late Joseph Myers we had to pass a swampy tract full of quicksand and boiling springs, which threatened for a time to bar our progress. This difficulty was met by tying loose muslin bags over the joints of the tile and crowding them full of cement, and carefully replacing the excavated earth upon the pipes before the cement had time to set; the whole contents of the trench settled uniformly, and when the cement hardened it left a water-tight joint. In other places we met with a greasy, treacherous quicksand, in which pipe would sink out of sight. These places were filled with brush and boulders, as long as they would sink, and then the whole was thickly covered with cement mortar, and submerged, and after the cement had hardened it was possible to lay our pipe. Especial treatment for each case had to be devised and executed, and finally our last obstruction was a dyke of rock about 1,300 feet across, which had to be cut through for an average height of eight feet above our grade line which was 5½ feet below the lake surface, and had to be excavated for that depth under the water level. This and other causes of delay, kept back the introduction of water into the city over three months, and besides the great expense of the work, it baffled the engineer in his original intention of making a natural filter in the gravel bed he expected to find where this rock dyke existed.

This division of the aqueduct, reaching 7,300 feet from the lake shore towards Canton, is laid with the tile before described, each piece being two feet long and one and a half feet calibre, and is bedded in, and the joints banded with mortar, made of equal parts of clear, sharp sand and Beeson's Phœnix Hydraulic Cement. The trench was from six to twenty feet deep, and has a general, though not regular inclination of ten feet in 7,300, at which point a "relief tower" is built in which the tile pipe ends; the object and use of this structure is to neutralize the "water hammer" incident to the sudden closing of valves. The momentum of this large column of water, eighteen inches in diameter and nearly a mile and a half in length, would, if suddenly stopped, burst every pipe for hundreds of feet, but here rising in a funnel-shaped tower, the force is gradually overcome and absorbed without violence, or great increase of pressure upon the cement joints. Without this structure the use of a tile aqueduct would be prohibited, and the greater expense of iron pipe must have been incurred.

The tower situated on the bluff, east of the cemetery, marks the line of the aqueduct and is the point where the 14 inch cement pipe begins, which extends 560 feet towards the city, it is then reduced to 12 inches in diameter, (the difference in elevation making the 12 inch pipe equal in capacity to the 14 inch pipe) and continues 750 feet to the Engine House, where a change to twelve inch cast iron pipe is made, and it passes into the basement of the Engine House and connects by a suitable gate

system with the suction pipes of the Holly Water Engines from which the city main pipe leads downward and outward. The cast iron pipe is continued for 800 feet eastward. Cast iron being considered indispensible, as we had to pass under the creek, and through a bed of soft peat, and it was thought that the vibrations caused by heavy pumping might crack cement joints and unequal settlements might occur in the soft peat, either of which might cause leakage in a place where repairs would be difficult to make. As soon as solid ground was reached we returned to the use of sheet iron and cement pipe, which is laid of twelve inches diameter, six feet below the surface and extends along Tuscarawas to Cherry street, a distance from the Engine House of nearly 6,000 feet.

The sheet iron used in the manufacture of this pipe is of the best quality, capable of resisting a strain of over 3,000 pounds per lineal inch, and the thickness of the iron and closeness of the riveting have been carefully adapted by mathematical calculation to the hydrostatic pressure due to the elevation at which it is laid, and a large margin of additional strength has been given beyond the theoretical requirements. The same care has been used in determining the thickness of the cast iron pipes.

The pipe on Tuscarawas street extends from near the residence of Esq. Martin to near Gibbs' Plough Shop east of the railroad, and may be considered the main artery of circulation, from which all other pipes are supplied.

Cherry street, which will be the base of future extensions eastward, has an eight inch pipe with branches pointing eastward at every street crossed, and by sending small pipes through these streets and joining them to a large pipe on some street farther east, a sufficient supply of water can be sent into the north east part of the city to meet all demands

Safety valves have been placed in the six inch pipes on South Market street near Col. Ball's residence, and on East Tuscarawas at Gibbs' Plough Shop, and are weighted to the standard pressure. Should this pressure be exceeded by the vigorous pumping during a fire, these valves will raise and allow sufficient water to escape to restore the standard, the wasted water will run into absorbing wells, built under the valve chamber, which is of stone set in cement mortar. This affords a most complete safeguard against bursting pipes by excessive pressure and will be a great protection against the shock caused by too sudden shutting of hydrant gates.

At proper intervals at the intersection of streets there has been set fifty-two of Holly's Anti-Freezing Hydrants, and the terminal hydrants on several of the streets are "double headed."

Gates have been placed wherever needed to control the circulation, and branches have been laid and plugged wherever it seemed probable that future extensions of pipe would require them.

The whole system of distribution has been planned with a view to very great extensions, and so far as has been possible with the limited amount of pipe at my disposal, I have arranged reinforcing pipes on cross streets, with gates, located so that a collateral circulation can be maintained when a part of a street is thrown out of service for extensions or repairs. This plan should be strictly followed in all future work, for besides the advantage named, it adjusts the balance between different sized pipes and often allows a small pipe to do the duty of a large one, the water flowing from both ends toward any point where a great draft is made on the pipe.

In the basement, or wheel room of the Engine House there is a hydraulic apparatus in the supply pipes of the water engines so arranged that the Superintendent can let the water flow into the city direct from the lake by gravity alone, or send it by either the domestic, or fire Engine or use both at the same time, or take water from the canal and send it to the city by the engines, or throw it into Myers' Lake; and if ever needed on account of buildings to be protected west of the Engine House, the whole line to the Relief Tower can be put under fire pressure by simply having a swing valve, placed in the 14 inch main at the base of the relief tower. The reverse action of the water would close the valve and fire pressure be maintained by the engines. Besides these very essential changes that can be made, an automatic safety valve and pipe has been placed in the head bay and connected with the main supply pipe. On the canal end a swing valve is placed, opening towards the city, and if at any time the supply from the lake should fail or be insufficient to supply the water engines, the lake pressure would fail to keep the valve shut, and the canal water would rush in and supply the engines without effort or even the knowledge of the Superintendent. This automatic safety arrangement was devised to prevent possible failure of water from any cause during fires, and will instantly restore the lake water to the pipes as soon as enough accumulates to close the

swing valve. It is believed that these several precautions will ensure a constant supply of water under all circumstances.

The water may be shut off by closing an eighteen inch Ludlow valve about 2000 feet east of the lake shore, and the entire lake division may be drained by a similar valve placed in a depression in the pipe 3,500 feet east of the lake. The city division on West Tuscarawas Street can be drained by a twelve inch "blow off" placed in the bed of Nimishillin creek 200 feet east of the Engine House.

The lake being only 45 feet above the public square, does not give head enough for effective general service, and the want of power is supplemented by the Holly System of Hydraulic Machinery, which is driven by water taken from a pond on Mr. Jacob Sprankle's land. To make this water power available it was necessary to build a new dam, and a canal nearly a mile long. The canal has a general inclination of only four-tenths of a foot per mile, which proves to give the desired velocity. In building the dam a trench was first dug through the loose mud and sand until a compact, semi-indurated gravel was reached. A row of sheet piling, two inches thick and twelve feet high, was set in this trench and extends from bank to bank, except where the overfall and head-lock of the canal are placed. A mixture of coarse gravel and clay has been packed about this sheeting, over fifty feet wide at base, and eighteen feet wide at the top, and rising six feet above the crest of the over-fall. It was built in layers and well compacted by carting over it, so that it is now perfectly tight. The overfall, eighty feet in length, is built between two stone piers, with deep foundations, and is practically a concrete stone, 80'x8'x4'.6, in a timbered crib, well braced and bolted to prevent the wearing action of the water, which falls only four feet from its crest, on a plank apron, resting on a crib work of heavy timbers filled with boulders and clay. The upstream end of these timbers extend about twelve feet into the solid embankment, which rises to the crest of the overfall. A slight accident happened to this during construction, but was readily repaired without lowering the water in the pond, and will now resist the full power of any flood. The canal conveying the water from the pond to the Engine House is nearly one mile long, twelve feet wide at bottom, nine feet deep, with side slopes of 1½ feet horizontal to one foot perpendicular, and has a fall of four-tenths of a foot per mile, and is intended to carry six feet of water. Being nearly all the way a side hill cutting, it meanders with the contour of the hill, and has generally been located so as to equalize excavation and embankment. At the point where it crosses the creek running from the lake, the water forms a small pond, and the bottom has been sloped from each end at the rate of six-tenths of a foot per mile, to allow the entire channel to be drained off for repairs—to which end an 18" Ludlow valve has been placed in a pipe passing under the embankment at the lowest point. A Waste Wier that will allow the passage of seventy-two feet of water is also placed there, and it has been proved in the late unusually high flood, that these two escapes can carry all the water that will pass the head lock. Besides these a circular surface wier, six feet across, is built in the head bay, with an opening into the wheel pit. The coping of this wier is set just at the standing level of the water and will discharge the reflux incident to sudden closing of wheel gates, and in floods can dispose easily of twenty square feet of water. The crest of the overfall at the dam, is, by our city bench mark, 68,000; the sill of the head-lock 62,000; the sill of the head-bay, at foot of iron screen, 61,600, and top of wheel-trunk 55,500. Thus we have four-tenths of a foot inclination in the canal, and twelve and five-tenths feet fall from the top of water above the dam, to the top of water in the tail-race, and six and four-tenths feet of water in the canal. A rack or screen 23'x6'.6", with openings ⅝" wide and made of bar iron 1¼"x⅜" has been placed at the opening of the head bay to, protect the wheels from injury from floating trash, the actual opening for water being 120 square feet, which proves to be amply sufficient for the heaviest draft.

The foundations of all the structures of the Water Works, and all stone and brick masonry, except the Engine House above the water table, have been made with a mortar composed of equal parts of clean sharp sand and Beeson's Phœnix Hydraulic Cement. The consumption on our works has reached nearly 2,100 barrels.

The foundation pits for the Engine House were excavated in a bed of iron ore and shale. The walls were laid in courses and the face joints pointed with well tempered cement, all spaces filled with angular fragments tightly packed, and when the pointing mortar was well set, the course was filled with a rich grout sufficiently liquid to penetrate every cavity. Some parts of these walls are five feet thick, and it is literally but one stone, the cement being much hard-

er now, than the Massillon stone used in building. No more solid masonry can be made than the foundations of this building.

The Engine House is a small building just large enough to hold the Holly machinery, and was built for use without attempting ornament. It has the upper story divided into two convenient rooms for the use of the keeper's family. At the time this building was designed, we had but $50,000 at our disposal, and the orders of the Committee on Water Works were in brief: "Exercise the most rigid economy, and leave ornamentation to a succeeding generation, if need be." Having an idea that the tastes of the community would eventually justify making the Engine House a more ornamental feature of the work, the design was made so that an enlargement can be made at a very moderate expense, without making the addition appear like an afterthought.

At the summit changes of the grade in the aqueduct west of the relief tower, four air escape towers are placed, to which self-acting escape valves will be placed if needed. These and all other openings to the pipe or gates are closed by iron boxes and kept locked.

It was in the original plan to build a gate house some two hundred feet out in the lake, in a depth of eight to ten feet of water, but this plan was finally postponed with the hope of securing a natural filter, which plan was in turn frustrated by the dyke of rock before referred to. Plans in detail had been made, and bills of materials and estimates prepared for all the structure, including coffer dam and caissons, required to build the work. The estimated cost of this reaching to nearly $6,000, it was thought advisable to defer it until the filter system was first tested. I have examined the reports of construction of all the principal filters, either natural or artificial in this country and in Europe, and from their workings it is my opinion a filter at the lake margin will be a success. The method is simple and cheap—the trench is dug of the proper width and depth, and the eighteen inch tile, two feet long, are placed with the joints open about half an inch; boulders are placed around them, selecting long ones, or bricks to bolster the joints to prevent displacement of the ends, and the whole trench for two feet above the tile is filled with boulders; the top of this boulder wall is then cemented across the entire trench, a wall built up with cement closes the trench around the pipe, and up to the cement roof each 100 feet, and the water as it gathers among the boulders passes into the open joints and flows onward to the city, the pipe being nearly six feet below the surface of the lake, has a good head and if the trench is extended far enough, a constant supply of cool, pure water, perfectly free from organic matter can be obtained. This plan will be cheaper, and preferable to the Gate House, but should you decide to build the Gate House, all the working plans are on file in the Engineer's office. This subject should receive your early attention.

A years experience will prove whether a dam at the outlet of the lake will be needed, and a few hundred dollars will do the work when called for. Frequent repairs of embankments of the dam and canal will be required the coming spring and summer, as the settlement of a new embankment is irregular but sure. It should be the aim to obtain a good turf slope as soon as may be, and to forward this, grass seed must be plentifully sown, and in some places soil and fertilizers should be applied, and when a thrifty sward is once established, there will be few repairs, and little watching needed. It will be a good policy to plant a row of willow twigs on each margin of the dam and canal bank and maintain them, and the long fibrous roots, penetrating the soil and interlacing and binding it together, offer a great and almost perfect protection against water for all time to come.

The Fire Alarm Telegraph belonging to the water works, is made independent of your present alarm wires, but will be connected with them by a switch. At the central office an automatic alarm box is placed to which access can be had by the proper officers. Pressing down a lever gives the alarm at the Engine House in unmistakeable bell tones, the orders to the keeper being so few, only "fire" and "stop," do not require much skill on his part, but a perfect set of signals may be sent him, and if posted he can converse. By the use of this important addition to our system, the hosemen will generally find a full fire pressure in the Hydrant, and thus every second of time is saved that is possible to be saved, at the early stage of a fire, when seconds are what hours would be at a later period.

This alarm system has been thoroughly tested in Cleveland, and Auburn, N. Y., and is now being erected in Memphis, Tennessee, and as the Holly System seems to be endorsed above all other water works, so the Cushman Fire Alarm Telegraph is above all other fire alarms, and will soon come to be considered a vital agency, inseparable from the water works and fire protection machinery. The Holly System will work without it, and respond almost instantly to the call of the hosemen; but by the Cushman signal the fire pressure is put in the pipes while the hosemen are running or making their attachment. Both are essential to a perfect fire protection.

The total length of	18″	pipe is	7,300′
" "	14″	"	559′
" "	12″	cast iron	800′
" "	12″	cem'nt & sh't ir'n,	5,808′
" "	8″	" "	1,367′
" "	6″	" "	7,216′
" "	4″	" "	12.161′
" "	2″	" "	259′

Making a total length of 35,470 feet, or 6 71-100 miles in place, and being chiefly the largest and most expensive, both to procure and lay. Upon this pipe, at the different street corners, are set fifty-two hydrants, leaving twenty-three more for the remaining pipe. We have also on hand, but were prevented from laying by the advance of cold weather:

Of 8″ pipe	1,336′
Of 6″ "	55′
Of 4″ "	6,096′
Total	7,487′

Which, when laid, will make a total length of distribution of 42,957′ or 8 13 100 miles.

The number of	18″	stop gates is	3
" "	12″	"	10
" "	8″	"	2
" "	6″	"	6
" "	4″	"	27
" "	2″	"	1
Total			49

The number of	Drain Valves is	3
" "	Safety Valves is	3
" "	Air Escapes is	5

The locality of underground fixtures of the entire distribution, is shown in a carefully prepared map drawn by Mr. Andrew Choffin, draftsman for the Water Works, and to whom much credit is due for the superior manner in which he executed drawings in detail of all the structures belonging to or contemplated for the Works, and which are carefully filed in the Engineer's office for preservation. Mr. Howard Platt and D. J. Myers, Levelers, discharged their duties in a commendable manner; and the different superintendents of laborers, Messrs. P. H. Blake, F. Myers, Wm. H. Burke, N. Huberty and J. Deuell, have brought me under obligations to them for faithful execution of plans.

I am also under many obligations to McRee Swift, Esq., Engineer, and G. C. Nichols, Esq., Superintendent of the Patent Water and Gas Pipe Co., of Jersey City, for the benefit of their long experience in pipe laying, and for much friendly advice, and am certain that their contract has been honestly performed. Mr. Nichols is the fitting executive of faithful and honorable contractors. The tests of his pipe have at last settled the question, and proved to the people that sheet iron and cement pipe *will* stand against the Holly engine pressure.

This kind of pipe is, beyond question, the best, where soft, pure water is used, and while it costs only about one-half as much as cast iron pipe, has, in soft water a much longer life. Pure water has remarkable solvent powers and will attack metals rapidly, while hard water coats them with a stony precipitate which protects the metal, for this reason the city required their street service to be cement lined; and with this kind of pipe we know no reason why the life of your pipe should be limited.

Having proved it to be capable of resisting the fire pressure, and the oxidizing power of your pure lake water, we think the public will not resent its other recommendation, i. e., half the cost of the cast iron pipe.

The Holly machinery in use here is equal to any heretofore built by them, and was promptly delivered and put in working order, long before we were ready to use it; compliments are unnecessary; it is the system for general use, and will be the popular plan. At the time I reported to your City Council in favor of its introduction here, it was publicly printed in papers in this State, that "no Engineer of any ability would endorse that system." I took the risk, knowing the principle was right, and can now point to the cities of Dayton and Columbus, Ohio; Indianapolis and Connersville, Ind.; and Covington, Ky., which are under contract for the Holly machinery. Some thirty sets of different sizes have been built or are under contract, and the experience of every place using them is, that they are a perfect success.

In concluding this final report of the present condition of the Water Works, I wish to render a just tribute to the originator of the scheme, Louis Schaefer, Esq., who suggested it and worked it up to completion, in the face of all discouragement, personal and financial, and who without compensation devoted his entire time to the work, and who with motives impugned, and factional influences to combat, kept the project moving steadily onward until now he has the satisfaction of seeing the work he labored so long for, completed and in successful operation. And I only state what every citizen knows to be true, in saying that to his general knowledge of the subject, and unremitting labors in the Council, in financial circles and the field, the Canton City Water Works unquestionably owe their existence; and to himself especially,

and to the Board of Trustees generally, I am indebted for courtesy, confidence, and countenance, without which I could have hardly brought my plans to a successful termination, and whatever measure of success may have attended the discharge of the duties of my department is mainly due to that trust and confidence, for which please accept my warmest gratitude.

During the short period that Mr. J. H. Shorb has been engaged as Superintendent, he has proved himself a capable and vigilant officer, and I trust he will receive as hearty support as I have had.

And with an expression of thanks to the citizens of Canton, who by their solid vote in favor of Water Works, so fully endorsed the action of the Board of Trustees and their Engineer, I will respectfully ask you to relieve me from the exercise of farther duty as Engineer of the Water Works.

I am very truly yours,
J. L. PILLSBURY,
Civil Engineer.

Rules and Regulations.

SEC. 1. Applications for a Permit to connect service or supply pipe with the distributing pipes must be made to the Secretary, and the sum of five dollars paid in advance for the Permit, connection and laying the street service pipe to the curb stone.

SEC. 2. The Trustees will furnish the taps, service cocks, and pipe from the street main to the inside of the curb stone; all street service pipe will be made of wrought iron gas pipe that has been tested to 125 lbs pressure per square inch, and lined with Hydraulic Cement $\frac{1}{8}$ of an inch thick.

SEC. 3. All tapping and making connections with street mains and laying the necessary street service pipes and cocks will be done by a person appointed by the Trustees to do such work, who shall before entering upon his duties give Bonds in the sum of one thousand dollars to perform his duties faithfully, and to report truly to the Trustees the exact location, the numbers and sizes of all taps inserted by him, and the length of street service pipe laid; and such person will make no connections until the aforesaid Permit, stating size of tap and pipes, and location of the same, is furnished him by the party ordering the same.

SEC. 4. Applications for water must state fully all purposes for which it is required.

SEC. 5. In sprinkling streets each water taker shall confine himself to the front of his premises and half the width of the street in front thereof.

SEC. 6. Hose larger than $\frac{3}{4}$ inch will not be permitted except upon an additional charge, and sprinkling without nozzle or a larger opening than $\frac{1}{4}$ inch is forbidden.

SEC. 7. No lease of water will be made for a shorter period than one year.

SEC. 8. All water rents are due in advance semi-annually on the first day of the months of January and July, and payable at the office of the Trustees of Water Works. Ten per cent. penalty will be added if not paid within ten days.

SEC. 9. The Superintendent, Engineer and other agents of the Board of Trustees shall have free access at all reasonable hours of the day to all places which are supplied with water to make necessary examinations.

SEC. 10. If the proprietors of Lumber Yards, Manufactories, Halls, Stores, Hotels or Public Buildings, regular customers and consumers of water from the works wish to lay large pipes with Hydrant and Hose couplings to be used only in case of fire—they will be permitted to connect with the street mains (upon application to the Trustees and under their direction) at their own expense; and will be allowed the use of water for fire purposes only free of charge.

SEC. 11. The water will be shut off without notice if parties violate any or either of the above rules, or allow water to run to waste without permission of the Trustees.

SEC. 12. The Trustees reserve the right to apply a Meter to any service pipe where they may deem it advisable.

SEC. 13. Any consumer who shall habitually permit others not members of his family, to use water, from his pipe, and any one who shall thus obtain water, shall be fined in a sum not less than five and not exceeding twenty dollars.

SEC. 14. Each family to be provided with one service pipe, if more than one family reside on one half lot, each additional service pipe to be paid for by the applicant, unless other special arrangements are made with the Trustees.

SEC. 15. No water is to be taken or used from Hydrants at curbstone, except for street sprinkling purposes and washing front of house or houses, and any one violating the requirements of this section, shall be fined in a sum not less than five and not exceeding ten dollars.