

# R E P O R T .

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To the Select and Common Councils  
of the City of Philadelphia.

GENTLEMEN : The Committee on Water have directed me to examine and make an estimate, for a loan to extend the Water Works.

In compliance with this, the Department would submit the following report :

The City has increased much more rapidly than the water supply has been extended. The works were deficient in capacity in 1858, when first I had the honor of reporting to Councils upon their requirements. A number of extensions were recommended at that time, viz. : an increase of the pumping machinery, storage capacity, and distributing mains. Some of these suggestions have since been carried out. The new mill-house at Fairmount, raising the Corinthian avenue reservoir and the thirty-inch main from the Corinthian avenue reservoir to Washington street. These extensions have been valuable to the City, not only in increasing the water supply, but also in a pecuniary point of view.

The new mill-house was at first intended to have but two wheels, with a daily pumping capacity of four million gallons. The works, as constructed, have three turbines, and a daily capacity of sixteen million gallons. It was estimated that the new mill-house would save 9,215 dollars per annum, in the expense of pumping water. Had it been necessary to pump by steam, the water supplied by the new works in 1863, it would have been at an additional cost of \$21,684 95, thus showing a saving of that amount of money, in the running expenses of the works. The revenue derived from the districts supplied by the thirty-inch main, viz : the First,

Second, Third, and Fourth Wards, has already increased one hundred per cent., and is now \$100,000 per annum.

The value of the increased storage capacity, created by raising the Corinthian avenue reservoir, cannot be determined by dollars and cents; but a moment's reflection will show that the expenditure was a judicious one, for it has increased the storage capacity of the works, from 66 to 93 millions of gallons. The total amount expended upon all these improvements, and for which a loan has been created, is \$353,063 92, while the gross annual income from the works has increased from \$457,518 48, in 1858, to \$568,740 60, in 1863—an increase of \$111,222 12.

The net earnings of the works, after deducting all expenses, in the these six years, from 1858 to 1864, has been \$2,048,401 87, being \$1,696,337 95 more than the entire amount expended, in extending the works in the same time. Thus it will be seen, that the water supply of the city has been materially increased, and that the amount expended has yielded a large profit in the increased revenue and decreased cost of pumping. The saving produced by the new mill-house, will alone pay the interest of all the money expended on the extensions. The accompanying paper, marked A, will show the receipts, expenditures, and net income of the Department since consolidation, 1855. There are still many of the extensions recommended in my report of 1858, which Councils have never deemed it expedient to undertake; these have, however, lost none of their importance by the time which has intervened, and the necessity of them is even more apparent now, than when first urged upon your consideration. The Department would respectfully urge them upon you again, with other extensions, which the rapid growth of the City has made necessary. It would not be practicable to undertake all these extensions at once, nor would it be policy, although they are all demanded to make the supply of the City perfect. The Department would respectfully suggest that some of the most essential be undertaken now, and the others undertaken as fast as proper arrangements can be made, viz.: surveys, detailed plans and specifications, and the necessary real estate procured; and as you may deem it expedient.

One consideration, of which, perhaps, it is unnecessary to remind you, is the increased cost of labor and materials.

How far such considerations should influence you, when an interest so vital, as an abundant supply of salubrious water, is a question, you alone must decide.

At this time, when prices are so fluctuating, it is hardly possible to make a reliable estimate, of the cost of these extensions, but the Department would recommend making a loan of one million of dollars, for the purpose of extending the Water Works, to be appropriated to such of the improvements, as you may think the interest of the City will demand, from time to time. An inspection of the accompanying statements of the requirements of the works, will convince you that even this large sum, will not be sufficient to bring the works up to the necessities of the City. It is believed, that if this sum be judiciously expended, it will be a profitable investment to the City, and will yield a direct return, in increased water rents, above the interest of their entire cost.

The following extensions the Department deem necessary :

#### PUMPING MACHINERY.

*First.* At Fairmount, substituting turbine-wheels for the old breast-wheels, would increase the capacity of these works ten million gallons per day, and make the total pumping capacity of Fairmount, during ten months of the year, thirty-eight millions per day, and for the remaining two months, sixteen million gallons per day. To take out the eight wheels, and substitute turbines and new pumps, will cost \$160,000; alterations to the mill-house, \$40,000; making a total of \$200,000. With this alteration, the pumping facilities of Fairmount, would be greatly in excess of the present requirements of the City.

One set of pumps, could be arranged to supply the Twenty-fourth Ward, thus dispensing with the use of the steam engines, a greater part of the year.

With proper connections to the Schuylkill and Delaware works, all the steam engines could be stopped, for at least eight months of the year. This would effect a large reduction, in the running expenses of the works, equal to many times the interest of the cost of the alterations.

The dilapidated condition of the old works at Fairmount,

makes it necessary to do something at once. It is almost impossible to keep them in running order.

An examination of Fairmount Dam, at the present stage of the water, is impossible, but as soon as the condition of the river, will admit of its being done, a thorough and careful examination will be made, and its condition and what is necessary to its permanency reported to you.

*Second.* A large Cornish pumping-engine, with a pumping capacity of ten million gallons per day. The location of this engine will be determined by other extensions, to be hereafter considered. If the improvements be made at Fairmount, as above suggested, this engine will only be required for a few months of the year. Such an engine will cost now, with engine-house, forty-eight-inch pumping main, say 3,000 feet, \$160,000.

*Third.* At Kensington works; by erecting a stand-pipe, both of the engines could be used at the same time. This would cost, with the necessary connections, extending the wharf to Port Wardens line, and laying a thirty-inch suction main, \$30,000. See Report upon this subject in full, Appendix to Journal of Select Councils, No. 63.

The extension of the wharf to the Port Wardens line, and laying a suction main to that point, will enable the Department to furnish water of much better character. Erecting a stand-pipe, will double the pumping capacity of the works, by enabling both engines to be used at the same time, and the ascending main can then be used as a distributing main, thus increasing the facilities for distributing the water.

*Fourth.* A forty-eight-inch main, from Fairmount works to Corinthian avenue reservoir, \$125,000. This main will be necessary, as soon as the old works are rebuilt. At present, all the water pumped by the new wheels, is forced through one thirty-inch main, which is not of sufficient capacity to vent it properly, and any increase in the amount to be delivered at Corinthian avenue reservoir, will require an additional main.

*Fifth.* A thirty-inch main, from the Corinthian avenue reservoir, to the Kensington reservoir, \$175,000.

This will dispense with the use of the steam engines, at the Delaware works, for nine months in the year, and will save, in running expenses, about \$15,000 per annum. . Should you

determine to lay the main, the Department would not recommend the abandoning of the Delaware works, but that they be kept in repair, and ready for any contingency that may occur requiring their use; at least until some other means of supplying the City is resorted to, than Fairmount dam.

*Sixth.* A thirty-six-inch main on Poplar street, from Nineteenth street to Ridge avenue, to connect the thirty-inch main from the Spring Garden reservoir, with the two sixteen-inch mains on Ridge avenue from the same reservoir, which will cost \$12,000.

This will afford great relief to higher parts of the Twentieth Ward. The most of this district lies too high, to be satisfactorily supplied by any of the existing reservoirs.

*Seventh.* A thirty-inch main, on Twenty-second street, to connect the ascending main, from Fairmount to the Corinthian avenue reservoir, with the thirty-inch main on Poplar street, from the Spring Garden reservoir. This will cost \$80,000, and enable the Works at Fairmount to pump directly into the Spring Garden reservoir.

*Eighth.* A twenty-inch main from the Kensington reservoir to Frankford road and Lehigh avenue. A sixteen-inch main, from this point to Westmoreland street and Frankford road, and another to Lehigh and Richmond avenues. This will cost \$150,000, and will insure a supply to Richmond, Frankford, and vicinity, where a large amount of water could now be sold, if the Department could furnish it. This entire district is without a single large main, and is supplied entirely through the service mains. There is but one main leading from the Kensington reservoir, of eighteen inches in diameter, and from the district furnished by this, the Department now receives \$86,000 water rent. A full supply of salubrious water, would no doubt add twenty-five per cent. to this gross income in a single year.

*Ninth.* A sixteen-inch main on Washington street, from Fifth to Front street, which will cost \$16,000.

The district lying east of Fifth street and south of South street, is now without any supply, except that received through the ordinary service mains.

*Tenth.* A twenty-inch main on Twenty-second street, to

South street, from Fairmount reservoir. This will cost \$80,000.

The district south of Walnut and west of Broad street, is now but indifferently supplied.

*Eleventh.* Should one of the wheels at Fairmount, be arranged to supply the Twenty-fourth Ward, a sixteen-inch main would be necessary from Fairmount across the river, and on Haverford street to Thirty-fifth street, which will cost \$30,000.

#### RESERVOIRS.

*Twelfth.* The surface of the water in the Kensington reservoir, is now seven and a half feet below that in the Spring Garden and Corinthian avenue reservoirs. By raising this reservoir to the height of the latter, its capacity will be materially increased, and its depth will add much to the salubrity of the water. This will cost \$70,000.

Upon examining the deed, for the property upon which this reservoir is located, I find the City has sufficient ground adjoining it to construct a reservoir of nearly the same capacity as that on Corinthian avenue. The Survey Department is now preparing a plan of the property, and as soon as possible the detailed plans and specifications for a reservoir to occupy the entire property, will be submitted. It will always be desirable, to have a distributing reservoir at this point, as it is three miles distant, from any of the other reservoirs, and the centre of a large and rapidly increasing population.

*Thirteenth.* A large store reservoir, should be constructed in some eligible situation, with a capacity of at least five hundred millions of gallons. The surface of the water in this reservoir, should be two hundred feet above the City datum; this would command the entire City, with but few exceptions. For such a reservoir the Department has examined several sites—west of Columbia Bridge, in the Twenty-fourth Ward, and south of Green Tree Run, in the Twenty-first Ward. The Twenty-fourth Ward is nearest to the centre of the City; a good location for the pumping machinery suggested in the second recommendation; is near the Columbia Bridge. The water in the river is deep at this point, and of as good quality as that at Fairmount. The reservoir, if constructed

here, would obviate the necessity of one, for the Twenty-fourth Ward.

The location near Green Tree Run, would be farther from the centre of the City, and would require a large and expensive main, but the necessary real estate could be procured at a much less price. The pumping engine, would be located so as to take the water from Flatrock Dam, which is free from contamination, and fully equal in quality to that taken from other parts of the river.

Roxborough and Germantown, could be furnished by pumping from this reservoir, which would lessen the expense of supplying them. Such a store reservoir is of great importance, as a source to draw from in times of emergency and as a means of equalizing the demands upon the pumping machinery. It would also insure pellucid water at all times, by allowing thorough subsidence, and the pumping machinery to be stopped, when the water in the river is turbid. The entire storage capacity of the City Works, is now less than one hundred millions gallons—but three days' supply in seasons of the greatest demand. The store reservoir recommended would contain fifteen days' supply.

The entire cost of the reservoir, would not compensate for the trouble, confusion, and expense that would be occasioned, by the interruption, of the water supply to the City for a single day. Without knowing the exact location of this reservoir, the price of real estate, and the distance from the centre of distribution, to which a forty-eight-inch main will be required, it will be impossible for the Department to make any reliable estimate.

The Department is not prepared to recommend either of the above locations at this time.

If the construction of this reservoir be determined upon, there are other localities which should be examined. The location must be fixed, and surveys and detailed plans made, before an estimate can be offered of the cost of the reservoir and the main, to bring the water to the required distributing point.

*Fourteenth.* Works for supplying Germantown and Roxborough. If the vicinity of Green Tree be selected for the large store reservoir, the pumping engine will take its

supply from it. These Works will cost, with the necessary engines, mains, and reservoirs, \$250,000.

*Fifteenth.* A reservoir for Twenty-fourth Ward, with the necessary mains, which will cost \$150,000. If the Twenty-fourth Ward is selected as the location for the store reservoir, it will only be necessary to lay a distributing main, which will cost \$80,000. In that case the expense of supplying Roxborough and Germantown will be increased, so that the gross amount required for the two will be the same.

The extensions which are most essential now, and which demand immediate attention, are the following:

The extension of the wharf at Kensington Works to the Port Wardens' line, laying a thirty-inch suction main to take the water from the end of the pier, and the erection of a stand-pipe at the Works; which will cost, with the necessary connections, (see third recommendation,) - -	\$30,000
A thirty-inch main on Poplar street, to connect the thirty-inch main from Spring Garden reservoir, to the two sixteen-inch mains on Ridge avenue from the same reservoir, (see sixth recommendation,) -	12,000
A sixteen-inch main on Washington street, from Fifth to Front street, (as per the ninth recommendation above,) - - - - -	16,000
To take out two of the old wheels at Fairmount, and substitute turbines and pumps, (as per first recommendation,) - - - - -	50,000
Total, - - - - -	\$108,000

The Department will mature the plans and specifications for the other Works recommended, as fast as possible, and present them for your approval. It will require some time to execute all of the Works above recommended. The delays incident upon procuring the necessary legislation, real estate, &c., and the time required to do the whole work, will be at least five years, when the demands upon the Works will be fully equal to their enlarged capacity. The daily average amount supplied by all the Works when first consolidated, was twelve millions gallons, and in 1863 twenty-six millions gallons; and, with the same ratio of increase, the water supply of the City will be about in the same position then as now.



At the present prices of material and labor, the entire cost of the work recommended above, would probably reach two millions of dollars.

It is obvious that at no distant day, other sources and other means of supplying the City with water than those now in use, must be resorted to. Allow me to call your attention to an extract, from a report I had the honor to make to Councils on October 28th, 1858, (see "Appendix of Select Council," page 442 :)

"There are sources not yet examined, and the subject of a more abundant supply of unobjectionable water, is one of sufficient importance, to call for a most careful and complete investigation. The Department would suggest the propriety of Councils appropriating, say \$2,000, for the purpose of making preliminary surveys and examinations. A source of supply has been overlooked, viz.: the system of surface drainage and store reservoirs, which is so successfully carried out in some of the cities of the Old World, particularly Liverpool and Manchester, in England, where an abundant supply of most excellent water has been procured, by the above system. That we have as well-fitted and as accessible, and in all points as desirable, sources of supply as those of either of the above cities, needs but a careful examination to demonstrate. An average supply, say, of thirty to fifty millions of gallons per day, brought by its own gravity and delivered into the City, at an elevation of about one hundred and fifty feet above tide, by an aqueduct of but from twenty-five to thirty miles in length, is a possibility, which the expenditure of a sum not greater than the above indicated, will most probably demonstrate to your entire satisfaction."

Such Work look to the future, but the necessities of the City, call for an immediate extension and enlargement of the present Works. During the six years that have intervened, this subject has not been forgotten, as the frequency with which it has been urged upon you will indicate. The Department would again present it to your consideration.

Should the project be found inexpedient, the amount necessary to make the preliminary surveys, is so small that the loss would be very trifling; but if it prove expedient, all the

extensions of the Works should be made with such a change in view, so that when the mode of supply is changed, the loss to the old Works would be as small as possible.

**HENRY P. M. BIRKINBINE,**  
*Chief Engineer.*

**EXHIBIT A.**  
**STATEMENT**  
*of Receipts, Expenditures, and Net Income of the Department from Consolidation.*

	Receipts.	Expenditures.	Net Income.	
1855...	\$382,036 72	\$250,895 87	\$181,141 85	
1856 ..	351,986 49	188,954 85	212,981 64	
1857...	425,426 11	200 605 82	224,820 29	568,948 28
1858...	457,518 48	187,978 09	269,540 39	
1859...	551,180 08	225,082 08	326,098 05	
1860...	558,581 58	199,269 18	360,262 35	
1861...	583,980 06	162,724 94	371,255 12	1,327,155 91
1862...	544,767 25	177,271 69	366,495 56	
1863...	568,740 60	218,750 20	354,750 40	721,245 96
	\$1,874,117 82	\$1,755,532 72	\$2,617,345 15	\$2,617,345 15

DEPARTMENT FOR SUPPLYING THE CITY WITH WATER.

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# ANNUAL REPORT

OF THE

CHIEF ENGINEER OF THE WATER DEPARTMENT,

OF THE

CITY OF PHILADELPHIA,

PRESENTED TO COUNCILS, FEBRUARY 2nd,

1865.

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PHILADELPHIA:

W. F. GEDDES, PRINTER, 320 CHESTNUT STREET.

# COMMITTEE ON WATER WORKS,

1864.

WILLIAM M. UHLER, Chariman,  
JOSHUA SPERING,  
JOSEPH MANUEL,  
FREDERICK C. BRIGHTLY,  
PETER V. WEAVER,  
HENRY W. GRAY,\*

JAMES G. PEALE,  
JOSEPH T. VANKIRK,  
WILLIAM LOUGHLIN,  
ROBERT M. EVANS,  
FRANCIS WOLBERT,  
AMOS BRIGGS.

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## OFFICERS.

### Chief Engineer.

HENRY P. M. BIRKINBINE.

### Register.

W. J. P. WHITE.

### Chief Clerk.

ALBERT H. O'BRIEN.

### Permit Clerks.

NATHANIEL H. PURDY,  
JESSE M. CHRISTOPHER,

GEORGE R. KRICKBAUM,  
LINNEUS B. ESHER,

ALBERT C. FETTER.

### Messenger.

GEORGE W. ECKERT.

### Clerk at Engineer's Office.

JOHN BIRKINBINE.

### Draughtsman.

JACOB H. YOCUM, JR.

### Inspectors.

First District, JOSEPH WIMER,  
Second " ALEXANDER McCONNELL,  
Third " JAMES SEDDONS, JR.,  
Fourth " WILLIAM JAMES.

### Purveyors.

First District, E. B. COBB, Office 615 Carpenter Street  
Second " GEORGE W. SHULTZ, " 918 Cherry Street.  
Third " HENRY JOHNSON, " 1420 Frankford Road.  
Fourth " JACOB C. APPLE, " 1324 Buttouwood Street.

### Engineers at Works.

*Fairmount Works*, JOHNSON HUGHES, WILLIAM OSBORNE,  
*Schuylkill* " WILLIAM HODGES, JOSHUA BARTLEY,  
*Delaware* " BENJAMIN F. NORMAN, JOSEPH THOMPSON,  
*24th Ward* " JAMES GREGORY, ANDREW ALEXANDERS.

\* In place of Henry Davis, Chairman, resigned.

# COMMITTEE ON WATER WORKS,

1865.

HENRY W. GRAY, Chairman,	JAMES G. PEALE,
ALEXANDER L. HODGDON,	ROBERT M. EVANS,
SAMUEL W. CATTELL,	MATTHEW J. BRADY,
CHARLES THOMSON JONES,	JAMES H. BILLINGTON,
JAMES ARMSTRONG,	JAMES T. ALLEN,
C. E. KAMERLY, M. D.,	THOMAS H. GILL.

## Sub-Committees on Water Works.

### ON LAYING SERVICE MAINS.

#### *First District.*

First, Second, Third, Fourth and Twenty-sixth Wards.  
JAMES G. PEALE, C. E. KAMERLY, M. D., and JAMES ARMSTRONG.

#### *Second District.*

Fifth, Sixth, Seventh, Eighth, Ninth, Tenth and Twenty-fourth Wards.  
JAMES T. ALLEN, SAMUEL W. CATTELL and THOMAS H. GILL.

#### *Third District.*

Eleventh, Twelfth, Sixteenth, Seventeenth, Eighteenth, Nineteenth, Twenty-third and Twenty-fifth Wards.

MATTHEW J. BRADY, ALEXANDER L. HODGDON and JAMES H. BILLINGTON.

#### *Fourth District.*

Thirteenth, Fourteenth, Fifteenth, Twentieth and Twenty-first Wards.  
ROBERT M. EVANS, H. W. GRAY and CHARLES THOMSON JONES.

### On Accounts.

ALEXANDER L. HODGDON,	JAMES G. PEALE,
C. E. KAMERLY, M. D.,	J. H. BILLINGTON.

### On Extensions.

C. THOMSON JONES,	S. W. CATTELL,
JAMES ARMSTRONG,	H. W. GRAY.

### On Works.

ROBERT M. EVANS,	JAMES T. ALLEN,
MATTHEW J. BRADY,	THOMAS H. GILL,

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ANNUAL REPORT  
OF THE  
CHIEF ENGINEER OF THE WATER DEPARTMENT,  
FOR THE YEAR 1864:  
PRESENTED TO COUNCILS, FEBRUARY 2, 1865.

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TO THE SELECT AND COMMON COUNCILS OF THE CITY OF  
PHILADELPHIA :

*Gentlemen* :—In considering the water supply of a great city the first essential is quality, and next to that in importance is quantity. It becomes the duty of the Department to call your attention to both these requisites at the present time.

QUALITY OF WATER SUPPLIED.

No city in this country is furnished with water of a better quality than that taken from the Schuylkill river at Fairmount Dam, for the supply of Philadelphia. Its salubrity is however threatened, and partially impaired, by the refuse from factories, mills etc., and other impurities allowed to flow into it, and by the large amount of mine water pumped from the coal workings, in the country drained by the head waters of the Schuylkill. A large proportion of the impurities effecting the salubrity of the water of the Schuylkill is furnished by the drainage from mines. Its pernicious effects are partially neutralized, by the water from the tributaries of the river

which drain limestone regions. The first of these is the Ontelau-nee creek, which has its confluence with the river about six miles above the City of Reading. At this point the chemical action of the waters as they mingle can be distinctly seen; a cloudy precipitate being formed. The Tulpehocken creek enters the river immediately above, and the Wyomissing creek opposite Reading: both these streams drain large areas of limestone country. Analyses of the Schuylkill water at Schuylkill Haven and Reading, have shown to what an extent the water from these streams neutralize the impurities found in the mine water. At Schuylkill Haven the water of the river contains 9.888 grains of sulphuric acid to the gallon, and after mingling with the above mentioned streams, draining limestone regions, this amount is reduced to 2.652 grains to the gallon at Reading. This amount is still further diminished by the waters of several confluents of minor importance, draining limestone country, which enter the river below Reading; the last of these is East Valley creek, which joins it at Valley Forge. Below the mouth of this stream the amount of sulphuric acid is about the same as at Fairmount, viz: 1.508 grains to the gallon. The amount of acid found in the water at and above Reading, is sufficient to make it unfit either for manufacturing or culinary purposes, but from Valley Forge down, no inconvenience is experienced from it. At Fairmount the amount of sulphuric acid in the water is found to be steadily increasing; in 1842, there was 1.302 grains to the gallon; in 1854, 1.417 grains; and in 1862, 1.508 grains. It is not probable that any inconvenience would be felt, either for culinary or manufacturing purposes, unless the amount of acid should exceed two grains to the gallon; but as the coal basin drained by the Schuylkill is fully developed, and in fact some of the mines worked out, the amount of mine water will most probably never be greater, but will decrease after a few years.

The other matter held in solution in the Schuylkill water, consists of magnesia and lime; the proportions are of magnesia, 0.835



grains, and lime, 1.457 grains to the gallon ; these proportions are so small and harmless that they require scarce a comment. Some authorities claim that small quantities of these mineral salts actually add to the salubrity of the water. It is also believed that a small amount of sulphuric acid in the water does not vitiate it, but has a beneficial effect in preventing putrescent decomposition, destroying organic matter, and imparting a sprightliness to the taste. Its presence possibly hastens the destruction of steam boilers, but as we probably now have the maximum amount that will ever be found in the water, it need occasion no uneasiness. One remarkable property in the water of the Schuylkill taken from Fairmount Dam, is the almost imperceptible amount of organic matter found in it.

In September, when the water was low and no rain water was flowing into the streams, the Department obtained specimens of water from the Schuylkill above the Ontelaunee creek ; from the Ontelaunee, Wyomissing and Tulpehocken creeks, and from Fairmount Dam, and subjected them to Clark's soap test, which furnishes reliable comparisons of the value of the different waters for culinary and manufacturing purposes. The water from the Schuylkill above the Ontelaunee creek, was found to possess 8.05 degrees of hardness. The Ontelaunee creek, 12.13 degrees. The Tulpehocken creek, 12.37 degrees. The Wyomissing creek, 13.39 degrees. The Schuylkill, at Fairmount, 6.19 degrees. Equal quantities of the water from the Schuylkill above the Ontelaunee, and from the Ontelaunee, mixed together, exhibited 7.92 degrees ; thus showing the effect of the lime water. Each degree of hardness represents the presence of one grain of mineral salts to the gallon.

A large amount of objectionable water is constantly flowing into Fairmount Dam—drainage from breweries, distilleries, gas, chemical, and dye works, paper, woolen and cotton mills, etc. Nor is this objectionable matter confined to drainage and liquid refuse, but spent dye stuff, lime, ashes, and all dross and waste material, no matter of what kind, are either thrown directly into the river, or so

placed that the first freshet will carry them off and deposit them in the lower portion of the dam. Thus the river is not only made a common sewer, but general carrier of all objectionable and refuse matter. The Department has made a careful examination of all the sources which produce these impurities, and believes that but little difficulty will be experienced in preventing most of such matter from entering the river. There appears to be ample legislation upon the subject, but these abuses have been so long continued, that the manufacturers and others look upon them as their rights.

A great amount of this detritus is accumulated in the lower part of Fairmount Dam, which, on account of the slow current, is rapidly filling up; thus destroying the great subsiding reservoir, so effectual for the depuration of the water supplied to the City.

The taste of the dye stuffs and other impurities is readily discerned as far down as the Reading Rail Road bridge at the Falls, and at times the entire river is discolored to this point; but below the Columbia Avenue bridge no trace of it can be distinguished either by the eye or palate.

A large amount of objectionable matter is also brought down and discharged into the dam, by streams draining into it. By constructing catch reservoirs much of this could be arrested. Of these streams, the most objectionable, on account of its proximity to Fairmount, enters just south of the Schuylkill works; it drains quite a number of breweries, chemical works, slaughter houses, etc. The Twenty-fourth Street culvert was carried out the rail road in order to receive this stream and discharge it into the river below the dam, (at Vine Street wharf); although it has for several years been finished to within a short distance of the stream, the connection has not yet been made, and this filth is still flowing into the river.

The knowledge of the amount of deposits in the lower portion of the dam, being of vital importance in connection with the water supply, in 1861 the Department made a careful and thorough hydrographical survey of the Schuylkill river, from Fairmount to

Columbia Avenue bridge; a distance, measured along the channel, of 9,352 feet, or 1.77 miles. Upon comparing the results with a survey of a part of this portion of the dam, made by the Schuylkill Navigation Company in 1852, it was found that a deposit of mud had been formed amounting to 1,576,240 cubic feet, or 68,532 tons. Believing that this deposit was being yearly augmented, the Department was induced last fall to make a second hydrographical survey between the same points. The results have been compared with those of the survey of 1861, and the following statements adduced:—

The contour of the river has undergone considerable change. Below the Columbia Avenue bridge the Eastern shore has encroached upon the channel for 600 feet, to the distance of 60 feet. Again, 500 feet above the Rolling Mill, and from thence down to it, there is a deposit of some importance. Just below the mill there has been considerable filling in for 300 feet. At Girard Avenue bridge the shore has advanced nearly to the line of the Schuylkill Water Works wharf. This deposit extends nearly 400 feet down the stream. In constructing the drive along the front of the Park, the shore has in several instances, been projected into the river. The Skating Club's House has formed a deposit above it, and the shore below has encroached upon the channel as far as the Pacific Boat Club's House. The improvement of the Park at the lower end, near the steamboat wharf, has extended the shore considerably.

In following the Western shore, the first encroachment is made by a little creek entering above Eggelsfield. At Girard Avenue bridge the shore line extends slightly into the river, and continues to do so until opposite "Solitary," where it is nearly 100 feet further out than in 1861. Below the 24th Ward works a creek has made a large deposit

The surface area of the river has altered very little, while that of the channel has greatly increased. At Columbia bridge the chan-

nel is about the same width as in 1861, but from this point it has increased in breadth until opposite Turtle Rock ; (this rock is about 400 feet north of the Philadelphia Skating Club's House,) where it occupies the same position that it was found to have in 1861 ; it however immediately widens again very rapidly, and is thrown toward the Western shore, owing to the projection of the Skating Club's House. Again contracting, it assumes nearly its former width, (working much nearer the overfall of the dam,) until within about 800 feet of Fairmount, where it slightly widens again. Throughout the entire length of the survey, the channel has worked much nearer to the western shore than in 1861.

There is little or no change in the sectional area of the river at Columbia bridge, but from there to a point opposite Schuylkill Heights, the current has scoured out the river and removed from between these two points, in three years, 926,459 cubic feet. The sectional area is here found to have decreased until about 500 feet below Girard Avenue bridge, and a deposit amounting to 2,431,771 cubic feet formed. Here again the area is increased, (notwithstanding the formation of an island opposite 24th Ward Works, and near the western bank of the river,) and it continues so to a point in the river just below Turtle Rock, making an excavation of 875,777 cubic feet. From this point to within 800 feet of Fairmount, the area has been again contracted and a deposit of 831,910 cubic feet made. In the remaining 800 feet, to Fairmount, there has been 68,822 cubic feet excavated.

Total deposit,	3,313,681 cubic feet.
Total excavation,	1,871,058 " " "

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Increased deposit since 1861, 1,442,623 " "

Deposit per annum, 480,876 cubic feet.

Total deposit below Schuylkill Heights, per annum, 789,694 cubic feet.

The following comparisons of the surveys of 1861, and 1864, have been made :—

	1861.	1864.
Greatest sectional area,	20,518 sq. ft.	13,136 sq. ft.
Least sectional area,	6,700 “ “	2,590 “ “
Mean sectional area,	8,254 “ “	7,153 “ “
Greatest average depth,	23.772 ft.	17.2 ft.
Least average depth,	7.524 “	5.8 “
Mean average depth,	22.346 “	10. “

The encroachments which have been made by the deposits upon the South side of the Park, are produced, no doubt, in part by filling in at Turtle Rock, and the projection of the Skating Club's House. The survey has demonstrated that the effect of erecting this house upon piles, out beyond the shore line at this point, was such as was feared when the Department protested against its construction. Just below the Schuylkill Water Works there is another deposit of detritus, much of which is formed by the debris brought down by the creek, which enters the river at this point. A large deposit is forming an island opposite the 24th Ward Works. There are a number of deposits being made at other points in the dam, but these do not require immediate attention; on account of their distance from where water is taken for the supply of the City, they do not so directly effect its purity. It has been asserted that a river will keep its own channel clear; this to a certain extent is true, where the flow of a stream is rapid and confined to its channel; but it is not true of the pool of a dam, and artificial means must be resorted to for the purpose of removing such accumulations. The deposit of mud on the South front of the Park, between Fairmount and the Skating Club's House, should be dredged out, and might be used for filling up such portions of the Park as may require raising.

In the improvement of the Park the shore line is being projected into the dam; this is certainly to be regretted, for, every foot taken

from this beautiful expanse of water, detracts from the attractions of our Park ; no green sward, however carefully kept, or shore line, be it ever so gracefully curved, can take the place of a pool of bright limpid water.

Accumulations of mud in front of the Park will doubtless continue, and further encroachments be made upon the river. Should it be dredged now, the operation must of necessity be repeated in a few years ; but this expense would be better borne than the loss of so much of the water space of the dam, which has such an influence upon the purity of the water supplied. By removing the Skating Club's House, and the earth thrown into the river at this point, or (if this be deemed undesirable,) by constructing a canal from Turtle Rock, passing in the rear of the building, thus placing it upon an island ; the water passing through this canal would do much to prevent the further accumulation of mud, and no doubt remove much which has been already deposited.

One of the reasons for purchasing the property now occupied by the Park, was to insure the purity of the Schuylkill water ; but in its improvement this fact is evidently often overlooked. The Water Department should at least have the control of the shore line of all property belonging to the City, and if possible no alterations should be made in the general contour of the river, without the approval of this Department.

The mud flat in front of the 24th Ward Works might be dredged and placed upon the island now forming at that point. In this work the Schuylkill Navigation Company would probably render some assistance, as this portion of the river is now entirely impassable for even empty light draught boats. An island at this point would not detract from the beauty of the river, and would be objectionable only as taking the place of water ; it could be formed about 150 feet from the Western shore, commencing 400 feet below the 24th Ward Works and continuing up the river for 1000 feet, by 250 feet in its widest part, and conforming it to the Western shore.

An ornamental summer house placed upon it would add much to the attraction of the river, as viewed from the Park, and make a pleasant point for visiting in boats.

These shallow places immediately in the vicinity of the works, where so much of the water is taken for the supply of the City, are very objectionable, owing to the action of the sun upon the mud, and the decomposition of organic matter, thereby impairing the purity of the water.

That portion of the dam between Fairmount and Columbia Avenue Bridge, is the reservoir of subsidence, where the water is prepared for the City's use. Every encroachment should be carefully guarded; every shallow place deepened or filled up, and the entire shore line walled, and the water along it kept at a depth of at least five feet. It is certain that with proper care, a rigid enforcement of the laws, and the alterations above proposed, the purity of the water supplied to the City can be maintained and its character improved.

#### QUANTITY OF WATER.

The demand for water has been rapidly increasing, and is now beyond the ordinary capacity of the works. The amount supplied to the City since consolidation has been as follows.

	Amount Pumped per Annum.	Daily Average.
	GALLONS.	GALLONS.
1854,	4,270,786,912	11,700,786
1855,	4,876,528,323	13,340,323
1856,	5,685,933,976	15,671,963
1857,	6,317,903,116	17,309,323
1858,	6,839,425,959	18,738,153
1859,	7,168,031,647	19,638,442
1860,	7,465,740,277	20,382,064
1861,	7,596,079,938	20,728,985
1862,	7,932,886,423	21,733,935
1863,	9,495,775,141	26,024,041
1864,	9,307,007,849	25,489,451

In regard to 1863, the amount pumped was estimated, as all the counters on the pumps were either out of order or disconnected, and the amount is no doubt much greater than that actually pumped. The average daily amount probably did not exceed 23,500,000 gallons.

The daily pumping capacity of the works are as follows :

Fairmount, Old Works,	12,000,000 gallons.
Fairmount, New Works,	16,000,000 "
	<hr/>
Total,	28,000,000 gallons.

This is during the ordinary stages of the water, but for a period of time in the summer, say three weeks, the capacity is reduced to about one-half, (14,000,000 gallons,) and for want of a larger ascending main, the greatest amount that can be supplied by these works, is twenty-four millions per day.

*Schuylkill Works.*—The four steam engines have a combined capacity of 10,000,000 gallons per day, but owing to the small size of the ascending main, not more than 8,000,000, can be pumped without injury to the machinery or pipes.

*Delaware Works.*—The two engines at these works have a daily capacity of 5,000,000 gallons, but as there is but one ascending main of 18 inches diameter, only 3,000,000 gallons can be pumped. The stand pipe now being erected will increase the capacity to 4,000,000 gallons.

*Twenty-fourth Ward Works.*—There is no store reservoir attached to these works, and but one engine can be depended upon, to be pumping at all times. Each engine was intended to pump 1,000,000 gallons per day, but this amount has been frequently more than doubled.



## Recapitulation of the capacity of the Works :

Fairmount Works,	24,000,000	gallons.
Schuylkill Works,	8,000,000	“
Delaware Works,	3,000,000	“
24th Ward Works,	1,000,000	“
	<hr/>	
Total capacity, per day,	36,000,000	“

During the past summer, the greatest consumption in any one day was 43,250,000 gallons, this continued for three days, reducing our reservoirs about five feet; had the demand been as great for several days more, the reservoirs would have been emptied and the City have felt the want of water. A large proportion of this amount was no doubt wasted, notwithstanding all the care the Department exercised to prevent it. At such seasons an abundant supply of water is more than a luxury, it is a necessity, for promoting the health and comfort of a large city.

From the above statements, you will observe that we are deficient in pumping capacity during the seasons of greatest demand, or when the water is low in the Schuylkill.

In storage capacity there is an equal deficiency. The contents of our reservoirs are :

Fairmount, (four reservoirs,)	27,000,000	gallons.
Corinthian Avenue, (one reservoir,)	40,000,000	“
Spring Garden, (two reservoirs,)	9,000,000	“
Kensington, (two reservoirs,)	9,000,000	“
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Making a total capacity of	85,000,000	“

Not three days mean average supply, or two days of the greatest demand.

It is therefore evident that the City will require additional steam and water power pumping machinery, and also greater reservoir capacity.

Upon the recommendation of your Engineer, in 1858, various additions and enlargements were commenced, a part of which were then carried out.

Since 1861 no improvements have been made. The City has increased, and the necessity for enlarging the works is greater now than at that date.

#### PUMPING MACHINES.

The first Steam Pumping Engines constructed in this country, were those erected by Nicholas Rosevelt for supplying this City with water. One was placed on the Schuylkill near Chestnut Street, and the other at Centre Square. There were then but three steam engines in operation in the United States. These pumping machines were of necessity rude and imperfect in their fittings, but notwithstanding this they were as economical in fuel as the majority of the steam engines now in operation, and reflected great credit upon their constructor; for it required more than ordinary mechanical skill and resource to build them, with the tools in use at that early day. In 1799 it was a matter of no small moment to erect two pumping engines, each of three million gallons daily capacity. From the records of the Works it is evident that Mr. Rosevelt had a hard contract, and was held to it with undue severity; his experience was doubtless that of many able mechanics, who have undertaken great enterprises. Notwithstanding this early effort in the building of pumping machines, and the celebrity of the manufacture of such engines in this city, the majority of the steam pumping engines now used by this Department, will not compare favorably with those in other cities of the Union.

From an inspection of the tables exhibiting the working of the steam engines, it will be seen that the average duty performed last year was but 322,987 foot pounds.

The average duty of the four engines at the Schuylkill Works was 339,110 foot pounds.

Of the two engines at the Twenty-fourth Ward Works, 421,449 foot pounds.

Of the two engines at the Delaware Works, 208,132 foot pounds.

From this you will perceive that there is ample room for improvement. At the present prices of coal the economy of an engine is a matter of considerable importance, and this consideration, would dictate replacing most of the pumping engines with others of better construction at once, as the saving in fuel alone would soon pay the expense of the alterations.

If engines of the same character as those in use at the Twenty-fourth Ward Works (Cornish Bull Engines,) were substituted for those now in operation at the Delaware Works, the saving in pumping an amount of water equal to that pumped during 1864, would be

In Coal,	-	-	-	-	-	-	\$6,827 00
In Oil,	-	-	-	-	-	-	126 00
In Tallow,	-	-	-	-	-	-	86 00
							————— \$7,039 00
Including all expenses, a saving of	-	-	-	-	-	-	7,527 00

It is requisite that the steam-pumping power of the Department should be much increased. The machinery has suffered greatly from mismanagement. Engineers have frequently been placed in charge of engines, whose only qualifications were their political weight; and as a consequence, there is not an engine or pump in the Department which does not give evidence of maltreatment; in broken parts, cut-bearing surfaces, &c. It is almost impossible to keep some of the machinery together, on account of their many defective parts. Ponderous machines, like those used in this Department, require a certain amount of experience in their peculiarities, which can only be gained by managing them, and any change in engineers involves the risk of accident. For want of this knowledge, even if they be qualified in other respects, it

would be economy in Councils to make a direct appropriation to political engineers, should it be necessary to appoint them, and retain experienced men in charge of the machinery.

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## CONDITION AND OPERATION OF THE WORKS.

### FAIRMOUNT DAM.

Your attention was called to the unsafe condition of this important structure in the Report of the Chief Engineer, presented to Councils in February, 1862, (see Report for 1861, page 19.) The necessity was shown for making immediate preparations, and commencing the work of rebuilding, either of wood or stone. During the month of December last, unusually low tide, occurred for several days in succession, at which time an opportunity was afforded for examining the foundations of the Dam. They were found to be in a very insecure condition. One portion appeared to require such urgent attention, that arrangements were immediately made for strengthening it. It was deemed inadvisable even to wait until the necessary appropriation and authority could be procured from Councils, before commencing the work.

The Dam at Fairmount was constructed by Mr. Ariel Cooley; the first crib was sunk on the 19th of April, 1819, and water flowed over the Dam January 25th, 1821. Mr. Cooley died a short time prior to its completion, from the effects of exposure while building it.

The over-fall of the Dam is 1204 feet long; the mound-dam 270 feet, and the head arches 104 feet; making its whole length, including the Western pier, 1600 feet. It backs the water up the river for six miles.

It is constructed as follows: 270 feet is stone, quarry spawl and earth, raised fifteen feet above the level of the water in the Dam.

This mound is terminated by a strong pier of timber, filled with stone. The mud and water where this part of the Dam is built, extends, in depth, about thirty feet below low tide. Next to this, 450 feet of the over-fall is in water from 14 to 19 feet deep at low tide; in this space cribs are sunk and filled with stone, up to low water; these are all secured together and backed with earth and stone. Upon this foundation the Dam is built; of timber filled with stone. For the remaining distance beyond the deep water, the Dam rests upon rock, bare at ebb tide. In many places the structure of the Dam is over 30 feet high, (more fully described in Report of 1860, pages 20, 21.)

The Department would again urge upon you the necessity of making immediate preparations for rebuilding the Dam. No repairs have been made since 1843, when all above low water was rebuilt.

It would be advisable to sink a line of cribs, filled with stone, along the front of the Dam, in the entire length of deep water, and place an apron upon them. This would protect the foundations from wear, and prevent further weakening of the structure by portions of the cribs being washed out.

A dam of timber, filled with stone, could be placed below the present one, and connected to it; which would render the structure perfectly safe for at least twenty years longer, at a comparatively small expense. A stone dam would be the most desirable, but would require an immense outlay of money. At the present prices of labor and material, probably half a million dollars. The Department would recommend, under existing circumstances, that a timber dam be built below the present one, to strengthen it as described.

Should you determine to have the Dam rebuilt, a sluice-way should be made in it, so that the water might be discharged from the bottom of the pool. The opening of this sluice would remove much of the deposits now obstructing the Dam, and to a great

extent prevent future accumulations. If the timber work, as recommended, be properly constructed, out of carefully selected materials, no apprehension need be felt for its safety, for such a length of time as would indicate its economy.



## FAIRMOUNT WATER WORKS.

### OLD MILL HOUSE.

The machinery, in this part of the works, is in a very delapidated condition.

Wheels Nos. 1, 2 and 3 were the first built; they were started in 1822, and rebuilt in 1846; since that time they have been running with but few repairs, and are now in better condition than any of the other wheels. The pumps propelled by them were also renewed in 1846, but now require rebuilding, all of them being more or less broken.

Wheels Nos. 4, 5, 6, 7 and 8 are of different construction from Nos. 1, 2 and 3. These were made as heavy as possible, under the mistaken idea that the momentum of the rim would add to the efficiency of the wheel. On account of this great weight they cannot be kept in repair; it is necessary to be continually renewing the starts, buckets and soleing. The pumps connected with these wheels are, with the exception of that attached to No. 4, broken in some important parts.

All the pumps require renewal, and wheels Nos. 4, 5, 6, 7 and 8 should be taken out and replaced by others. The recommendation so frequently made, of substituting turbines for these wheels, is again pressed upon your consideration.

Some repairs were made to No. 9 (turbine wheel) this season, but it is now in good working order, and is the only wheel and pump in satisfactory condition in the Old Mill House.

## NEW MILL HOUSE.

It is to be regretted, that the machine work of the New Mill House has not been finished with the care and integrity which this important work demands.

The pumps are everything that can be desired. The gearing however, has been placed in the hands of mechanics entirely ignorant of the construction of such work, and without adequate tools to execute it properly. It was left in a very defective condition, and can never be made perfectly satisfactory.

The turbine wheels were never completed as contracted for; they depend solely upon a wooden step, to sustain the weight and the labor of the gearing.

The hoisting arrangements for the gates were also defective, being wanting in strength for wheels of such magnitude. Some of these defects have been remedied. The pinions have been dressed, the gate hoists renewed and strengthened: there are other improvements to be made, which will be attended to from time to time, as the machinery can be spared. The gearing was re-cogged last winter, but by unskilled mechanics, with unseasoned and brash wood; and it has required a great deal of attention and many repairs during the year. A new set of wooden cogs are being prepared, which will be inserted as soon as possible.

The New Mill House cannot be worked to its full capacity without an ascending main being laid; all the water now pumped is forced through the old thirty inch main, connecting Fairmount with Corinthian Avenue Reservoir, through the Stand Pipe. The forty-eight inch main for which preparations are made at the foot of the Stand Pipe, should be laid at once.

This would enable these works to pump a much larger amount of water.

These works are of vital importance to the water supply of the City; without them an adequate amount could not be furnished.

Had it been necessary to pump by the Schuylkill Works the water supplied during the year by the new works at Fairmount, it would have been at an additional cost of \$47,190.

This saving is nearly equal to 30 per cent. upon the entire cost of the New Mill House.

The hot water heating apparatus placed in the New Mill House answers the purpose; maintaining it sufficiently warm to prevent frost, and making it comfortable to work in without the annoyance of dust and gas, as was the case with the old stoves. The heat is diffused throughout the whole building better than with stoves, and with a large saving of fuel.

The amount of water pumped, oil and tallow used is exhibited by Table No. 1.

The following are the principal repairs made at Fairmount works. In the old mill house, a new rack was made to the gate hoist, the guide curves of wheel No. 9 (turbine,) were raised, and a self-acting airing apparatus placed on the pump. Frequent repairs and renewals of the starts, buckets and soleing of wheels Nos. 4, 5, 6, 7 and 8, self-acting airing apparatus upon pumps Nos. 1, 2 and 3. The gates were all repaired.

In the new mill house, all the gate hoists have been repaired and almost entirely renewed. A new step block was placed under No. 11 wheel, brass liners in all the upper bearings of the wheels, self acting airing apparatus on each pump, and a valve of No. 10 repaired. New packing was placed in all the pumps, and a counter upon each wheel. A Babbitt metal bearing was made for the main shaft of No. 11 wheel. A large number of cogs and keys in the gearing were repaired. A hot water apparatus was put up for the purpose of warming the building.



No. 1. OPERATION OF FAIRMOUNT WORKS DURING 1864.

MONTHS.	WATER.		OIL.			TALLOW.		
	Number of gallons pumped each month during the year.	Average number of gallons pumped per day each month.	Oil used each month during the year.	Number of gallons raised in Reservoir, per quart of oil.	Duty in million gallons raised one foot high per quart of oil.	Tallow used each month during the year.	Number of gallons raised in Reservoir, per pound of tallow.	Duty in million gallons raised one foot high, per pound of tallow.
January .....	513,601,319	16,567,784	88	5,836,378	583			
February .....	447,507,930	15,431,307	82½	5,424,339	542			
March .....	421,059,600	13,582,567	101	4,168,907	416	24	17,544,150	1,754
April .....	388,148,378	12,938,279	105	3,696,651	369	15	25,876,558	2,588
May .....	535,831,237	17,284,879	148	3,620,481	362	16	33,489,452	3,348
June .....	477,229,643	15,907,654	146	3,268,696	326	35	13,635,132	1,363
July .....	588,743,960	18,991,450	150	3,924,900	396	35	16,820,999	1,682
August .....	564,853,178	18,221,070	138	4,093,139	409	35	16,138,659	1,613
September .....	534,212,008	17,807,067	127	4,206,393	421	22	24,282,364	2,428
October .....	529,422,094	17,078,132	129	4,104,047	410	39	13,574,925	1,358
November .....	490,475,694	16,349,190	150	3,198,168	320	20	24,523,784	2,452
December .....	479,725,288	15,475,009	140	3,426,609	342	40	11,993,132	1,199
	5,970,801,329	16,358,360	1,504½	4,080,726	408	281	16,489,921	1,648

## RUNNING EXPENSES OF FAIRMOUNT WORKS.

Salaries of Engineers and labor, . . . . .	\$4,199 46
Gas for lighting, . . . . .	752 59
54 tons of coal, for warming Works, at average price, \$10 08 $\frac{1}{2}$ per ton, . . . . .	544 50
446 $\frac{1}{2}$ gallons of oil, . . . . .	597 08
1,629 pounds of tallow, . . . . .	265 50
Packing and small stores, . . . . .	1,361 52
Repairs, . . . . .	7,077 21
	<hr/>
	\$14,797 86
Interest on cost of Works and Water Power, . . . . .	36,000 00
	<hr/>
	\$50,797 86

Cost of raising water into reservoir, per million gallons, including interest on cost of Works, . . . . .	\$8 50
Not including interest on cost of Works, . . . . .	2 48
Cost of raising water per million gallons, one foot high, including interest on cost of Works, . . . . .	08 $\frac{1}{2}$
Not including interest on cost of Works, . . . . .	02 $\frac{1}{2}$

## SCHUYLKILL WORKS.

A large amount of repairs were found to be necessary to these works, and much remains to be done, particularly to engines Nos. 2 and 4. No. 4, The Cornish Beam Engine, was so much out of repair, that it was with difficulty kept in operation through the summer.

The piston head, packing rings, wrought iron braces to the beam, air pump bucket, and facing of the foot valve were broken, the

cylinder head and discharge valve box were cracked, and the main shaft of the beam, and wrists on the plunger were badly cut. This engine could not be spared during the summer, and the most necessary repairs were done at intervals; it is now being thoroughly overhauled, and as far as possible, all the broken, cut or defective parts will be renewed and repaired. All the hands at the works have been engaged for six weeks upon these repairs; they will probably be completed by the first of April, and the engine prepared for the season of greatest demand. Engine No. 3, required a large amount of repairs. No. 2, was in better condition than any of the other engines. No. 1 was taken apart and under repair; it has since been put in working order by the employees at the works, and is now in as good condition as it is possible to make it without having it rebuilt.

The boilers used for the Cornish Engine, require a large amount of repairs. The iron in some of the mud drums, was found to be less than one-sixteenth of an inch in thickness.

Table No. 2, shows the amount of water pumped and coal oil and tallow used for each month of the year. From this it will be observed, that the amount of water pumped during the year by these works, was 800,000,000 gallons less than the amount pumped in 1861. This deficiency was made up by the pumps of the New Mill House, as well as the amount necessary to meet the increased demand, (2,439,000,000) gallons.

The district supplied by these works is now being furnished by the pumps of the New Mill House at Fairmount, with the exception of four hours pumping per day, for the purpose of furnishing water to the breweries drawing their supply from the ascending main. When the pumping main is laid from the New Mill House, these works can be stopped from six to nine months of the year.

The following are some of the repairs made to the Works:—The tubular boilers, and two of the boilers in the old fire room were repaired, and the Cornish boilers taken out and patched; all the

fire chambers were repaired, and the steam joints and feed pipes overhauled and made tight. Engine No. 1, was repaired as thoroughly as possible without making a new valve house for the pump. No. 2, was finished with a new cut off and lifter for steam valves. No. 3, had the exhaust pipe and bearing of the fly-wheel shaft repaired; new packing rings placed in the pump, and a self acting airing apparatus attached to it. The engine received a thorough overhauling. The Cornish Engine, No. 4, had new metallic packing placed in the cylinder, and the cylinder cap, valve faces, discharge valve, and wrought bracing for the beam repaired, etc.

COAL, OIL AND TALLOW ACCOUNT OF SCHUYLKILL WORKS, 1864.

*Coal.*

	Tons.	Cwt.	Qrs.	lbs.
Amount on hand January 1st,	No account given.			
Received during January,	0	0	0	0
"    "    February,	143	15	1	0
"    "    March,	254	4	2	0
"    "    April,	50	13	0	0
"    "    May,	158	17	0	0
"    "    June,	431	13	0	0
"    "    July,	260	10	0	0
"    "    August,	145	18	0	0
"    "    September,	159	06	0	0
"    "    October,	397	11	0	0
"    "    November,	79	7	0	0
"    "    December,	277	17	1	23
	<hr/>	<hr/>	<hr/>	<hr/>
	2,359	12	0	23
Coal consumed, including amount consumed in stoves,	2,150	04	0	24
	<hr/>	<hr/>	<hr/>	<hr/>

Coal on hand Dec. 31, 1864, 411 tons.

No. 2. OPERATION OF THE SCHUYLKILL WORKS DURING THE YEAR 1864.

MONTHS.	WATER.		COAL.			OIL.			TALLOW.		
	Gallons of water pumped each month.	Average number of gallons pumped per day.	Pounds of coal consumed during the month.	Gallons raised into Reservoir, per pound of coal.	Duty in gallons raised one foot high, per pound of coal.	Quarts of oil used each month.	Gallons raised into Reservoir per quart of oil.	Duty in million gallons raised one foot high per quart of oil.	Pounds of tallow used during the month.	Gallons raised into Reservoir per pound of tallow.	Duty in million gallons raised one foot high per pound of tallow.
January .....	124,922,400	4,029,754	321,104	389.4	44,739	27	4,626,755	532	63	1,982,895	228
February. ....	128,352,000	4,425,931	341,376	375.9	42,229	33 <sup>1</sup> / <sub>2</sub>	3,831,701	440	58	2,213,000	254
March .....	95,364,160	3,076,263	299,600	318.2	36,593	28 <sup>1</sup> / <sub>2</sub>	3,346,108	384	78	1,222,617	141
April .....	125,776,800	4,192,560	444,416	283	32,545	53	2,373,147	272	101	1,245,314	143
May .....	188,503,050	6,080,744	510,720	369	42,435	110	1,713,664	197	132	1,428,053	164
June .....	172,558,120	5,751,937	636,384	271.1	31,176	124	1,222,242	140	178	970,551	108
July .....	235,587,850	7,599,608	630,112	373.8	42,987	88	2,677,135	308	134	1,758,118	202
August .....	176,678,340	5,699,301	512,288	345	39,675	100	1,766,783	203	147	1,201,893	138
September .....	142,205,120	4,740,171	279,216	509.3	58,535	35	4,063,003	467	118	1,205,128	138
October .....	110,088,960	3,551,257	275,408	399.7	45,885	36	3,058,027	352	120	917,408	105
November .....	177,690,360	5,923,012	423,272	419.8	48,185	32	5,552,824	638	158	1,124,623	128
December .....	27,717,500	894,112	142,576	194.4	22,356	28	954,200	110	28	954,200	110
	1,725,444,660	4,727,245	4,816,472	354	40,612	695	2,932,132	337	1,315	1,351,983	155

Average duty for the year, 33,911,000 pounds, raised one foot high, by the consumption of 100 pounds of anthracite coal.

*Oil.*

Amount on hand January 1st,	No account given.			
Received during the year,	-	-	-	206½ gallons.
Consumed during the year,	-	-	-	178 "
				28½ "
On hand Dec. 31st, 1864,	-	-	-	21 "
Deficiency unaccounted for	-	-	-	7½ "

*Tallow.*

Amount on hand January 1st,	No account given.			
Received during the year,	-	-	-	1,756 pounds.
Consumed during the year,	-	-	-	1,500 "
				256 "
On hand Dec. 31, 1864,	-	-	-	200 "
Deficiency unaccounted for,	-	-	-	56 "

## RUNNING EXPENSES OF SCHUYLKILL WORKS.

Salaries of engineers and firemen,	-	-	-	\$ 9,113 34
2,359½ tons of coal, at average price of \$9 75 per ton,				23,000 00
206½ gallons of oil, at	-	-	-	258 29
1,756 pounds of tallow, at	-	.	-	314 24
Gas for lighting works,	-	-	-	268 90
Packing and small stores,	-	-	-	794 32
Repairs,	-	-	-	6,780 46
				\$40,529 55
Interest on cost of works, (\$150,000)	-	-	-	9,000 00
				\$49,529 55

Cost of raising water into reservoir per million gallons,			
including interest on cost of works,	-	-	- \$28 70
Not including interest on cost of works,	-	-	- 23 48
Cost of raising water per million gallons one foot high,			
including interest on cost of works,	-	-	- 24 <sup>3</sup> / <sub>10</sub> cents.
Not including interest on cost of works,	-	-	- 20 <sup>4</sup> / <sub>10</sub> cents.

#### DELAWARE WORKS.

These works have required a large amount of repairs during the year. Engine No. 1, (high pressure,) was running when the present engineers took charge of them. The flue boiler had been disconnected from the engine, and all the parts that could be detached were missing. The crank of engine No. 2, (low pressure,) was cracked, so as to render the engine unfit for use. From the repairs enumerated below, you can judge of the condition of the machinery at these works. This district has with difficulty been kept supplied, and were it not for the inadequate area of the supply main from the reservoirs, they could not have been kept filled. The amount of water pumped, coal, oil and tallow used, will be exhibited by Table No. 3. Comparing the amount pumped this year with that pumped in 1861, the increased amount supplied is but 107,078,320 gallons; not enough to furnish the augmented number of water takers.

The extension of the wharf to the Port Wardens' Line, and taking the supply of water from the river at that point, will no doubt furnish this district with water of a more desirable quality. The stand pipe will also increase the capacity of the works by enabling both of the engines to be worked at the same time, which cannot be done now on account of the contracted area of the pumping main. It will be seen, by comparing the consumption of coal, oil and tallow, in 1864, and 1861, that the duty is not so high now as it was. That is, it required more coal, oil and tallow to do a given amount of work in 1864, than it did in 1862; this is accounted for, by the fact that the works were much out of order. These engines when in good condition, require a much larger amount of coal, oil and tallow, to run them, than any of the other engines in the Department.

The following are some of the repairs made during the year :—To the tubular boilers, 34 stays, 60 feet of feed pipe, 48 feet steam pipe, a man hole plate, escape pipe, safety valve weight, check valve, gauge cocks and a copper slip joint, all new.

The cylinder boilers have been inspected and thoroughly overhauled; they were found much worn, and dangerous in some places, which were repaired. To allow of a thorough inspection, the brick work was torn down. The fire chambers have all been renewed. The roof of the boiler house has been raised, and strengthened with training bolts.

Engine No. 1. Piston faced, and new bolts and springs made for it; heater taken out and repaired, exhaust pipe removed from chimney.

Engine No. 2. Piston repaired with new rings, follower, springs and bolts. Repaired crank by shrinking two heavy wrought iron bands on it. Engine and pump lined up.



### No. 3. OPERATION OF THE DELAWARE WORKS DURING THE YEAR 1864.

MONTHS.	WATER.		COAL.			OIL.			TALLOW.		
	Number of gallons pumped each month during the year.	Average number of gallons pumped per day each month.	Pounds of coal consumed during the month.	Gallons raised into Reservoir per pound of coal.	Duty in gallons raised one foot high per pound of coal.	Quarts of oil used during the month.	Gallons raised into Reservoir per quart of oil.	Duty in million gallons raised one foot high per quart of oil.	Pounds of tallow used during the month.	Gallons raised into Reservoir per pound of tallow.	Duty in million gallons raised one foot high per pound of tallow.
January .....	93,752,280	3,024,367	446,162	210.13	23,534	30	3,125,076	350	54	1,736,153	194
February .....	74,897,600	2,582,676	399,922	187.2	20,966						
March .....	88,729,060	2,862,228	463,235	191.5	21,448	34 $\frac{1}{2}$	2,571,856	288	58	1,529,811	171
April .....	89,722,480	2,990,749	414,062	214.2	23,990	30	2,990,749	335	68	1,319,448	148
May .....	94,247,840	3,040,253	427,732	220.3	24,663	30	3,141,594	352	54	1,745,330	195
June .....	96,670,720	3,222,357	439,733	219.8	26,617	29	3,333,473	372	52	1,858,916	208
July .....	102,880,000	3,318,710	434,755	236.6	26,499	31	3,318,710	372	126	816,508	91
August .....	100,297,920	3,235,417	465,542	215.4	24,125	32	3,134,310	351	81	1,238,246	139
September .....	91,766,170	3,058,872	428,805	214	23,968	31	2,960,199	332	90	1,019,624	114
October .....	85,715,990	2,765,032	372,560	230	25,760	31	2,765,032	309	64	1,339,312	149
November .....	84,151,760	1,384,035	331,108	254.1	28,448	26	3,236,606	361	50	1,714,319	192
December .....	88,052,240	2,840,394	338,865	259.8	29,097	30	2,935,078	328	60	1,467,537	164
	1,090,884,060	2,988,723	4,962,481	219.8	24,926	334 $\frac{1}{2}$	3,261,238	312	757	1,441,062	147

Average duty for the year, 20,813,200 pounds, raised one foot high, by the consumption of 100 pounds of anthracite coal.

## COAL, OIL, AND TALLOW ACCOUNT OF DELAWARE WORKS, 1864.

*Coal.*

	Tons.	Cwt.	Qrs.	lbs.
Amount on hand January 1st, no account given.				
Received during January, no account given.				
Received during February,	366	10	0	22
"    "    March,	78	0	0	0
"    "    April,	187	0	0	0
"    "    May,	126	0	0	0
"    "    June,	75	0	0	0
"    "    July,	147	0	0	0
"    "    August,	231	0	0	0
"    "    September,	196	0	0	0
"    "    October,	164	0	0	0
"    "    November,	149	0	0	0
"    "    December,	179	0	0	0
	<hr/>			
	1,898	10	0	22
Consumed during the year, including amount consumed in stoves,	2,215	7	3	13
	<hr/>			
Coal on hand, Dec. 31, 1864,	10 tons.			

*Oil.*

Amount on hand January 1st, no account given.				
Received during the year,	-	-	-	115 gallons.
Consumed during the year,	-	-	-	88 $\frac{1}{8}$ "
				<hr/>
				26 $\frac{7}{8}$ "
On hand December 31, 1864,	-	-	-	20 "
Deficiency unaccounted for,	-	-	-	6 $\frac{7}{8}$ "

*Tallow.*

Amount on hand January 1st, no account given.

Received during the year,	-	-	-	1065 pounds.
Consumed during the year,	-	-	-	872 "
				<hr/>
				193 "
On hand December 31, 1864,	-	-	-	160 "
Deficiency unaccounted for,	-	-	-	33 "

## RUNNING EXPENSES OF DELAWARE WORKS.

Salaries of engineers, firemen, etc.,	-	-	-	\$ 5,579 74
2,215½ tons of coal, at average price of \$8 54 per ton,				18,828 72
115 gallons of oil, at	-	-	-	143 75
1065 pounds of tallow, at	-	-	-	178 75
Coal oil for lighting works,	-	-	-	95 90
Packing and small stores,	-	-	-	226 92
Repairs,	-	-	-	3,054 66
				<hr/>
				\$28,108 44
Interest on cost of works, (\$150,000,)	-	-	-	9,000 00
				<hr/>
				\$37,108 44

Cost of raising water into reservoir, per million gallons,

including interest on cost of works,	-	-	-	\$34 01
Not including interest on cost of works,	-	-	-	25 67
Cost of raising water per million gallons one foot high,				
including interest on cost of works,	-	-	-	30 <sup>3</sup> / <sub>10</sub> cents.
Not including interest on cost of works,	-	-	-	22 <sup>5</sup> / <sub>10</sub> "

## TWENTY-FOURTH WARD WORKS.

The engines at these works have for years been worked beyond their capacity ; and as a consequence it is almost impossible to keep them in working condition. There is no reservoir, and they cannot be spared long enough to give them a thorough rebuilding, which is necessary on account of the manner in which they are overworked ; they are now being put in as good order as is possible, with their many broken and injured parts. But notwithstanding their defects, these are the most economical engines in the use of coal, oil and tallow in the Department. The amount of water pumped, coal, oil and tallow used is shown by table No. 4. During 1864, there was 166,563,900 more gallons of water pumped, than in 1861.

It will scarcely be possible during the coming season, to furnish an ample supply to this district. There are a number of very large consumers in it, such as the Alms House, Satterlee Hospital, Pennsylvania Rail Road, West Chester Rail Road, Warren's Paper Mills, etc. These, together with the continually increasing demand, by new buildings erecting, make some additional provision for this district necessary. The South Engine has been thoroughly repaired, and the North Engine is now being placed in as good condition as possible.

The brick work has been partially removed, so as to afford an opportunity to inspect the boilers ; so far as this has been done, they were found in a very satisfactory condition.

**No. 4. OPERATION OF THE TWENTY-FOURTH WARD WORKS DURING THE YEAR 1864.**

MONTHS.	WATER.		COAL.			OIL.			TALLOW.		
	Gallons of water pumped each month.	Average number of gallons pumped pre day.	Pounds of coal consumed during the month.	Gallons raised into Reservoir per pound of coal.	Duty in gallons raised one foot high per pound of coal.	Quarts of oil used during the month.	Gallons raised into Reservoir per quart of oil.	Duty in million gallons raised one foot high per quart of oil.	Pounds of tallow used during the month.	Gallons raised into Reservoir per pound of tallow.	Duty in million gallons raised one foot high per pound of tallow.
January .....	45,941,130	1,481,971	200,200	229.47	52,778	3	15,313,710	3,522	16	2,871,320	660
February.....	40,388,310	1,392,700	164,600	245.3	56,419	4	10,997,077	2,320	15	2,692,554	619
March.....	39,525,120	1,275,004	196,700	200.9	46,217	3	13,175,040	3,030	18	2,195,840	505
April .....	40,108,680	1,336,956	189,200	211.9	48,737	5	8,021,736	1,845	16	2,506,792	577
May.....	40,305,060	1,300,163	191,300	210.7	48,461	5	8,061,012	1,854	22	1,832,048	421
June.....	42,563,250	1,418,775	200,800	211.9	48,730	3	14,187,750	3,261	18	2,364,625	543
July.....	49,693,500	1,603,016	218,700	227.2	52,256	5	9,938,700	2,285	32	1,552,922	357
August.....	50,324,490	1,623,370	228,400	220.3	50,669	4	12,581,123	2,893	32	1,572,640	361
September.....	49,233,510	1,641,117	231,000	213.1	48,990	5	9,846,702	2,265	28	1,758,340	404
October .....	43,579,530	1,405,791	205,500	212.	48,760	4	10,894,883	2,505	39	1,117,424	257
November.....	41,521,050	1,384,035	189,200	219.4	50,370	7	5,931,578	1,364	25	1,660,842	388
December .....	36,694,170	1,183,682	158,700	231.2	53,176	5	7,338,834	1,688	34	1,079,240	248
	519,877,800	1,420,548	2,374,300	319.4	50,473	53	10,449,012	2,402	295	1,933,715	445

**Average duty for the year 42,144,900 pounds, raised one foot high, by the consumption of 100 pounds of anthracite coal.**

COAL, OIL AND TALLOW ACCOUNT OF TWENTY-FOURTH WARD  
WORKS, 1864.

*Coal.*

	Tons.	Cwt.	Qr.	lbs.
Amount on hand January 1st., no account given.				
Received during January,	69	11	0	18
“ “ February,	76	15	1	17
“ “ March,	85	8	3	16
“ “ April,	80	16	0	3
“ “ May,	93	2	3	17
“ “ June,	145	9	1	1
“ “ July,	98	10	3	6
“ “ August,	100	8	2	11
“ “ September,	97	17	0	11
“ “ October,	99	18	0	9
“ “ November,	100	10	0	5
“ “ December,	80	19	0	22
	1,129	7	1	24
Consumed during the year, including amount consumed in stoves,	1,059	19	0	12

Coal on hand December 31, 1864, 50 tons.

*Oil.*

Amount on hand January 1st.	No account given.			
Received during the year, - - - -	-	-	-	00 gallons.
Consumed during the year, - - - -	-	-	-	13 $\frac{1}{4}$ “
On hand December 31, 1864,	-	-	-	16 “

*Tallow.*

Amount on hand January 1st.	No account given.
Received during the year, - - - -	559 pounds.
Consumed during the year, - - - -	295 "
	264 "
On hand December 31, 1864, - - - -	20 "
Deficiency unaccounted for - - - -	244 "

## RUNNING EXPENSES OF THE TWENTY-FOURTH WARD WORKS.

Salaries of engineers and firemen, - - - -	\$ 3,720 54
1,129 7-20 tons of coal, at av'g price, \$9 29½ per ton, 10,496 63	
374 pounds of tallow, at - - - - -	55 56
Packing and small stores, - - - - -	226 92
Coal oil, for lighting, - - - - -	161 20
Repairs, - - - - -	4,519 67
	\$19,180 52
Interest on cost of works, (\$55,000,) - - - -	3,300 00
	\$22,480 52

Cost of raising water into stand pipe, per million gal- lons, including interest on cost of works, - - -	\$37 60
Not including interest on cost of works, - - -	36 89
Cost of raising water, per million gallons one foot high, including interest on cost of works, - - -	16 <sup>8</sup> / <sub>10</sub> cents.
Not including interest on cost of works, - - -	16 "

## TOTAL QUANTITY OF WATER PUMPED.

This is exhibited by Table No. 5, which shows that the amount of water pumped during the year, is less than reported for 1863; this is no doubt an error. The increase from 1862 to 1863, is very much greater than at any other period of the operation of

the Works; and notwithstanding the increased number of water takers, and augmented revenue of 1864 over 1863, the amount of water pumped is less by 191,767,292 gallons. For these reasons, in this report the pumping accounts of 1863 are disregarded, and comparisons made with those of 1861. The greatest amount of water was furnished in May, June, July and August. The lowest daily average for a month, was in December—20,392,877 gallons; the greatest daily average was in July—31,512,784 gallons.

### No. 5.

#### TOTAL QUANTITY OF WATER PUMPED BY ALL THE WORKS DURING THE YEAR 1864.

MONTHS.	Gallons pumped each month.	Average number of gallons pumped per day.
January,.....	778,217,129	25,103,778
February,.....	691,145,840	23,832,615
March,.....	644,677,940	20,796,062
April,.....	643,756,338	21,458,544
May,.....	858,887,187	27,706,039
June,.....	789,021,733	26,300,724
July,.....	976,896,310	31,512,784
August,.....	892,153,928	28,779,158
September,.....	817,416,808	27,247,227
October,.....	768,806,574	24,800,212
November,.....	793,838,864	26,461,295
December,.....	632,189,198	20,392,877
Total,.....	9,307,007,849	25,498,651

Of the above, the following amounts were pumped by each of the works :

	Total.	Daily average.
Fairmount,	5,970,801,329	16,358,360
Schnylkill,	1,725,444,660	4,727,245
Delaware,	1,090,884,060	2,988,723
Twenty-fourth Ward,	519,877,800	1,424,323



## COMPARATIVE ECONOMY OF THE WORKS.

The comparative economy of the Works in coal, oil and tallow, is exhibited by Table No. 6.

The duty of the Works has been better than in 1861, with the exception of the Delaware Works; in this the duty has been less; however, taking the Works collectively, the duty has been much better than in 1861. A pound of coal in 1864, raised 1,144 gallons more of water one foot high than in 1861. One quart of oil raised 111,000,000 gallons more of water one foot high, than in 1861. One pound of tallow raised 620,000,000 less gallons one foot high than in 1861. This is accounted for by the amount of tallow used in the preparation of wooden cogs, to be used during the present year, in cogging all the wheels.

## No. 6.

COMPARATIVE ECONOMY OF THE WORKS IN COAL, OIL AND TALLOW,  
FOR THE YEAR 1864.

WORKS.	Average number of gallons raised one foot high, per pound of anthracite coal.	Pounds of anthracite coal per horse power per hour.	Number of pounds of water raised one foot high, per one hundred pounds of anthracite coal.	Millions of gallons raised one foot high, per quart of oil.	Millions of gallons raised one foot high, per pound of tallow.
Fairmount,.....				408	1,648
Schuylkill,.. ..	40,612	5.8	33,911,000	337	155
Delaware, .....	24,926	9.5	20,813,200	312	147
24th Ward, .....	50,473	4.7	42,144,900	2,402	445
Average,.....	38,670	6.7	32,289,700	865	599

The management of the Works, reflect great credit upon the Engineers in charge of them. As the machinery will be in better condition this year, a higher duty and greater economy may be expected. The running expense of all the Works has been much

increased by the high price of coal, oil, tallow and labor. The increase in the cost of pumping one million gallons one foot high is,

At Fairmount Works,	0.8	cents	per	million	gallons.
At Schuylkill . . . . .	13	“	“	“	“
At Delaware . . . . .	10.7	“	“	“	“
At 24th Ward . . . . .	7.8	“	“	“	“

The prices paid for labor and material have advanced during the year, as computed with 1863; for labor 25 per cent., for coal 100 per cent., oil and tallow 25 per cent., small stocks, (gum, paint, etc.,) 50 per cent., machine work and materials for repairs 200 per cent. As compared with 1861, this advance has been much greater, especially in coal and repairs, where it is 200 per cent.

#### RESERVOIRS.

The division of the Fairmount Reservoir, into which the water is pumped, was cleaned and repaired; a large accumulation of mud was removed from it; a dangerous leak found in the bottom and repaired; all the stops were also repaired.

Both the Reservoirs at Lehigh Avenue and Sixth Street, Kensington, were cleaned and a large amount of mud taken out of them.

The Reservoirs are all in good condition at present; there is a slight leaking, in the connection of the pumping main at Corinthian Avenue basin. The Spring Garden Reservoir, at Thompson Street, should be cleaned as soon as it is possible to do without it a sufficient length of time.

The want of greater storage capacity is felt in the management of the Works; from the small capacity of the Reservoirs, it is almost impossible to maintain a uniform head in them.

## BUILDINGS AND GROUNDS.

*Fairmount Works.*—The floor of the Public Saloon has been taken up, strengthened and relaid. This was made necessary by the decayed condition of the joists, and the fact that the room is often filled to its utmost capacity by visitors. The imperfect manner in which the flag pavement, forming the roof of the New Mill House, was laid, made it necessary to take it up and relay it; but it still leaks in a few places, and will require further repairs. If the use of the Old Mill House is to be continued for any number of years, the building will require extensive repairs. The fences around the grounds and Reservoir, are in a very bad condition, and demand attention.

*Schuylkill Works* —The rail road track, scales, shed, coal shoot and fences, have been repaired, and a large amount of new fencing put up.

*Delaware Works.*—The roof of the boiler house was raised and repaired.

*Reservoirs.*—A new picket fence was placed around the lot north of the Spring Garden Reservoir; used by the Olympic Base Ball Club. The property belonging to the City, west of Kensington Reservoirs, was taken possession of by the Department, and enclosed with a fence.

The grounds around the Twenty-fourth Ward stand pipe should be graded and enclosed, as the surrounding district is being rapidly built up.

A large amount of painting has been done to the Works during the year. Painting will be necessary to the outside of the Delaware Works, and the stand pipes at Fairmount, and Schuylkill Works.

This Department has under its charge a large amount of unoccupied property, embracing a lot south of Corinthian Avenue Reservoir, extending to Brown Street, and from Corinthian Ave-

nue to Twenty-second Street ; a lot north of this reservoir, extending from Poplar Street to Girard Avenue, and from Corinthian Avenue to Twenty-second Street, with the exception of the corner property at Girard and Corinthian Avenues ; a lot south of Spring Garden Reservoir ; a lot north of this Reservoir ; a lot west of Kensington Reservoir, extending west to Eighth Street, between Lehigh Avenue and Somerset Street. This lot, although purchased when the works were built, was not in the possession of the City, until it was enclosed and occupied by the Department last summer.

#### FAIRMOUNT PARK.

Those portions of the Park under the charge of this Department, viz : at Fairmount Works, 32 acres ; at a Schuylkill Works, 15 acres ; have been kept in good order. Few improvements have been made during the year ; these embrace the alteration of the street grade at the Green street entrance, so that gutters are avoided ; the protection of a point along the forebay dangerous to visitors, by an iron railing, and the erection of a drinking fountain facing the forebay, near the bridge, constructed of Berks County brown stone ; this is supplied by a spring a short distance from the lower fountain.

These grounds are thronged every pleasant day with thousands of our citizens, and afford them so much enjoyment that the propriety of making an annual appropriation of, say ten thousand dollars, to improve and beautify them, is respectfully suggested. Some improvements may be said to be necessary.

The gate at Green street, through which almost every carriage and equestrian enters the park, forms the terminus of one of the best improved streets of the City, and a suitable entrance should be erected in place of the present one, which consists of a plain picket gate, too narrow to admit of two carriages passing at the same time ; it is in a very dilapidated condition.

Fairmount has several springs of most excellent water. The one on the North side of the reservoir is highly prized, and on a summer evening it is taxed to its utmost capacity, to supply the numbers who crowd around it; many persons coming from a distance, on account of their high appreciation of the water; indeed, it is frequently with difficulty that visitors can procure water sufficient from all of these springs, and crowds are kept waiting around them. These springs are now in a very primitive condition, and can scarcely be said to be improved. The excellency of the water they furnish, and their location in the most attractive spot in our city, demand for them suitable improvements, such as would be ornaments to the Park. Vases and statuary would also add much to the attractions of the place. A summer house should be erected near the Green street entrance. A trellis, covered with vines, placed on the top of the new mill-house, running parallel with, and near the upper side of it, would be a most desirable addition, and would afford a delightful place of resort, particularly in sultry weather; the view of the river and park from this point is unsurpassed. Many other improvements could be suggested, but the above seem most necessary. When the thousands of our citizens who enjoy these improvements are considered, generous appropriations cannot be called unnecessary or extravagant.

The first and only donation for the improvement of this part of the park, was the two Norway firs placed on each side of the water tower by Mr. W. A. Maupay. In a city of noted liberality, it is astonishing that donations to so delightful a resort, should be so few. The ground lying between the Schuylkill Works and the Rail-road, was graded and planted with trees before consolidation, and is now in good order; but the other part of the property belonging to these works, and forming the Northern extremity of the park, has never been attended to. Near the Rail-road, before the construction of these works, there existed a spring of water impregnated with iron, this spring was very celebrated, on ac-

count of the medicinal qualities of the water; in building the works the spring was covered, and lost sight of. Last season it was traced out and opened, and is now flowing near the front door of the works, and rapidly regaining its former celebrity.

#### DISTRIBUTION.

The number of feet of service mains laid during the year, has been less than in any other since consolidation, except the first. A much larger amount of pipe was required for the new streets, which were opened and built up. Owners of property petitioned, and Councils directed a larger amount laid, but on account of the increased price of labor and materials, the Committee on Water did not think it advisable to ask for additional appropriations. The following service mains were laid during the year.

#### FIRST DISTRICT.

##### ACCOUNT OF IRON PIPES LAID IN THE FIRST, SECOND, THIRD, FOURTH, AND TWENTY-SIXTH WARDS, 1864.

Street.	Location.	Size.	
		Inches.	Feet.
Wharton.	From Eleventh to Thirteenth,	6	938
Ninth.	“ Winton to Old Second,	6	884
Watkins.	“ Seventh to Eighth,	4	434
Montrose.	“ Twentieth to Twenty-first,	4	471
Seventeenth.	“ Ellsworth to Federal,	6	357
Ellsworth.	“ Twentieth to Twenty-first,	6	550
Twenty-first.	“ Washington to Federal,	6	572
Ratchford.	“ Ninth to Tenth,	4	441
Winton.	“ Ninth to Tenth,	4	441
Montrose.	“ Eighteenth to Nineteenth,	4	466
Mifflin.	“ Otsego to Second,	6	214
	Plug attachments	4	142
Total number of feet of pipe laid in First District, or, 1.12 miles			5910

The number of feet of new pipe laid was,

Of four inch,

2395

Of six inch,

3515

---

5910 feet

Or. 1.12 miles.

## SECOND DISTRICT.

ACCOUNT OF IRON PIPES LAID IN THE SIXTH, SEVENTH, EIGHTH,  
NINTH, TENTH, AND TWENTY-FOURTH WARDS, 1864.

Street.	Location.	Size.	
		Inches.	Feet.
Brooklyn.	From North to South of Eadline St.	6	140
Forty-second.	“ Kingsessing Ave. to Baltimore Pike,	6	459
“ “	“ Sansom to Walnut,	6	270
Sansom.	“ Thirty-Sixth, East,	4	348
Fortieth.	“ Baltimore Ave. to Woodland,	6	271
Thirty-sixth.	“ Market to Filbert,	6	341
Spruce.	“ Thirty-ninth, East,	8	323
Forty-first.	“ Pine to Baltimore Pike, (Relaid.)	6	400
“ “	“ Baltimore Pike, South, “	6	218
	Market-street Bridge, “	4	185
Pine.	“ Forty-first to Forty-second,	6	413
Oak.	“ “ “ West, (relaid)	6	76
Spruce.	“ Forty-first to Forty-second,	8	386
“	“ Thirty-seventh to Thirty-eighth	8	550
Forty-second.	“ Baltimore Pike to Pine,	6	533
Forty-sixth.	“ Kingsessing Ave. South, (relaid)	6	386
Kingsessing Ave.	“ Forty-sixth street, “	6	388
“ “	“ Forty-fifth street, “	6	280
	Fire plug attachments “	4	65
	“ “ “	4	273
	Logan Square for the Great Central Fair,	4	1471
	Logan Square for Great Central Fair,	6	533
Total number of feet of pipe laid in the Second District,			8309
Or, 1.57 miles.			

The number of feet of pipe relaid was,	
Of six inch,	1748
Of four inch,	250
	<hr/>
	1998 feet.
Or, .37 of a mile.	
The number of feet of new pipe laid was	
Of four inch,	.621 feet.
Of six inch,	2427 "
Of eight inch,	1259 "
	<hr/>
Total number of feet of new pipe laid	4307 "
Or, .82 of a mile.	
The number of feet of pipes laid in Logan Square for the Great Central Fair, was,	
Of six inch,	533 "
Of four inch,	1471 "
	<hr/>
Total number of feet of pipe	2004 "
Or, .38 of a mile.	
Total expense of laying and taking up pipe from Logan Square, used by the Great Central Fair,	\$272 00



## THIRD DISTRICT.

ACCOUNT OF IRON PIPES LAID IN THE ELEVENTH, TWELFTH, SIXTEENTH, SEVENTEENTH, EIGHTEENTH, NINETEENTH, TWENTY-THIRD AND TWENTY-FIFTH WARDS, 1864.

Streets.	Location.	Size.	
		Inches.	Feet.
Hancock.	From Cumberland to Lehigh,	6	1100
Thompson.	“ Norris to York,	4	624
“	“ Somerset to William,	4	608
Salmon.	“ Ann to Alleghany,	4	1995
Adrian.	“ Otter to Girard Ave.,	5	575
Moyer.	“ Norris to York,	4	649
Dauphin.	“ Wilson to Moyer,	6	415
Trenton.	“ Norris, North,	4	600
Cumberland.	“ Richmond to Beach,	6	555
Sergeant.	“ Frankford Road to Memphis,	6	1417
Leopard	“ Linden to Otter,	4	280
Dauphin.	“ Belgrade to Wilson,	6	502
Cambria.	“ Frankford Road, East,	4	185
Richmond.	“ Tioga to Butler,	6	2300
Thompson.	“ Norris to Otis,	4	645
Edward.	“ Adams to Church,	4	1030
Church.	“ Edward, East,	6	49
	Plug attachments,	4	54
	Suction Main at Delaware works,	30	272

Total number of feet of pipe laid in the Third

District,

13,855

Or, 2.57 miles.

The number of feet of new pipe laid, was,

Of four inch,	7245 feet.
Of six inch,	6338 “
Of thirty inch,	*272 “

Total number of feet of new pipe laid in  
the Third District,

13,855

\*Suction mains at Delaware works.

## FOURTH DISTRICT.

ACCOUNT OF IRON PIPES LAID IN THE THIRTEENTH, FOURTEENTH,  
FIFTEENTH, TWENTIETH, AND TWENTY-FIRST WARDS, 1864.

Street.	Location,	Size.	
		Inches.	Fect.
Wallace.	From Twenty-second to Twenty-third,	4	480
"	" " " " " "	6	90
North.	" Fifteenth to Sixteenth,	4	365
Columbia.	" Twentieth to Twenty-first,	6	576
Thirty-first.	" Master, North,	6	171
Master.	" Ridge Ave. to Twenty-first,	7	540
"	" Ridge Ave. to Twenty-fourth,	6	1060
Girard Ave.	" Sixteenth to Ridge Ave.	6	1122
North.	" Nineteenth to Twentieth,	4	479
Twenty-second.	" North College Ave. to Oxford St.	6	618
"	" " " " " " " "	8	9
"	" " " " " " " "	10	840
Montgomery.	" Eighteenth to Twentieth,	6	896
Nineteenth.	" Montgomery to Berks,	6	538
Berks.	" Tenth to Eleventh,	6	434
Warnock.	" Montgomery to Berks,	4	556
Eliza.	" Fifteenth to Green Hill,	4	732
Warnock.	" Columbia Ave. to Montgomery,	4	615
Twenty-second.	" Montgomery to Norris, (for U. S. Government,)	6	1795
	Fire plug attachments	4	49
	" " "	6	102
Total number of feet of pipe laid in the Fourth District,		12,067	
Or, 2.28 miles.			

The number of feet of pipe laid, was,	
Of four inch,	3276 feet.
Of six inch,	7942 "
Of eight inch,	9 "
Of ten inch,	840 "
	<hr/> 12,067

## No. 7.

## RECAPITULATION OF PIPE LAID IN THE SEVERAL DISTRICTS DURING THE YEAR.

WARDS.	4 in. diam.	6 in. diam.	8 in. diam.	10 in. diam.	30 in. diam.	TOTAL.
1st Dist. 1, 2, 3, 4,.....	2,395	3,515				5,910
2d Dist. { 5, 6, 7, 8, 9,	621	2,427	1,259			4,307
{ 10, 24.....						
3d Dist. { 11, 12, 16, 17,	7,245	6,338			272	13,855
{ 18, 19, 23, 35.						
4th Dist. { 13, 14, 15, 20,	3,276	7,942	9	840		12,067
{ 21.....						
Total.....	13,537	20,222	1,268	840	272.	36,139

Being a total of 6.84 miles.

Total number of feet laid previously,	. 1,884,532
“ “ “ “ during the year,	. 36,139

Total,	. . . . . 1,920,671
--------	---------------------

Being a total of 363 miles, 4031 feet, of water main now laid in the City.

## No. 8.

## ACCOUNT OF THE NUMBER OF HOLES DRILLED FOR MAKING NEW ATTACHMENTS TO PUBLIC MAINS DURING THE YEAR 1864.

MONTHS.	$\frac{1}{2}$ in. diam.	$\frac{3}{4}$ in. diam.	$\frac{1}{2}$ in. diam.	1 in. diam.	Total holes drilled and attachments made.	Shut off for re-pairs to private pipes.	Shut off for re-pairs to public pipes.
January .....	23	17	3	1	44	53	9
February .....	34	25	1	12	72	8	4
March .....	60	50	9	6	125	19	9
April .....	75	95	8	6	183	18	5
May .....	80	77	9	6	172	16	8
June .....	90	44	9	3	146	28	21
July .....	66	40	38	4	148	15	18
August .....	39	50	9	8	106	19	0
September .....	68	60	50	4	182	23	3
October .....	49	34	10	3	96	17	13
November .....	42	50	21	2	115	23	9
December .....	22	32	7	3	64	20	4
	648	574	174	57	1,453	259	103

## No. 9.

## THE ABOVE ATTACHMENTS WERE MADE IN THE WARDS AS FOLLOWS:

WARDS.	$\frac{1}{2}$ in. diam.	$\frac{3}{4}$ in. diam.	$\frac{1}{2}$ in. diam.	1 in. diam.	Total holes drilled.	Shut off private pipes.	Shut off public pipes.
1st Dist. 1, 2, 3, 4, .....	152	42	13	15	222	47	17
2d Dist. { 5, 6, 7, 8, 9 { 10 and 24.....	175	86	35	10	306	78	21
3d Dist. { 11, 12, 16, 17 { 18, 19 and 23.	174	76	20	10	280	62	55
4th Dist. { 13, 14, 15, 20 { and 21.....	147	370	106	22	645	72	10
	648	574	174	57	1,453	259	103

## ACCOUNT OF NEW STOPS AND FIRE PLUGS.

DISTRICT.	No. Stops.	No. Fire Plugs.
First District.....	11	10
Second do .....	11	12
Third do .....	24	15
Fourth do .....	29	20
	—	New Fire Plugs..... 57
New Stops.....	75	—
Account per last report.....	3892	Account per last report..... 3198
	—	—
Total.....	3967	Total..... 3255

Councils have ordered pipes to be laid in the following streets, which still remain to be done viz :

*Pipe ordered to be laid in the First District.*

Moore Street,	from Seventh to Ninth.
Taylor “	“ Eighth to Ninth.
Twenty-sixth Street,	“ Park to Gray’s Ferry Road.
Twelfth “	“ Wharton to Passyunk Road.
Wharton “	“ Sixteenth to Seventeenth.
Price, “	“ Seventh to Eighth.
Twenty-second “	“ Montrose to Carpenter.
Reed “	“ Eleventh to Thirteenth.
Moore “	“ Ninth to Broad.
Fernon “	“ Tenth to Eleventh.
Reed “	“ Fifteenth to Sixteenth.
Montrose “	“ Jessamine, west 170 feet.
Pierce “	“ Passyunk Road to Thirteenth.
Twenty-third “	“ Shippen to Pemberton.
Labroiesse “	“ Moyamensing Avenue to Second.
Bond “	“ Moore to Mifflin.
Prime “	“ Broad to Fifteenth.

*Pipe ordered to be laid in the Second District.*

Myrtle Street,	“	Forty-first to Preston.
Preston “	“	Myrtle to Aspen.
Brooklyn “	“	Haverford to Lancaster Avenue.

*Pipe ordered to be laid in the Third District.*

York	Street, from	Second to Germantown Road.
Toronto	“	“ Melvale, south 806 feet.
Wager	“	“ Fourth to Fifth.
Day	“	“ Girard Avenue to Thompson.
Tilton	“	“ Emery to Huntingdon.
Huntingdon	“	“ Almond to Frankford Road.
Sergeant	“	“ Cedar to Memphis Street.
Emlen	“	“ Trenton Avenue to Cedar.
Gordon	“	“ Geisse to West.
Jasper	“	“ York to Huntingdon
Leib	“	“ Harrison to South line of Estate of Lydia Harrison.
Sixth	“	“ Sommerset to Reading Rail Road.
Waterloo	“	“ Cumberland to Davis.
Palethorp	“	“ York to Dauphin.
Lloyd	“	“ Sergeant to Hamilton,
Anthracite	“	“ Salmond to Almond.
Norris	“	“ Second to Fourth.
Blair	“	“ Otis to Norris.
Vienna	“	“ Tulip to Cedar.
Canal	“	“ Thompson to Lawrence.

*Pipe ordered to be laid in the Fourth District.*

Thompson Street,	from	William to Schuylkill Works.
Master	“	“ Twenty-seventh to Twenty-eighth.
Franklin	“	“ Diamond to Susquehanna Avenue.
Diamond	“	“ Seventh to Ninth.
Geary	“	“ Poplar to Wiley.
Sydenham	“	“ Master to Columbia Avenue.
Ninth	“	“ Montgomery to Berks.
Eleventh	“	“ “ “
Edmond	“	“ Ridge Avenue to Geary.
Ridge Avenue	“	“ Twenty-second to Columbia Avenue.
Thirty-first	“	“ Girard Avenue to Thompson.
“ “ “	“	“ Master to Jefferson.
Oxford	“	“ Broad to Twenty-third.
Thompson	“	“ Stand Pipe, 150 feet East of Thirty-first.
Alder	“	“ Columbia Avenue to Montgomery.

To lay the above streets will require about 62,448 feet of pipe.

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ACCOUNT OF PIPES, BRANCHES, TOOLS, ETC., IN THE HANDS OF THE  
PURVEYORS OF THE DIFFERENT DISTRICTS.

FIRST DISTRICT.

*Stock of pipes, branches, &c., on hand at the Yard, 615  
Carpenter Street.*

Pipes nine feet long : of three inch, 22 ; of four inch, 34 ; of six inch, 19 ; of ten inch, 9.

Fire plugs, single ; of four inch, 6.

Branches, four-way : of four inch, 13 ; of six inch, 7 ; of twelve by six inch, 1.

Branches, three-way : of four inch, 2 ; of six inch, 8.

Sleeves : of six inch, 2 ; of eight inch 2 ; of ten inch, 2.

- Reducers : of four inch, 7 ; of six inch, 12.  
 Bevel hubs : of four inch, 4.  
 Curved pipes : of four inch, 3 ; of six inch 1.  
 Saddle pipe : of four inch, 1 ; of six inch, 2.  
 Stop Cocks : of four inch, 2 ; of six inch, 3.  
 Stop Cock Boxes : of four inch, 8.  
 Frames and Covers : of four inch, 8.  
 Goose Necks : of four inch, 9.  
 Bonnets : of three inch, 1 ; of four inch, 8 ; of six inch, 1 ; of ten inch, 2 ; of sixteen inch, 1.  
 Quarter Turns : of six inch, 2.  
 Pieces of Pipe : of four inch, 2 ; of six inch, 2.  
 Lead : 100 pounds.

#### TOOLS, ETC.

Caulking irons, 8 ; gasket irons, 17 ; bull nose chisels, 8 ; cold chisels, 6 ; pipe cutters, 5 ; lead cutters, 1 ; picks, 23 ; pick handles, 28 ; shovels, 40 ; eye bolts, 4 sets ; S. wrenches, 6 ; pot hooks, 2 sets ; washers, 40 ; hand saw, 1 ; wood saw, 1 ; bonnet bolts for stops, 30 ; packing box bolts, 10 ; spindle keys, 21 ; monkey keys, 30 ; S. hooks, 8 ; gauge, 1 ; augurs, 1 ; brands, 2 ; drills, 12 ; reamers, 3 ; drifts, 3 ; bending iron, 1 ; lever wrenches, 2 ; lead pots, 1 ; clay boxes, 1 ; crow bars, 1 ; furnaces, 1 ; pot bars, 2 ; wooden plugs : six inch, 7 ; of four inch, 5 ; of three inch, 8 ; pieces of riveting iron, 2 ; plug spanners, 2 ; one-half spanners : for three way plugs, 1 ; hammers, 5 ; sledges, 1 ; plug swivels, 6 ; plug monkeys, 11 ; packing box caps, 11 ; plug nuts, 2 ; chains, 1 ; buckets, 1 ; stop cock keys, 6 ; hydrant keys, 2 ; long jawed keys, 4 ; short jawed keys, 2 ; stop cock bailer, 1 ; wheel barrows, 2 ; crows, 3 ; tool boxes, 1 ; tool house, 1 ; vice, 1 ; brass oil cans, 2 ; tin oil cans, (one gallon,) 1 ; tin oil can, (five gallon,) 1 ; grind-stone, 1.



## SECOND DISTRICT.

*Stock of pipes, branches, &c, on hand, at the yard 918 Cherry Street.*

Pipes 9 feet long : of three inch, 100 ; of four inch, 22 ; of six inch, 47 ; of eight inch, 5 ; of ten inch, 6 ; of twelve inch, 9.

Fire plugs, of three-way for steamers : of four inch, 5 ; of six inch, 2 ; of single fire plugs : four inch, 28.

Branches, four-way : of four inch, 45 ; of six inch, 41 ; of eight inch, 2 ; of twelve inch, 1.

Branches, three-way : of three inch, 1 ; of four inch, 12 ; of six inch, 24 ; of eight inch, 1 ; of ten inch, 1.

Branches, five-way : of six inch, 2.

Sleeves : of three inch, 1 ; of four inch, 13 ; of six inch, 1 ; of eight inch, 7 ; of ten inch, 3 ; of twelve inch, 17 ; of sixteen inch, 1 ; of twenty inch, 5 ; of thirty inch, 1.

Reducers : of four inch, 2 ; of six inch, 1 ; of twelve inch, 1.

Bevel hubs : of three inch, 1 ; of four inch, 1 ; of six inch, 2 ; of eight inch, 1.

Curved pipe : of six inch, 2 ; of four inch, 10.

Flange pipe : of six inch, 1.

Saddle pipe : of four inch, 12 ; of six inch, 6.

Stop cocks : of three inch, 3 ; of four inch, 13 ; of six inch, 35 ; of ten inch, 3 ; of twelve inch, 3 ; of twenty inch, 1 ; of thirty inch, 1.

Stop boxes : of six inch, 8 ; of twenty inch, 1.

Frames and covers ; of six inch, 4 ; of twenty inch, 1.

Fire plug cases : of four inch, 5 ; of six inch, 2.

Goose necks : of three inch, 17 ; of four inch, 1 ; of six inch, 2 ;

Bonnets : of six inch, 2.

Quarter Turns : of three inch, 9 ; of four inch, 15 ; of six inch, 14.

Public hydrants, 3.

Pieces of pipe : of three inch, 2 ; of four inch, 5 ; of six inch, 2 ; of eight inch, 2 ; of ten inch, 1.

#### TOOLS.

Bars, 5 ; shovels, long handles, 2 ; short handles, 11 ; picks, 3 ; stop cock keys, 4 ; saws, 1 ; buckets, 2 ; sets drilling tools, 3 ; sledge, 1 ; ladles, 3 ; wrenches, 2 ; monkey wrenches, 2 ; oil cans, 3 ; augurs, 3 ; drilling poles, 2 ; poles, 1 ; horses, 4.

#### *At West Philadelphia.*

Sledges, 1 ; shovels, long handles, 8 ; short handles, 17 ; sets drilling tools, 3 ; bars, 2 ; picks, 17 ; furnace and pot, 1 ; stop cock keys, 3 ; ladles, 3 ; drilling poles, 1 ; horses, 6 ; poles, 5 ; augurs, 1 ; buckets, 3 ; saw and wood horse, 1 ; axes, 2.

#### THIRD DISTRICT.

##### *Stock of pipes, branches, &c., on hand at the yard 1420 Frankford Road.*

Pipe nine feet long : of four inch, 9 ; of six inch, 2 ; of ten inch, 4.

Branches, four-way : of six inch, 8 ; of four inch, 1 ; of ten by four inch, 1 ; of ten by fourteen inch, 1 ; of twenty by six inch, 1 ; of ten by six inch, 2 ; of six by four inch, 1.

Branches, three-way : of four inch, 1 ; of ten by six inch, 5 ; of six by four inch, 11 ; of six inch, 7.

Reducers : of ten inch, 5 ; of fourteen inch, 1.

Saddle pipes : of four inch, 1 ; of six inch, 2 ; of ten inch, 2.

Stop cocks : of four inch, 1 ; of six inch, 5 ; of ten inch, 1.

Stop box ; of ten inch, 1.

Frames and covers, 3.

Fire plugs, 7.

Sleeves : of different sizes, 12.

Bonnets : of different sizes, 14.

Lead,  $3\frac{1}{2}$  pigs.

Goose necks ; of four inch, 1.

*At Frankford.*

Pipe nine feet long : of six inch, 4 ; of ten inch, 2.

Branches, three-way : of six inch, 1 ; of twelve by six inch, 1.

Plug cases, 3.

Fire plug, (old,) 1.

*At Wood Street Wharf.*

Pipe twelve feet long : of eighteen inch, 2.

TOOLS.

Hydrant keys, 3 ; buckets, 2 ; monkey wrenches, 2 ; spanners, 4 ; hatchet, 1 ; hand saws, 2 ; stop cock keys, 4 ; sledges, 3 ; crow bars, 2 ; shovels, 22 ; picks, 16 ; caulking tools, 6 sets ; crow keys, 3 ; riveting hammer, 1 ; wheel barrows, 3 ; furnaces, 3 ; stuffing boxes, 12 ; eye bolts, 17 ; grindstones, 1 ; drillers tools, 1 set ; oil cans, 2.

FOURTH DISTRICT.

*Stock of pipes, branches, &c., on hand at the yard 1324 Buttonwood Street.*

Pipe nine feet long : of three inch, 1 ; of four inch, 6 ; of six inch, 10 ; of sixteen inch, 4

Branches, four-way : of four inch, 23 ; of six inch, 34 ; of eight by six inch, 1 ; of six by four inch, 16 ; of ten by six inch, 4 ; of ten by four inch, 1 ; of ten inch, 1.

Branches, three-way : of six inch, 2 ; of four inch, 4 ; of six by four inch, 1 ; of ten by six inch, 1.

Sleeves : of four inch, 21 ; of six inch, 1 ; of twelve inch, 7 ; of sixteen inch, 3.

Bevel hubs : of four inch, 2.  
 Curved pipe : of six inch, 1.  
 Saddle pipe : of six inch, 1.  
 Quarter turns : of three inch, 3.  
 Goose necks : of four inch, 11.  
 Bonnets : of twelve inch, 1 ; of ten inch, 2 ; of six inch, 2.  
 Lead, 360 pounds.

*At different Works.*

Pipe twelve feet long : thirty-six inch, 18 ; of twenty-four inch, 1 ; of twenty-two inch, 3.

Branches, four-way : of thirty inch, 1 ; of thirty by twenty inch, 1 ; of twenty by twelve inch, 1 ; of twenty by six inch, 3 ; of twenty by four inch, 1.

Branches, three-way : of thirty inch, 2 ; of thirty by twenty inch, 1 ; of twenty by six inch, 1 ; of twelve by four inch, 1 ; of sixteen inch, 1 ; of twenty by twelve, with a six inch outlet, 1.

Sleeves : of thirty inch, 2.

Quarter turns : of twenty inch, 3.

*Tools on hand at yard 1324 Buttonwood Street.*

Shovels, 14 ; picks, 18 ; bars, 2 ; stop cock keys, 5 ; nut keys, 2 ; hydrant keys, 2 ; monkey wrenches, 2 ; axes, 1 ; wood saw, 1.

**COST OF LAYING PIPE.**

The average cost of laying pipe, was, for labor, (digging, filling, making joints, setting plugs and stops, hauling and handling pipe), 32 cents per foot ; including all other expenses (making stops, fire plugs, inspecting, measuring, making bills, etc.), 62 4-10 cts. per foot. The cost of labor for this work has advanced fully fifty per cent. above last year. The cost of materials : pipe, iron and brass castings, lead, etc., have also advanced. A six inch pipe (the size principally used) cost in 1862—52½ cts. per foot ; in 1863—79 cts., and in 1864—\$1 13 cts., about the price of the same size pipe in 1823, when

it was \$1 10 cts. per foot. The cost of all the materials used in pipe-laying, making stops, fire plugs, &c., during the year, was \$1 32½ cts. per foot, and the total cost of labor, material, etc., \$1 94½ cts.

The expense of laying pipes in the different Purveyors' Districts, has been as follows :

First District, 42 8-10 cents per foot.	
Second District, 28	“ “ “
Third District, 23	“ “ “
Fourth District, 39 7-10	“ “ “
Average cost, 32	“ “ “
The cost of making attachments has been, in the	
First District,]	\$6 17 per attachment.
Second District,	\$3 94 “ “
Third District,	\$5 65 “ “
Fourth District,	\$2 21 “ “
Average cost,	\$3 85 “ “

The following table exhibits the number of repairs to mains, stops and plugs, by the different Districts during the year 1864.

	Repairs to mains.	Repairs to stops.	Repairs to plugs.
First District,	31	234	395
Second District,	24	315	323
Third District,	35	230	81
Fourth District,	29	129	409
Total,	<hr/> 119	<hr/> 908	<hr/> 1208

The high price of labor, and the restless condition of working men, on account of the great demand for them, has made this part of the management of the department particularly difficult, but notwithstanding all this (if due allowance be made for the increased cost of labor), there has been a saving in the expense, as compared with last year.

The amount of service pipe laid during the year, was 35,867 feet—a less amount than in any other year since Consolidation. The

average amount of pipe laid for the last ten years, was 61,095 feet. Seventy thousand feet of pipe per annum, will not more than supply the built and improved streets requiring service mains. Councils have ordered to be laid 62,000 feet of service mains; a list of streets in which this pipe is directed to be laid, will be found on pp. 51-53.

In appropriating money for pipe, it should be borne in mind that the 600,000 feet laid in the last ten years, cost the City about \$200,000 including stop-cocks, fire plugs and all allowances.

The Department would recommend, that each district be furnished with a horse and light wagon—such as are used by plumbers. When the amount of business transacted by the Purveyors is considered, (each having on an average 90 miles of pipe under his charge), it will be seen that this recommendation, if carried out, would effect a large saving in expense, and also facilitate business. The present mode of carrying articles for repairs, tools for drilling, &c., is by hand-cart. The time saved by employing a horse and wagon would more than compensate for the expense.

#### PIPE LAID SINCE CONSOLIDATION.

Table No. 10 exhibits the operations of the department in laying service mains for the last ten years; this table shows that 610,950 feet of service mains have been laid, while in the time mentioned, there has been but one additional supply main,—the 30 inch main, connecting Corinthian Avenue Reservoir with the lower portion of the City, at Broad and Washington Avenue. All the senew service pipes are therefore fed from the old mains, some of which were too contracted before this increase draught was made from them.

A number of new feeding mains are now indispensable, as many parts of the city are suffering for want of an adequate supply of water.

No matter how constant the head be maintained in the reservoirs, the draught from lower or more favorably situated districts rob those at a greater elevation, or more distant from the source of supply. In warm weather, when the demand is greater, there are some portions of our City where water cannot be procured even from the fire plugs in the street.

The entire amount expended from the year 1855 to 1864, inclusive, upon service mains; pipes, from 3 to 12 inches in diameter, laid in the streets, from which private attachments are made, was \$747,589 27, of this sum 48 4-10 per cent., \$361,993 97 was collected by the Department within four months from the time the pipe was laid, and 28 2-10 per cent., \$211,197 62, was placed in the hands of the City Solicitor for collection. A considerable amount of this has doubtless been paid over to the City Treasurer by the Law Department, but large sums have been lost to the City through ignorance, or neglect to return the bills to the City Solicitor in proper time. Of the total amount expended for service mains, the City has paid 23 3-10 per cent., \$174,287 22, for crossings, stop-cocks, fire plugs, and allowances made for corners. The average cost of pipe laid, including all expenses for the past ten years, has been \$1 22 4-10 cts. per foot. The average cost per foot, that could be chargeable to the properties in front of which it has been laid, adding the expenses of crossings, &c., is \$1 51.

#### CITY SHOP.

The tools of this shop are of the most primitive character; all the work is performed by manual labor, and of course, to a great disadvantage. It is, however, of great importance to the City, as here all fire plugs, street stops, and ferrules used in the Department are made and repaired, and a large amount of work done; principally forgings for repairs to the works. This shop should be enlarged, and furnished with a steam engine and additional machinery. The sum of twenty thousand dollars, if expended upon a building, engine and tools, would pay a large return.

Much of the work for the large stops, is of necessity done at other shops, at a great disadvantage in time and expense. By the account of the operations of the shop below, it will be seen that, notwithstanding all these disadvantages, it has earned \$2,328 66 during the ten months, it has been under the management of the present foreman, Mr. John Cloud. The work done, is credited at the price paid to other shops for work of the same kind.

STATEMENT OF THE OPERATION OF THE SHOP, FROM  
MARCH 1st, TO DECEMBER 31st, 1864.

Dr., to stock on hand March 1st, 1864,	-	-	\$1,905 55
“ 10,320 lbs. wrought iron, at average 8 21-100 cts.,			847 96
“ 40,524 “ cast “ “ “ 3 9-10 “			1,604 69
“ 4,477 “ brass castings, “ 40 “			1,790 80
“ 208 “ steel “ “ 56 6-10 “			117 79
“ 12,296 feet lumber, “ 4 1-3 “			528 75
“ 10 tons blacksmith's coal, “ \$7 80			78 00
“ machine work, - - - - -			331 57
“ covering 163 spindles, at \$2 30 - - -			386 40
“ hardware, &c., - - - - -			1,147 60
“ wages paid hands, - - - - -			6,159 35
			\$14,948 46

Cr. by ferrules furnished to Register's office :

“ 638 lbs. ferrules $\frac{1}{2}$ inch at 75 cts.	\$478 50		\$478 50
“ 504 “ “ $\frac{5}{8}$ “ “ 75 “	378 00		378 00
“ 180 “ “ $\frac{3}{4}$ “ “ 75 “	135 00		135 00
“ 53 “ “ 1 “ “ 75 “	39 75		39 75
“ 135 fire plug cases “ \$16 00	2,160 00		2,160 00
“ 55 “ plugs, “ 18 00	990 00		990 00
“ 4 “ “ cases, (steam,) at \$25 00	100 00		100 00
“ forgings for 9 steam plugs, - -	50 00		50 00
“ repairs to 17 fire plugs, at \$6 00	102 00		102 00
“ 36 stop cocks, 6 in. “ 60 00	2,160 00		2,160 00
“ 33 “ “ 4 “ “ 40 00	1,320 00		1,320 00
“ 2 “ “ 8 “ “ 75 00	150 00		150 00
“ 1 “ “ 30 “ - - -	400 00		400 00
“ 273 “ “ boxes, at \$3 50	955 50		955 50
“ 9 hydrants, new, “ 30 00	270 00		270 00
Amount carried forward,	\$9,688 75	\$14,948 46	



Amount brought forward,	\$9,638 75	\$14,948 46
To 2 hydrants repaired,	- - - 10 00	
“ 24 chains for hydrants, at 25 cts.	- - - 6 00	
“ patterns and repairs to same,	- - - 82 50	
“ roof for portable engine,	- - - 30 00	
“ repairs for First District,	- - - 795 52	
“ “ “ Second “	- - - 842 73	
“ “ “ Third “	- - - 365 62	
“ “ “ Fourth “	- - - 471 27	
“ “ “ Schuylkill Works,	- - - 82 08	
“ “ “ Delaware “	- - - 133 26	
“ “ “ Twenty-fourth Ward Works,	49 82	
“ “ “ Fairmount Works, heating apparatus, &c.	- - - 811 90	
“ 1,556 lbs. wharf bolts, for repairs to Fairmount Dam, at 12 cts.	\$186 72	
“ repairs for Delaware Water Works, extension,	- - - 44 60	

*Stock on Hand.*

“ 695 lbs. brasses finished at 80 cts.	\$556 00
“ 148 “ ferrules “ “ 75 “	111 00
“ 161 “ plugs “ “ 50 “	80 50
“ 76 spindles “ “ \$6 00	456 00
“ 41 screws, 6 inch, “ “ 5 00	205 00
“ 28 “ 4 “ “ “ 5 00	140 00
“ 6 “ 20 “ “ “ 16 00	96 00
“ 5 “ 16 “ “ “ 13 00	65 00
“ 1 “ 30 “ “ “ 20 00	20 00

Amount carried forward,	\$15,329 27	\$14,948 46
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Amount brought forward,	\$15,329 27	\$14,948 46
To 6 screws, 6 inch, finished, at \$9 00	54 00	
“ 2 “ 12 “ “ “ 11 00	22 00	
“ 28 “ sharp thread, “ 2 00	56 00	
“ 21 “ for fire plugs, “ 3 00	63 00	
“ 13 irons “ “ 8 00	104 00	
“ 4,762 lbs. wrought iron at 8 cts.,	380 96	
“ 17,990 “ cast “ “ 4 “	719 60	
“ 580 “ bolts “ “ 16 “	92 80	
“ 50 “ nails “ 11 “	5 50	
“ 87 wooden plugs “ 50 “	43 50	
“ 45 pick handles “ 25 “	11 25	
“ 150 feet lumber “ 4 “	6 00	
“ scrap iron & brass turnings, sold for cash,	190 50	
“ scrap iron exchanged for iron castings,	197 74	
“ balance, profit of shop, - -		2,328 66
	<hr/>	<hr/>
	\$17,277 12	\$17,277 12

### EXTENSION OF THE WORKS.

The only extensions now being made, are at the Delaware Works, viz: extending the wharf out to the Port Warden's line, 125 feet beyond the old wharf line; laying a thirty-inch suction main from a chamber in the outer pier, to the pumps, and erecting a stand pipe in front of the Works, upon the forcing main. These extensions are fast approaching completion. The piers have been sunk and connected, and the pipe laid to within a short distance of the engine house. The stand pipe is riveted together at the contractors' establishment, ready for delivery. The amount thus far expended upon this work is \$15,306 72.

There is no doubt that the water procured from the end of the pier, will be much purer than that which had been supplied, particularly since the breaking of the wooden trunk, which was form-

erly the suction main. All the water is now taken from within the wharf line, where a large amount of surface area is bared at every tide. The regulation recently adopted by the Port Wardens, making it necessary for the owners of property to keep their docks dredged, if enforced in this vicinity, will increase the salubrity of the water.

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## RECEIPTS AND EXPENDITURES.

### REVENUE.

The annexed report of the Register, W. J. P. White, Esq., will exhibit the receipts of the Department for the year 1864. From this it will be seen, that the amount received by the Register, was \$609,257 28, which, together with the receipts at the Engineer's office, from all sources, make a total of \$610,112 57. The receipts for water rents have increased \$48,953 13 over 1863. The receipts for water pipe were \$8,436 56 less than in 1863; this is owing to the small amount laid during the year.

The gross receipts were \$40,516 28 more than in 1863, this is a gratifying result, and when the expenses for the year are deducted, the net income of the works to the City will be found to be \$356,143 82, being \$1,203 43 above that of 1863. When the increased cost of labor and all materials is considered, it will be seen that the employees of this Department have looked to the interests of the City, in the discharge of their duties. Were it not for the advanced prices, the expenses of the Department would have been reduced about \$40,000. There were other difficulties; owing to the unsettled condition of the country, it has been almost impossible to procure men who feel an interest in any ordinary employment.

The Department was subjected to considerable expense during the rebel raid into our state, in July and August; thirty of the

employees attached themselves to the "Philadelphia City Scouts," under the command of Capt. Robert M. Evans. As they received no compensation, either from State or Government, for their services, the Committee on Water directed that their salaries and wages be continued during their absence. This company were furnished with horses and equipments by the City Authorities, and were of efficient service to the general and state governments, in assisting in the protection of our border, and in arresting deserters and disloyal persons.

The amount paid for salaries and wages of these employees was \$1,898 22.

There is \$4,751 06 due the Department for work done during the year ; and also pipe bills to collect, amounting to \$5,825 46.

Table No. 10 exhibits a statement of the gross receipts, the expenditures, the net income after deducting expenses, the percentage of net income of the receipts, and the number of feet of pipe laid for the past ten years. From this it will be seen that the net earnings of the works, after deducting all expenses, have been nearly three million dollars.

#### INCREASING THE REVENUE.

There is no doubt that the City is still wronged out of a large amount due for the use of water ; by misrepresentations, by attachments made to the mains clandestinely, and by taking water from plugs or hydrants without paying for it. To protect the City against such wrongs, the appointment of a number of additional inspectors is recommended ; there are at present four, for the entire City ; this gives each of them about 19,000 water takers to look after, besides new attachments made every year, and the distribution of bills for water pipes. Four additional inspectors would enable the Department to visit every building supplied with water, at least once a year. For years it has been necessary to appoint a number of persons, to assist in the assessment of water

No. 10.

SERVICE MAINS LAID FROM 1855 to 1864.

YEAR.	Feet of new pipe laid.	Gross amount expended.	Amount received for pipe by Register.	Amount sent to Solicitor for Lien.	Amount paid of expenses by City.	Cost per foot of pipe laid.
1855.	31,574	\$40,673 09	\$21,351 01	\$7,980 71	\$9,341 37	\$1 28 8-10
1856.	54,879	69,915 81	31,925 61	6,938 20	31,055 00	1 27 4-10
1857.	61,182	78,527 02	30,373 58	28,923 91	19,229 53	1 28 3-10
1858.	67,519	80,944 12	37,145 91	29,448 40	14,349 81	1 15 4-10
1859.	97,993	115,705 81	63,249 13	27,302 11	25,154 57	1 18
1860.	97,095	99,142 79	62,297 57	26,459 47	9,985 75	1 02 1-10
1861.	59,406	65,063 89	34,495 36	31,963 25	6,719 38	1 09 5-10
1862.	48,474	56,357 17	28,164 31	24,200 28	3,992 58	1 16 2-10
1863.	56,961	70,489 59	30,715 02	14,350 70	25,423 87	1 23 7-10
1864.	35,867	70,769 98	22,278 57	13,630 59	29,035 36	1 94 5-10
Total.	610,950	747,589 27	361,993 07	211,197 62	174,287 22	1 22 4-10

Bills for pipe outstanding, due the City, Dec., 31st, 1864, \$5,825 46

rents for a large portion of each year ; these being but temporary appointments, their work cannot be relied upon so implicitly, nor can they accomplish so much as those who hold permanent situations. The annual amount appropriated for these assessments, would about pay for the additional inspectors.

The Department would also suggest the appointment of a permanent clerk, to take charge of the pipe account ; and an additional permit clerk, to take the place of the temporary clerks it is found necessary to employ. Neither of the above suggestions would increase the expense of the Department, but rather diminish it ; and no doubt add much to the revenue.

The project of licensing plumbers, has frequently been urged upon your attention. This would be of great importance to the Department, and directly promote the interests of honorable men engaged in the business. The licensed plumbers would be a part of the Department, possessing interest common with it, and without any inducements to make attachments extending the use of water, without a permit, or without paying for it. The regulations of the Department would then be observed, without the necessity of legal interference. The fines imposed for violating these regulations are valueless.

The following are suggested as the leading features of such an arrangement : any plumber having a regular place of business, who will give to the city satisfactory security, to the amount of \$500, can be licensed. Any infringement of the regulations by them, should result in the withdrawal of their licenses, until the fine imposed is settled. Permits to be issued to licensed plumbers only, and to no other parties.

The Register has suggested a means of increasing the revenue, viz : advancing the price of water rents upon certain properties. Water is so essential to the health and prosperity of a city, that the policy of making it dearer can scarcely be recommended, it would be more preferable to have it cheapened ; otherwise all the

surplus income should be appropriated in enlarging and extending the works. Should you, however, deem it advisable to increase the water rates, the plan suggested by the Register would be recommended.

Your attention is again called to the fact, that the City has no other security for the collection of the income of this Department, than the integrity of the officers. While this is flattering to those filling positions of trust, they would prefer that proper checks upon the receipts and expenditures be instituted.

The following amounts have been received at the Chief Engineer's Office, and paid to the City Treasurer.

For rents,	- - - - -	\$145 00
“ Old Iron,	- - - - -	340 00
“ Hay,	- - - - -	96 54
“ Work done for Philadelphia, Germantown and Norristown Rail Road Company,	- - -	138 35
“ Work done for Powers & Weightman,	- -	10 70
“ “ “ “ Phila. and Trenton Rail Road Co.		124 70
		<hr/>
Total,		\$855 29

The following amounts are due to the City for work done by the Department, December 31st, 1864 :

From Northern Liberty Gas Company, for placing Fire plugs in yard of works,	- - -	\$322 24
“ James Naulty, for removing Fire plug,	-	69 31
“ Philadelphia, Wilmington and Baltimore R. R. Co., for making connection with main,		174 77
“ Pennsylvania Central R. R. Co., for making con- nection with main,	- - -	194 53
“ U. S. Government, for laying 6 in. pipe to Camp Cadwallader Barracks,	- - -	3,897 14
“ Camden and Amboy R. R. Co., for making con- nection to main,	- - -	93 07
		<hr/>
Total,		\$4,751 06

## REGISTER'S STATEMENT.

DEPARTMENT FOR SUPPLYING THE CITY WITH WATER,  
REGISTER'S OFFICE,  
January, 1865.

H. P. M. BIRKINBINE, Esq.,

Chief Engineer of the Water Department :

DEAR SIR :—I would respectfully submit the following statement of the transactions of this office for the year 1864.

The enclosed tabular statement presents to you in detail, a full report of the financial operations of the office for the year 1864.

From January 1st to February 29th, inclusive, covers the term of office of my predecessor, Mr. C L. Wolf, and is made up from the weekly statements filed in the office.

The estimated receipts, from all sources, for the year 1864, was \$600,000. By reference to the tabular statement, you will find they amount to \$609,257 28; an increase over the total receipts of the previous year of \$40,516 28. Taking into consideration the fact that 56,961 feet of iron pipe were laid in 1863, against 35,867 feet in 1864, it exhibits a very gratifying gain in the amount of water rents collected, over that of the year 1863; being an excess of \$48,953 13. This is in part attributable to great attention given to the collection of arrearages, which, in 1864, amounted to \$20,614 13, against \$12,815 05 in 1863.

The amount due for iron pipe, still outstanding, is \$5,825 46, exclusive of \$13,630 59 sent for lien, to the City Solicitor during the year.

Annexed are the amounts of the duplicates, arranged in Wards, for the years 1864 and 1865, showing more clearly the increase. This, together with income from delinquent water rents and new permits, will probably swell the receipts for water rents for the year 1865 to \$620,000.



It is difficult to form an estimate of the income derived from iron pipe, it being dependent on the number of feet laid. There are now some 60,000 feet ordered to be laid, of which some fifty per cent will probably be paid into this office.

WARDS.	1864.	1865.
First, - - -	\$39,847 75	\$18,384 25
Second, - - -	26,892 75	27,207 10
Third, - - -	16,524 50	16,599 25
Fourth, - - -	17,351 75	17,686 25
Fifth, - - -	27,067 75	27,123 00
Sixth, - - -	32,705 75	31,933 75
Seventh, - - -	31,611 75	32,278 75
Eighth, - - -	31,266 50	30,843 25
Ninth, - - -	26,966 25	28,371 00
Tenth, - - -	28,410 50	29,233 75
Eleventh, - - -	17,301 00	17,432 75
Twelfth, - - -	19,056 00	18,951 00
Thirteenth, - - -	26,514 00	26,232 00
Fourteenth, - - -	29,314 00	30,070 00
Fifteenth, - - -	45,620 75	48,281 25
Sixteenth, - - -	21,162 25	21,126 30
Seventeenth, - - -	18,181 00	18,203 75
Eighteenth, - - -	19,052 00	19,647 75
Nineteenth, - - -	32,389 50	31,271 75
Twentieth, - - -	39,521 75	49,051 75
Twenty-first, - - -	410 50	1,975 00
Twenty-third, - - -	474 00	519 00
Twenty-fourth, - - -	18,439 25	18,177 05
Twenty-fifth, - - -	4,052 00	4,316 00
Twenty-sixth, - - -		23,382 25
Total, - - -	<u>\$570,133 25</u>	<u>\$588,297 95</u>

No. 11.

Statement of Receipts at Register's Office, from January 1st, to December 31st, 1864.

MONTHS.	Rents, 1861.	Penalties, 1861.	Rents, 1862.	Penalties, 1862.	Rents, 1863.	Penalties, 1863.	Rents, 1864.	Penalties, 1864.	Fractional Rents.	Iron Pipes.	Total.
January,.....	\$102 50	\$9 08	\$420 50	\$55 65	\$2120 50	\$204 06	\$38,403 75		\$630 10	\$1,820 45	\$43,766 59
February,.....	45 50		176 00	10 80	771 00	70 80	71,191 25		1,708 70	475 54	74,449 59
March,.....	54 00	5 40	219 25	28 88	1,898 25	260 92	108,430 00		1,880 10	2,615 10	115,392 90
April,.....	173 50	24 10	942 50	125 26	3,636 25	506 87	234,229 75		1,881 65	1,404 49	242,924 37
May,.....	5 00		721 60	74 71	1,309 45	167 29	14,717 75	\$530 43	2,639 75	457 62	20,623 60
June,.....			870 75	84 99	839 50	93 53	36,628 75	1,652 00	1,547 55	635 38	42,352 45
July,.....			439 00	50 11	375 25	46 11	5,848 25	735 23	1,592 75	1,247 72	10,334 42
August,.....			452 08	53 81	479 00	57 05	4,599 50	642 14	1,223 75	1,399 95	8,907 28
September,.....			516 75	48 82	511 75	53 82	5,180 25	642 66	1,065 25	2,730 57	10,749 87
October,.....			274 00	21 16	282 00	29 56	6,606 25	843 00	848 95	1,663 87	10,568 79
November,.....			140 00	17 94	146 50	15 57	4,562 25	503 28	964 65	2,521 90	8,872 09
December,.....			277 25	28 83	249 25	20 13	11,828 31	1,150 68	1,475 90	5,304 98	20,315 33
	380 50	38 58	5,449 68	600 96	12,618 70	1,525 71	542,226 06	6,679 42	17,459 10	22,278 57	609,257 28

I would recommend an increase in the water rates for all buildings: half buildings, now \$2 50 to \$4; three-quarter buildings, now \$2 75 to \$5; full buildings, now \$5 to \$7; and water closets, now \$1 to \$3. This proposed change in rates would insure an additional income to the City of \$136,750, as is shown by the accompanying statement:

15,000 $\frac{1}{2}$ Buildings at \$2 50, \$37,000 00	15,000 $\frac{1}{2}$ Buildings at \$4, \$60,000 00
3000 $\frac{3}{4}$ " 3 75, 11,250 00	3000 $\frac{3}{4}$ " 5, 15,000 00
50,000 Full " 5 00, 250,000 00	50,000 Full " 7, 350,000 00
5000 Water Closets 1 00, 5,000 00	5000 Water Closets 3, 15,000 00
<hr/>	<hr/>
\$303,250 00	\$440,000 00
	303,250 00
	<hr/>
	Gain of, \$136,750 00

Cases where additional fixtures have been made by plumbers, without taking out a permit, as the ordinances of the City require them to do, are of so frequent occurrence that it has become a serious evil. It not only defrauds the City out of a large amount, but proves to be a positive injury to the honest plumber. The most effectual remedy that presents itself to me is, that recommended by you in your report of 1862, and has been adopted in most of the large cities, viz: plumbers to be licensed by the Department, or by the Committee on Water Works. The plumbers to give security for their faithful observance of the ordinances and regulations of the Water Department; and who only would be authorized to lay service pipe, or do any kind of plumbing work connected with the introduction and supply of water from the water pipes.

Yours respectfully,

W. J. P. WHITE,  
*Register.*

## EXPENDITURES.

The expenses of the year having been unusually large, on account of the high price paid for labor, materials, etc., the advances have been about 20 per cent on salaries, 50 per cent on labor, 100 per cent on coal, iron, etc., and 200 per cent on repairs, over the prices of 1863. If due allowance be made for this increase, it will be seen that economy has been exercised, and that the management of the Department this year will compare favorably with any previous year.

Notwithstanding the advance in prices, the net revenue is greater this year than last.

The increase in salaries has been less in proportion than it was found necessary to pay for ordinary laborers, or that which you have paid to other departments. The average advance to this Department has been about 20 per cent, and but 12 per cent has been added to the salary of your Chief Engineer.

It should be borne in mind, that this Department pays a large surplus into the treasury, and that the officers have added about forty thousand dollars to the income of the Department, about the ordinary annual increase, and if credit be given for the advance, paid for labor and materials, about the same amount has been saved in managing the Department, as compared with the previous year.

## EXPENDITURES OF THE DEPARTMENT FOR THE YEAR 1864.

*Ordinary Expenses.*

Salaries of chief engineer, register, clerks, &c.,	\$22,888 29
Office expenses,	3,838 44
Salaries of engineers, firemen, &c., at Works,	22,613 08
Supplies to Works, viz.,	
Coal,	\$52,869 85
Tallow, oil and gas,	2,993 88
Wood,	107 92
Small stores,	2,609 68
	58,581 33
Repairs, viz.,	
Fairmount Works,	\$7,077 21
Delaware     “	3,054 66
Schuylkill   “	6,780 46
Twenty-fourth Wards Works,	4,369 67
	\$21,282 00
Buildings, Grounds and Reservoirs,	24,016 94
	45,298 94
“Iron pipes, fire plugs and other fixtures, and materials for laying pipe, &c.,” viz.,	
Iron pipe,	\$33,622 55
Iron castings,	3,170 95
Brass do	1,650 56
Lead,	5,724 25
	\$44,168 31
Amounts carried forward,	153,220 08

Amount brought forward,	\$44,168 31	\$153,220 08
Wrought Iron, . . . . .	869 02	
Wood, . . . . .	151 00	
Hardware, . . . . .	185 50	
Coal, . . . . .	153 50	
Repairs, . . . . .	703 30	
Bolts and Nuts, . . . . .	357 48	
Leather, . . . . .	141 90	
Lumber, . . . . .	836 70	
Oil, . . . . .	99 58	
Gasket, . . . . .	266 88	
Paints, . . . . .	58 62	
Tallow, . . . . .	24 78	
Covering Spindles with brass, .	296 70	
Wharfage, . . . . .	30 00	
Sundry Bills, . . . . .	50 84	
	<hr/>	48,394 11
Labor, laying pipe, setting plugs, &c., and for fitting up stop-cocks, fire plugs, &c., viz.,		
Pipe, First District, \$2,531 25		
“ Second “ 2,449 52		
“ Third “ 3,155 16		
“ Fourth “ 4,799 89		
	<hr/>	12,935 82
Shop, viz.,		
Wages, . . . . . \$7,357 53		
Bills, . . . . . 477 14		
	<hr/>	7,834 67
Pipe plans, . . . . . 476 66		
Inspecting pipe, 231 20		
Surveyors, for measur- ing pipe, . . . . . 897 52		
	<hr/>	1,605 38
	<hr/>	22,375 87
Amount carried forward,		\$223,990 06

	Amount brought forward,	\$223,990 06
Keeping pipes, plugs, stops and fixtures in good order, viz.,		
Wages, First District,	\$4,492 85	
"    Second "    "	3,908 47	
"    Third "    "	3,282 92	
"    Fourth "    "	4,175 43	
	<hr/>	15,859 67
Paving,		1,204 00
Plumbing, &c.,		167 89
	<hr/>	17,231 56
Drilling and making new attachments, viz.,		
Wages, First District,	\$1,370 25	
"    Second "    "	1,201 88	
"    Third "    "	1,583 25	
"    Fourth "    "	1,427 87	
	<hr/>	5,583 25
Germantown Water Company,		275 00
Railing at Fairmount, viz.,		
Hardware,	\$10 00	
Wrought Iron,	70 13	
Iron Castings,	557 58	
Wages,	334 05	
	<hr/>	971 76
Re-assessment of Water takers,		3,779 50
Bills of 1859, 1860, 1861, 1862 and 1863,		643 44
Surveys for a better supply of Water,		821 49
Cleaning Fairmount Reservoir,		2,093 08
Sewer 25th and Green,		622 97
Bills for over paid Water-rents of 1861, 1862, 1863 and 1864,		122 13
Repairs to Fairmount Dan,		464 55
Drinking Hydrants,		115 22
Grading at Fairmount,	\$73 50	
Labor at Stand Pipe, Fairmount,	144 00	
Gutters at Fairmount,	73 50	
Paving 25th and Biddle Streets,	357 08	
"    Pennsylvania Avenue and Coates Street,	488 00	
	<hr/>	1,136 08
Total amount of ordinary expenses,		\$257,850 09
Extensions of the Delaware Works,		\$15,306 72

No. 12.

*Statement of Receipts and Expenditures, Net Income, &c., of the Department, since Consolidation.*

YEARS.	Receipts.	Expenditures.	Net Income.	Per centage of net income.	No. of feet of pipe laid.	Chief Engineer.
1855,	\$382,036 72	\$250,895 37	\$131,141 35	34 32-100	31,724	Graff.
1856,	351,936 49	138,954 85	212,981 64	60 50-100	54,879	Ogden.
1857,	425,426 11	200,605 82	224,820 29	52 84-100	63,684	"
1858,	457,518 48	187,978 09	269,540 39	58 91-100	72,124	Birkinbine.
1859,	551,180 08	225,082 03	326,098 05	59 16-100	116,944	"
1860,	558,531 53	198,269 18	360,262 35	64 50-100	100,544	"
1861,	533,980 06	162,724 94	371,255 12	69 52-100	59,406	"
1862,	544,767 25	177,271 69	367,495 56	67 27-100	48,474	Cassin.
1863,	568,740 60	213,750 20	354,990 40	62 37-100	56,961	"
1864,	610,112 57	253,968 75	356,143 82	58 37-100	35,867	Birkinbine.
Total,	\$4,984,229 89	\$2,009,500 92	\$2,974,728 97	59 68-100		



## PRELIMINARY SURVEYS.

The surveys authorized by ordinance of Councils, under date of April 15th, 1864, for the purpose of ascertaining the practicability of procuring a supply of water, from sources other than the present, and beyond the limits of the City, were prosecuted with energy as long as the weather would permit. Reconnoissances of the entire length of the following streams have been made, namely: Darby, Cobb's, (a branch of Darby,) Crum, Ridley and Chester Creeks entering the Delaware below the City, Mill, Gulf and East Valley Creeks joining the Schuylkill from the west above the City. The examination of the Perkiomen Creek, which has its confluence with the Schuylkill about seven miles above Norristown, is now in progress. It is proposed to examine all the streams within a reasonable distance, (say forty miles,) of the City. A complete report will be presented as soon as this is done.

A hydrographical survey of the Schuylkill, from Fairmount to Columbia Avenue bridge, was made during the fall.

A number of tests were made, to ascertain the comparative hardness of waters from various sources accessible to the City. Thus far, however, the Department has not succeeded in finding any source of supply holding out sufficient inducements to offer a recommendation. The total amount expended upon these surveys has been \$821 49.

## PROPOSED EXTENSION OF THE WATER WORKS.

This subject has been so frequently pressed upon the consideration of Councils, and so many reports made upon it, that there remains but little to add. The necessity of your early attention to it is most respectfully urged.

Many of the following recommendations have been familiar to Councils since the report I presented upon the extension of the Works, in October 1858. It is to be regretted that these improvements were not carried out at that time.

The Department have been looking for a supply of water from sources other than the present; hoping to find one where water could be procured and stored free from contamination, and which could be connected with the City by an aqueduct, and delivered into the reservoirs by its own gravity. Thus far no such location has been found, but the thorough exploration of the country surrounding the City, now being prosecuted, may develop some such source. Should it be to the advantage of the City to make an entire change in the mode of water supply, much of the present Works would have to be abandoned, and some of the new extensions recommended, be useless; except for the purpose of keeping the City adequately supplied during the time that must necessarily elapse after a source is selected, before the Work is completed and connected with the City. A number of years will be required to construct Works of the extent and magnitude required. For these reasons, the following extensions are pressed:—

### AT FAIRMOUNT.

First. The necessity of rebuilding the dam is again urged upon your consideration, at least the sinking of a line of cribs across the deep water below the dam, for the purpose of protecting the foundations.

Second. Substituting turbine wheels and new pumps for the

eight breast wheels and pumps in the Old Mill House. This will require the rebuilding of the water front of this part of the Works.

Third. Placing a Cornish pumping engine in the Old Engine House, (the public saloon.) This engine to be capable of raising ten million gallons every twenty hours, either into Fairmount or Corinthian Avenue Reservoirs.

The reasons for recommending the placing of this engine in the Old Engine House are, that it will only be necessary to use it when the water is low in the river, and should any accident happen to the dam, the supply could be taken from the river below the dam.

It would only be necessary to use this engine when there is not sufficient water flowing to propel all the pumps driven by water, or when the demands of the City are beyond the capacity of the other machinery, and in case of accident.

For these considerations, the location of this engine is changed. In former recommendations it was to be placed at the Schuylkill Works. If erected there, it would be necessary to lay an additional forty-eight inch main from these Works to Spring Garden Reservoir.

Fourth. A forty-eight inch main from the foot of the Water Tower to Corinthian Avenue Reservoir, which was a part of the original design. Without this main, the full power of the New Mill House cannot be exerted, and any further increase of the pumping capacity would be useless.

#### SUPPLY MAINS.

Fifth. A thirty inch main connecting the Corinthian Avenue Reservoir, at Poplar street and Corinthian Avenue, with the Kensington Reservoir at Seventh street and Lehigh Avenue. This will enable the Works at Fairmount to furnish water to the district now supplied by the Delaware Works. When the improvements in recommendations second, third and fourth are made, these Works can be dispensed with during a greater part of the year, and will

only be necessary in seasons of the greatest demand, or should any accident occur to the other works.

Sixth. A thirty inch main to connect the ascending main from Fairmount with the thirty inch distributing main from Spring Garden Works. This will enable the Fairmount Works to pump directly into the Spring Garden Reservoir in case of necessity.

Seventh. A twenty inch main from the Kensington Reservoir along Lehigh Avenue to Frankford Road, at this point branching into two sixteen inch mains, one continuing along Lehigh Avenue to Richmond street, and the other along Frankford Road to Westmoreland Avenue. This whole district is now without a supply main, and is furnished only through the service mains.

There is but one supply main in all the district furnished by the Delaware Works. This is but eighteen inches in diameter, and is laid from the reservoir along Seventh street to Norris street, and down Norris to Frankford Road.

Eighth. A sixteen inch main on Washington Avenue from Fifth to Front street. There is no supply main in the district east of Fifth and south of South street.

Ninth. A twenty inch main on Washington Avenue from Broad to Twentieth street. This is made necessary by the large number of manufacturing establishments locating in this part of the City. There is no supply main south of South street or west of Broad street. When the thirty inch main was laid on Broad street, a branch was inserted and the pipe carried across the street for this purpose. Preparations were also made for a twenty inch main down Broad street from Washington Avenue. This, although not now necessary, will be so in a few years, as all this district is rapidly building up.

Tenth. A twenty inch main extending from Fairmount Reservoirs along Twenty-second street to South street. This section of the City is also deficient in supply, on account of the number of new houses and large manufacturing establishments being erected.

TWENTY-FOURTH WARD WORKS.

Eleventh. A Cornish pumping engine capable of raising three million gallons of water per day into the stand pipe; the engine to be located at the Works.

Twelfth. A twenty-four inch pumping main from this engine to the stand pipe.

These are new recommendations; made, because the demand for water in this district is now fully equal to the capacity of the present engines; and even with a reservoir, it will be necessary to furnish additional pumping power. Such an engine could be erected in a few months, while a reservoir will require, at least, two years in constructing.

Should property be bought for a park on the west side of the river, a suitable site for a reservoir of ample capacity could be selected and included in it.

DELAWARE WORKS.

Thirteenth. Constructing an additional reservoir adjoining the present ones. This is also a new recommendation, intended for the present to take the place of the proposition to raise those now in use seven feet, to bring them to the same level as the Corinthian Avenue Reservoir. The City bought the land adjoining Kensington Reservoir, extending to Eighth street, when the Works were built, but never had possession of it until last summer.

It will cost less to build a new reservoir to the proper height, than to raise the present ones; and after the new one is built and in use, the present ones can be raised at less expense and risk. The storage capacity of both the reservoirs will be necessary by the time they can be finished and ready for use.

There are other extensions to the Works that can be made with advantage to the City. All the above are deemed to be necessary. They should be commenced as early as possible, and prosecuted vigorously.

## WATER WORKS

FOR GERMANTOWN, ROXBOROUGH AND MANAYUNK.

The citizens of these districts are suffering for want of water, and have frequently petitioned the City for a supply. They could be furnished by one system of Works, and also that part of the City lying between Manayunk and Poplar street west of Broad; most of which lays too high to be supplied by any of the other Works. These Works could be arranged to furnish a supply of water to the Twentieth, Twenty-first and Twenty-second Wards; now either without any supply, or one partial and unsatisfactory. It therefore becomes necessary to make some provision for these important districts. The Germantown Water Company have offered to sell their Works to the City.

*Source of Supply.*—The only source of supply is the Schuylkill above Flat Rock Dam. The source from which the Germantown Company now take their supply is not only insufficient, but liable to contamination, as all the smaller streams are, in a district so thickly populated and so full of manufacturing establishments. It is to be doubted whether any amount of care or expense could insure desirable water from these sources. For these reasons the Schuylkill is recommended, and there is no point where water of a better quality can be procured than from that above indicated.

*Quantity of Water.*—In the estimate of the quantity of water, the amount is that supposed to be sufficient for about ten years to come. Germantown will require about one million gallons; Manayunk one million gallons, and Roxborough five hundred thousand gallons per day. Should the main be extended so as to furnish the Twentieth Ward, it would require an additional supply of one million gallons per day, making a total of three and a half million gallons per day. A Works capable of furnishing at least four million gallons per day will be required; but as a large amount of water may be necessary for manufacturing purposes, and these

districts may be much more rapidly built up, the daily capacity of these Works should, therefore, be six million gallons.

*Works.*—Fourteenth. A Cornish pumping engine, capable of raising six million gallons one hundred and seventy feet high, located at Flat Rock Dam.

Fifteenth. A thirty inch pumping main from the Works to the reservoir.

Sixteenth. A store reservoir of sixty million gallons capacity, would be sufficient for these Works; but one of double that size is recommended. There are a number of locations, within a reasonable distance of the point where the pumping machinery would be erected, well adapted for the construction of a reservoir.

Seventeenth. A Cornish pumping engine, with a capacity of raising two million gallons one hundred and sixty feet high; this engine to be placed at the store reservoir, and force the water into a stand pipe, from which it could be conducted to the reservoir of the Germantown Water Company, for the supply of the Twenty-second Ward. A main from the stand pipe along Ridge Avenue would distribute the water to Roxborough.

Eighteenth. A sixteen inch main from the stand pipe to the reservoir of the Germantown Water Company.

Nineteenth. A twenty-four inch main, from the store reservoir, along the main street to the lower end of Manayunk, and from this point a twenty inch main along Ridge Avenue to Twenty-second street, and along Twenty-second street to North College Avenue, there connecting with one of the sixteen inch mains from the Spring Garden reservoir.

By this connection water could be drawn from the store reservoir at Manayunk, if at any time it is found necessary.

The Department does not furnish estimates with these recommendations, owing to the constantly varying prices of labor and materials. An estimate made to-day would be found to be greatly in fault in ten days or two weeks.

In these extensions, if the Department have erred, it is not in

making them large enough; the condition of the country and high prices have had this influence.

Were it not for these considerations, some of the recommendations would be altered; and it is a subject of doubt, if the true interest of the city would not indicate that at least the following changes in the above recommendations be made, notwithstanding the large increased expenditures they involve.

In place of the Cornish engine, fourteenth recommendation, an engine of double the capacity—twelve million gallons.

In place of the fifteenth recommendation, a forty-eight inch ascending main.

In place of the sixteenth, a store reservoir of at least three hundred million gallons capacity.

In place of the nineteenth, a forty inch main to Manayunk, and a thirty-six inch main along Ridge Avenue to Lehigh Avenue, there branching into two thirty inch mains; one leading to Broad street and Lehigh Avenue, there connecting with the thirty inch main joining the Corinthian Avenue and Kensington Reservoirs, the other branch connecting with the main from Spring Garden Reservoir at Twenty-second and North College Avenue.

Such an arrangement would make the Cornish engine at Fairmount, (third recommendation,) unnecessary, and would add much to the stability of the water supply of the City, as ten million gallons per day could be drawn from these Works for the supply of any other part of the City requiring it.

#### LEGISLATION.

The ordinances regulating this Department, have been passed from time to time as the exigencies of the Works demand them. Some cannot be enforced, many of them are useless, and there are some subjects which need legislation to protect the Department, and enable it to collect the revenue.

The water rates also require a revision. They might be much simplified; in some instances lowered, and in others advanced. Some of the charges are not equitable as compared with others. The subject is one of considerable importance, and the revision would be much to the advantage of the City. Some additional legislation by the State authorities will also be necessary.

Very respectfully,

H. P. M. BIRKINBINE,  
Chief Engineer.