## CHICAGO WATER WORKS

The Water Supply in the Past and Present--Historical Sketch.

A Private Company the First Supplier.

The Chicago City Hydraulic Company--Its Charter, Powers, and Privileges.

Organization of the Board of Public Works-The Water Works Placed Under Its Control.

The Water Furnished-Causes of Its Impurity-Proposed Remedy.

## THE LAKE TUNNEL.

History of the Gigantic Undertaking.

The Completion of the Work.

In the earliest days of our city's history, when all the residents of the little town lived within an easy distance of the lake shore, or the banks of the then pleasant river, water works were then unknown within the town limits, and really unneeded. When everybody could supply himself or herself with an abundance of the aqueous necessity, by a short journey with pail or bucket, any arrangement of pipes or reservoirs would have been superfluous; but when, in the course of time, the little settlement increased in size, and its population commenced to extend further and further to the north, south, and west, a demand sprang up for the establishment of some plan to supply the town with water for domestic and manufacturing purposes. The history of mankind proves, in the most conclusive manner, that man is always wanting something; but it also asserts that what he wants very badly he is tolerably certain to obtain. And so, in this case, though the city was but very young and the people were by no means rich, we find that the demand had hardly become general and earnest when means were resorted to to supply it, and a chartered company, bearing the somewhat grandiloquent title

CHICAGO HYDRAULIC COMPANY, was duly formed and incorporated, for the express

purpose of establishing and maintaining the city's water supply. The appointments of this first water works association of Chicago were necessarily of a somewhat simple and inexpensive character. The reservoir email and inconvenient, was situated on the lake shore, near the present depot of the Illinois Central railroad, and was chiefly characterized by the extensive rat drowning facilities it possessed. Indeed, so many of the troublesome little rodents were daily destroyed in this manner that the hydrant water was said to exercise a remarkable influence over cats and dogs on the approach of the occasions of the periodical purification of the reservoir. The water-pipes used were in themselves curlosities, and bear testimony to the primitive ideas of the time. Generally they consisted simply of logs of wood, bored out through the center and dovetailed together in as perfect a manner as possible. As a matter of course, they most of them leaked with a commendable persistency, or if they did not the wood soon began to rot, when it would be washed out at the hydrants in fragments of greater or less magnitude, according to the size of the egress pipe. This state of affairs, modified and improved in a certain degree, lasted until the 15th of November, 1851, when, by an act of the State Legislature, the CHICAGO CITY HYDRAULIC COMPANY

was incorporated, and a "Board of Water Commissioners of the City of Chicago" was appointed.

This act provided that John B. Turner, Horatio G. Loomis, and Aison S. Sherman be named and constituted as a Board of Water Commissioners, who and their successors in office shall be a body politic and corporate, with power to contract, sue and be sued, to purchase, held, and convey personal and real estate, to have a common seal, to alter and break the same at pleasure, to make by-laws, and do all legal acts which may be necessary and proper to carry out the effect, intent, and object of the act. The Commissioners were to hold office for the term of three, four, and five years respectively, their several terms being decided by lot: and the duty of the Board was defined to be the ex amination and consideration of all matters relative to "aupplying the city of Chicago with a sufficient quantity of pure and wholesome water, to be taken from Lake Michigan, for the use of its inhabitants. The Commissioners had full power to purchase suits ble land, and to construct necessary buildings, machinery and fixtures. They were empowered to establish reservoire, jets, and public and private hydrants, and to lay pipes in and through all the streets and alleys of the city, and across all rivers and streams, though not to interfere with the navigation of the same, nor without the consent of the Common Council; also, to construct hydrants of sufficient size and capacity, and in such localities as they should deem desirable, for the purpose of extinguishing fires, and to assess all water rents.

Section 3 of the act provided that "the said Commissioners should have power to loan from time a sum of money not exceeding \$250,000, upon the credit of the city of Chicago, and have authority to issue bonds for the payment of the principal and interest. Section 15 provided that whenever the receipts from

water-renis or other sources should accumulate so that there should be a surplus of not less than \$500, not needed for the payment of the current expenses of the corporation, it should be the duty of the Commissioners to invest the same in some safe stocks, or upon other real or personal securities, under the direction of the Judge of the Circuit Court of Cook county. CONSOLIDATION.

By section 19 of the act the Commissioners were autherized to "purchase the corporate rights and real and personal property, fixtures, and stock of every name and description of the Chicago Hydraniic Company," on such terms as may be agreed upon between said Board and said company, and when such purchase should be made, the Commissioners should succeed to, and become invested with, all the powers. rights, privileges, and immunities enjoyed by the Chicago Hydraulic Company under their charter, and should contrive to supply, water to the citizens of Chicago under the same, and collect the money and rents due therefor, in all respects as fully as said company could do, until the said Commissioners, acting under the provisions of the act, should have completed their arrangements, machinery, engines, pipes, buildings, and other things provided for in the act, for the purpose of appointment to th pipes, buildings, and other things provided for in the act, for the purpose of supplying the city with pure and wholesome water; after which time the Chicago Hydrau's: Company should become extinct: "Provided always, that if said Commissioners cannot agree with the said company as to what 'sum shill be paid them for their property, rights, and privileges, them the said company shall have the 'right to establish, by satisfactory proof, the actual costs of their said property, before the Judge of the Circuit Court of Cook county, and no greater sum shall be paid for the same

then the said Judge shall decide to have been the actual cost."

then the said Judge shall decide to have been the actual cost."

REPORTS.

Section 14 provided that "It shall be the duty of said Commissioners to make report to the Common Council of said city semi-annually, which report shall embrare a statement of the frucia and securities of said corporation, and all debts due and owing to said or poration, together with an accurate account of their expenses, which statement shall be certified to by said Commissioners under oath; and shall be entered of record by the clerk of said city, and published in some newspaper of said city of Chicago."

GENERAL POWERS.

The above comprise the most important and characteristic polints of the act. Its other sections regulate the duties of the Board in the collection of water rents or assessments of water taxes; fixes its powers in relation to contracts, and gives it the general powers enjoyed by similar corporations. By section 23 it is provided that any Commissioner may be removed from office by the Judge of the Circuit Court for malfeasance or misteasance in office; and section 29 protects the Board by providing that hay person who wilfully interferes with any of their property, or pollutes the waters of the lake, should be detened guilty of a misdemeanor, and liable to punishment therefor.

THE FIRST BOARD

under the provisions of the above act, Mesers. John B. Turner, Horatio G. Loomis, and Alson S. Sherman, the newly appointed Board of Water Commissioners, entered upon the duties of their office on the 16th of June, 1851.

Surrays.

On the 36th of the same month they employed William J. McAlpine, an engineer of distinguished vegentation and exceptions of the provisions and exception and exceptions of the property of the commissioners and exceptions of the property of distinguished vegentations and exceptions of the property of distinguished vegentations and exceptions of the property of distinguished vegetations and exceptions of the property of distinguished vegetations and exceptions of the property of distinguished vegetations

soners, entered upon the duties of their office on the 16th of June, 1851.

Surveys.

On the 26th of the same month they employed William J. McAlpine, an engineer of distinguished reputation and experience, for the purpose of making surveys, and submitting a plan or plans for the purpose of carrying the provisions of the act of incorporation into execution.

Mr. McAlpine was instructed to make such examinations of Lake Michigan in this vicinity as would exable him to ascertain from what part of the lake pure and wholesome water could best be procured for the purpose of supplying the city. And after he should have made such examinations as were necessary, he was to report to the Board in detail all the planel which in his opinion would be adapted to the object desired, and the estimates for each plan, with the probable revenue to be derived therefrom.

In making his plans and estimates, he was instructed to regard economy and permanency as well as the anticipated increase in the population of the city, estimating that, at the expiration of fitteen years, the probable population would be one hundred incursand couls.

This estimate, by the way, was only one hundred and twenty thousand out of the way.

Pursuant to these instructions, Mr. McAlpine commenced his examinations, and on the 14th of October reported to the Board four different plans for supplying the city with water. Of these plans the Board reported to the Board four different plans for supplying the city with water. Of these plans the Board reported that it each was complete in itself, adapted to the present need of the city, and designed to be extended with the water of the location of the pumps and reservoirs proposed that the engine and pumps be situated on the shore of the lake, on the north side of the river, near the corner of Chicago avenue and Sand street, and that the water be forced into a reservoir situated on the north side of the river, near the location of the pumps and cert of the city.

In the second plan, the engines and pumps were plac

divisions of the city.

In the second plan, the engines and pumps were placed on the lake shore, on the south side of the river, near the corner of Tweifth street and Michigan avenue, and the water was to be forced into a recervoir placed on the south side of the river, near Wells

voir placed on the south side of the river, near Wells street.

In the third plan, the engines and pumps were placed, as stated in the first plan, on the lake shore, near the corner of Chicago avenue and Sand street; and the water for the North Division was forced into a reservoir placed near the corner of Clark and Oniario streets; the water for the South Division into a reservoir near the corner of Olark and Madison streets; and for the West Division into a reservoir placed near the corner of Desplaines and Madison streets.

In the fourth plan, the engines and pumps were placed as stated in the second plan, and the water was forced into reservoirs placed in the North, South, and West Divisions as at ited in the third plan.

The estimated cost of these four plans was as follows:

Required expenditure in 1853..... \$10,000

Required expenditure in 1860. Required expenditure in 1861. Required expenditure in 1863 Required expenditure in 1863.	10.00
Required expenditure in 1864	10,000
Total increase in thirteen weeve	<b>6350 00</b>

with slight modifications, they were subsequently adopted and carried into effect.

EUPPLY PIPE.

A wrought from pipe of thirty inches diameter will be extended from the crib to the namp well. This pipe will be placed in a trench dag at least three feet below the bottom of the lake, and in no place less than five feet below the level of the water, and covered with rubble stone. At the pump well the pipe will be turned down to the levil of the bottom of the well. The surface of the water in the reservoir, when full, requires an elevation of eighty feet above the level of the lake, to give a head of sixty feet on the distribution pipes most distant from the receivoirs. The power of the engine must be anficted the running of the machinery at night, when labor is not only more expensive, but less reliable, and, consequently, the hearst of breakage is greater.

According to the plan adopted, three millions of gallons of water, weighing thirty millions of pounds, which is equal to three and one third millions of pounds.

millions of pounds. THE ENGINE

recommer ded to perform this work was of the following description: The bed plate was a massive casting, placed at the level of the floor of the engine house, and enpported by the walls of massary of the well chambers. The gream cylinder, the air pump and condenser, and the crank shaft were supported by and boiled to the bed plate. The pump, air, and connecting chambers are also supported by and holied to the bed plate of the engine. The air chamber was four feet in dismeter, and extended to a sufficient height to receive the cross and longitudinal timbers which receive the cross and longitudinal timbers which braced and apported the centers of the working beam. In addition to the support of the air chambers, a heavy frame of timber was extended, bracing from the bea plate to the beam centers, in the usual form of steam-boat engines. 

The nump rods were attached at eight feet eight

The pump rods were attached at eight feet eight inches from the beam center, which gave them a stroke of six feet; and the sir pump rod at four feet four inches, giving it a stroke of three feet. The eteam piston and pump rods were attached to crow heads which worked in slide frames.

The fly-wheel was twenty-four feet in diameter and weighed it tons. The bolier was of the marine 7p2, thirty feet in length and time feet in diameter. The grant and one test in chamble. The grant's required to throw three million gallons of water in twelve hours, which gives six hundred and sixty-pire cubic feet per mirrie, and sllowing one third leakage in the pumps when he valves became with

gives eight hundred and ninety-two cubic feet per DUPLICATE PUMPS AND ENGINE

minute for their capacity.

DUPLICATE PUMPS AND ENGINE.

The recervoir, as proviously sisted, was designed to contain only similated water for use during the inight. It was therefore considered necessary to maintain the supply, when the main engine was stopped, for the purpose of cleaning the boller or making repairs, by means of a daplicate engine. As this engine was only required to be used for their intervals, cheapness in its construction was studied more than economy in running it; it was therefore made non-condensing to be worked with steam at a high preserve, and of the minimum size, requisite to furnish the necessary supply by ranning it the whole twenty-four hours.

THE ENGINE HOUSE

was determined to be built of brick masonry, in the modern Italian style, forty-four feet from and fity-four feet deep, with a wir giorty-four by thirty-four feet.

The foundation walls were of stone maconry, placed on piles six feet below the enriace of the ground, and raised three feet above the level of the principal floor.

RESERVOIRS.

The plan by Mr. McAlbine proposed three

raised three feet above the level of the ground, and RESERVOIRS.

The plan by Mr. McAlpine proposed three reservoirs—one in each division of the city, but upon cossideration, the Board determined to erect only one reservoir, and located that near the corner of Ulark and Adams streets, where it would suffice to eatiefy the demands of the city until the population exceeded 50,000 souls. It was sixty feet in diameter and twenty-cight feet deep, being capable of holding nearly half a million gallons of water. The building which inclued and supported the tenk was two stones in height; it was circular in form, with four projecting square fronts, built of cut stone and brick. Owing to the breat weight of the tark and water contained therein, inverted arches of brick masonry were required for the foundation of the whole area of the base.

PUMPING MAINS.

PUMPING MAINS.

DASC.

PUMPING MAINS.

According to the plans of the engineer, the pumping mains were to be carried, by pipes of bolier from thirty inches in diameter, under the main river, and twelve inches in diameter, under the south branch. The bottom of the river was to be dredged out so as to slow these pipes to be piaced three feet below the bed in the center of the stream, and curve gently to a level twelve feet below the surface of the water on the line of the wharves; from thence they were to curve to the lines of the cast-from mains. The tops of the pipes were protected by heavy timbers, secured to them by from street, and the whole covered with rubble stone; Stop-cocks were placed in the pipes on each side of the river, and man holes were provided for entering, repairing, and examining them.

DISTRIBUTION

In the portions of the divisions of the city which were designated by the Commissioners as the ones which required to be first supplied, were as follows:

In the North Division, between Ontario street and the river, and between Wells and Rushireels, together with some other streets by yond these limits near the river. In the South Division, all of the district north of Fifth street, together with a few of the more important streets south of Fifth, and one line of pipe through Clark to Twelfth street. In the West Division, all of the district cast of Desplaines, between Hubbard and Madieon streets, and east of Clinton, between Madison and First streets.

REFERENCE AND EXPENSES.

As an indication of the fact that Chicago in its

and First streets.

As an indication of the fact that Chicago in its growth has exceeded, in a marked decree, the anticipations of its founders and early residents, the following table, compiled in 1881, of the estimated expenses and revenue of the Water Works for twenty-five years, will be or interest:

Year. Water Rates. Total expenses.

Surplus.

iear.	Water Dates	TOTAL OF DODESS.	יינווקזעט.
851		<b>\$</b> 34 800 00	\$1,200 00
18.5	<b>\$3</b> 6 000	26 546.00	2,454 00
156	42,000	39.504 93	2.495,78
857	46,000	40,629 51	5,370.49
858	50.(00	42 833 53	7.116.43
859	64 000	43 685.43	9,116,59
	58 000	48 8 3 41	10,814 67
861	62,000	49 645 25	12,451.75
862	66.(0)	49.973.43	16 036 58
F03	70,000	50.123.26	19.876.44
864	75,100	50,060 21	21 939 79
865	80 000	60,104 42	29.895.58
	85.000	50.011.73	34,983.27
	90,000	49,6 2 55	40.837.45
1.893	P5 (00°	49.939.98	46 061,07
	100.000	47 814 65	62.185 : 6
	105 000	46 261 68	58.738.33
	110.000	44 249.99	65,750.01
	115 0.0	41,747,43	78 253 61
	120,000	38 719 82	81,280,18
874	125 ( 0	85 130.21	89,949,79
	130,000	31,089.82	98,980.68
			,

FINANCIAL STATEMENT.

1875......130,000

31,039.32

93,930.68

FINANCIAL STATEMENT.

From a statement of the financial condition of the city of Chicago, made about this time by Hon. W. L. Gurnee. Mayor, to the Board of Water Commissioners, we find that the real cetate in the city was valued at \$6,601,262, and the personal property at \$1,758 455, making a total valuation of \$5,562,717, or an increase of \$1,342,478 over 1880—the preceeding year. The city taxes amounted to \$63,385 87.

The total assets of the city were reported to be \$229,525,14, and the total liabilities \$122,267,71, leaving a balance of \$147,256 43.

LOANS.

In the month of April, 1852, the Board of Water Commissioners, for the purpose of commencing the work, sketched out in the preceeding pages, effected a loan with Mesers. Doncan, Sherman & Co. of New York, of \$210,000, under the provision of the charter. It speedily appeared that this sum was quite inadequate to defray the expenses of the great undertaking, and legislative aid was invoked to enable the Board to raise an increased amount.

The subject was favorably considered by the Legislature, and in June, 1852, an act was passed entitled "An act to amend an act to incorporate the Chicago City Hydraulic Company," the purport of which was that the Commissioners named in the aforesaid act were authorized to loan from time to time as they should deem expedient the additional sum of \$150, 100. Provided. That no higher rate of interest than seven per cent per annum should be paid for such loan.

The second loan thus authorized was effected in The second losn thus authorized was effected in

The second loan thus authorized was effected in August, 1852, with the same New York house, and upon the most advantageous terms. The whole amount of bonds issued and disposed of was \$400,000, bearing interest at the rate of six per cent. per annum, having 25 years to run: interest payable semi annually on the first days of January and July. The next amount realized from the sale of these bonds was \$851,280, equivalent to a premium of \$3,000 on bonds bearing seven per cent. per annum interest.

COMMENCEMENT OF THE WORK.

With one or two changes to the plan of operating previously mentioned, the most important of which was the alteration of the location of the river main from Clark street to Wolcott, the work was commenced

previously mentioned, the most important of which was the alterasion of the location of the river main from Clark street to Wolcott, the work was commenced and prorecuted with energy and zeal. In the early part of 1882 public proposals were invited for the performance of the several portions of the work, and shortly after ward the several contracts were awarded. The crih and inlet pipe were both constructed and 96 linesi feet of the latter adjoining the pump well, was put down, when the further prosecution of the work was delayed by the unruly and bolsterons disposition manifested by the lake. Three attempts were wade during the season to place the crib and inlet pipe in the lake, but on each occasion the work-men were driven back by the violence of the wave, The excavation of the well was commenced on the 36th of June, and finished on the 14th of August. The masonry was commenced on the 18th of September and finished to a sufficient height to allow the engire house to be commenced on the 18th of October. The masonry of the well was completed in November. November.

The foundation of the main building was com-

The foundation of the main building was commenced on the folio of October, but in November the work had to be discontinued on occount of the inclemency of the weather. The laying down of water pipes was commenced on the flat of July and continued until the 10th of December.

In his annual report made at the end of the year 1862. William J. McAipine, the chief engineer asid:

"There remains but two critical pieces of work to be performed during the enging year—the work in the lake and extending the pumping mains across the river.

river.

For the former we have the whole season, and the most favorable time may be availed of, as the work on the crib and inlet pipe is now completed, and they are ready to be placed in the lake whenever it is sufficiently calm to warrant the undertaking.

The river pipes will soon be completed and must be laid down before navigation opens in the spring.

The Engide House can easily be completed before the avival of the sentine.

the arrival of the engine.

the arrival of the engine.

The engine and pumps will be forwarded by the first veesel up the lake, and they can be set up by the lat of July next.

In the meantime the duplicate engine and pumps must be made and set up.

From the large amount of work already done at the foundry at West Troy, at casting the place, there is every appearance that an ample supply will be fornished to analytically this work to be completed in the month of July next.

After a careful examination of the month of the set of

and the opinion that the water may be prepared for distribution to the citizens of Chicago by the first day of Checks next.

Buch were the prospects on the 1st of January, 1852,

PERPLEXITIES

During the year 1883, the labors of the Commissioners in prosecuting the work upon the water works was company, to Commissioners were authorized to purchase the company, the Commissioners were authorized to purchase the company of the company.

company. Utder extino 19 of the charter of the new company, the Commissioners were authorized to purchase the curporate rights, property and stock of the old sescitation. In March, 1852, the Common Council savised the Water Commissioners to pay \$30.000 for the property and franchises of the old company, or \$15,000 for the framchises alone. To this arrangement the company never intimated a willingness of compilarce, but immediately attempted to werent the company never intimated a willingness of compilarce, but immediately attempted to werent the boilding of the new works, by defeating the negotiation of the loan of money necessary to their completion. Failing in this endeavor, the company appealed to the law, and sought to enjoin the city from taking any further proceedings toward supplying the Inhibitants with pure and wholesome water, upon the assumption that their charter was exclusive.

The motion for an injunction the Court overraied for the following reasons. In helef:

my does not expressly confer upon the company the clusive privilege of supplying the city of Unicage

with water.

"3. That it there are no express exclusive powers conferred by their charter upon the completants is introduce water into the city of Chicago, such exclusive power cannot be inferred from the nature of the great.

grant:

\*\*3. That if the 19th section of the act to incorporate
the Beard of Water Commissioners imposes a day
agon them to purchase the corporate rights and propcriy of the old bydraulic company as claimed, neretheless such a duty is not a condition precedent to the
exercise of the other powers conferred upon the Boat
by the act of incorporation, the exercise of which this
suit socks to enjoin."

A NEW BOARD.

thekes such a duy is not a condition precedent to the exercise of the other powers conferred upon the Bort by the act of incorporation, the exercise of which the suit seeks to enjoin."

In 1883, the terms of the first Board of Water Commissioners having expired, the following gentlemes were appointed their accessors in office: J. H. Woodwork, George W. Dole, John C. Haines.

On the lat of February, 1864. Mr. B. F. Walker was appointed Superintendent and from his first annal report, made January 1, 1885, we find that though the work on the Water Works, was continued through the work on the Water Works, was continued through the work on the Water Works, was continued through the work on the Water Works, was continued through the first such the main, and tearing it sate street, was found to have been impaired by a vessel dragging her anchor under it. The main was repaired and replaced, but on the Stift of the ensuing May acother anchor, from a vessel passing up the river at Sitte street, from the street, struck the main, and, tearing it satunder, readered it uscless. From that time until the lat of October, when the pipe was repaired, the supply of war for the South and West Divisions had to be forcal through a sitis-fact main on Kinzle street, from the min on Wolcott to the North Branch. Passing the North Branch, by a twelve-linch main at Adams street, to the Fouth Division, and crossing the South Branch, by a twelve-linch main at Adams street, to the Fouth Division, when completed, the thirty-inch main was laid down at the State street crossing; but this time, to remove it beyond the reach of any anchors, it was sunk in the bothom of the river and covered over with five feet of saud.

To obviate the difficulty experienced by the drifting of sand into the inlet pipe, and its penetration into the pump well and machinery, it was determined, in 1831, to build a break water around the end of the pipe by driving two rows of piles firmly into the ground; the rows to be six feet apart, and Tastend to very the pipe was a

which had beginne hearly ince with said, the Continuance of the supply was maintained.

The ergines and engine house were completed during 1854 in a most encersful manner, but the reservoir building proved to be a fature. When completed, it was slowly filled for the first time, but hardly had the water risen to within a foot of the topplet the water pipe, when the enormous pressure caused the walls to pread at the pring of the majors are under the tank, and the maconry to crack on all sides of the building. Owing to this accident, the pumps at the engine house had to be kept running night and day. After some accessary delay, the reservoir was strengthened by two-inch from rods extending quite through the building, and secured on the outside by heavy come abutments built against the foundation, and also by building plers from the foundation to the center of the main arch under the fank.

PIPE EXTENSION.

ing piers from the foundation to the center of the main arch under the tank.

PIPE EXTENSION.

In the season of 1854, about one and one cighth miles of distributing pipe were laid down in the city, making his total amount then in the city upward of thirty miles and a half.

HYDRANTS.

In this same year the number of fire hydrants were increased from one hundred and sixteen to one hundred and twenty-three. There were also diventy, nine Bartholomew public hydrants put up in various portions of the city for the accommodation of those who were unable to take water in their dwollings, or who lived oniside the water district.

CONT. OF WATER-WORKS.

About this time, the water works having been completed at a cost, including the additions and extensions of the year, at \$393,040.33, and/of sufficient magnitude to supply a city of 100,000 inhabitenus, the following comparative figures were reported; by the Superintendent, of the cost of the works of other cities:

Name of city.

Population. Oct of works.

Pittaburgh.

\$50,000 \$700.00
Cincinnati 155.000 \$0.000
Cincinnati 155.000 \$0.000
Cincinnati 150,000 \$0.000
Cincinnati 150,00

on the 39th of May of the same year, an ordinance was passed by the Common Council to the effect that, as the loan was advisable and authorized, "the Mayor and City Clerk be directed to fill up and sign one hundred six pur cent. coupon bonds of one thousand dollars each, to be dated June 1, 1854, and payable on the 1st day of July, 1874, at the office of Duncan, Sherman & Co. in the city of New York, with interest payable, semi-annually."

But they now the Commissioners could not be test.

But even now, the Commissioners could not but feel that the supp'y of money at their disposal was insequable to satisfy the demand, and consequently upon the passage, February 15, 1855, of an act of the Legislature, entitled "An act in amendment of and supplementary to an act entitled an act to incorporate the Chicago City Hydraulic Company," they obtained a section authorizing the Common Council to rate by loan, from time to time, the further sam of \$300,000, upon the credit of the city of Unicago. Under the provisions of this act, the Common Council, in the provisions of this act, the Common Council, in the provisions of this act, the Common Council, in the proceeding month, passed an ordinance authorizing the Board of Water Commissioners to issue bonds to the amount of \$120,000.

BLECTION OF COMMISSIONERS.

BLECTION OF COMMISSIONERS.

The supplemental act to the original charter of the Board, which authorized this further loss of \$200,000, contained, in addition to several sections regulating the duties of the Commissioners, the following impor-

contained, in addition to several sections regulating the duties of the Commissioners, the following important enactment concerning their election:

"The persons hereafter to be elected Water Commissioners of said city shall be taken successively from the Sonth, North, and West Divisions of said city, in the following erder: The first election after the passage hereof shall be of a Commissioner from the South Division, the next from the North Division, and the next from the West Division, and so on in the came order, so that one Commissioner shall be electer for one of said Divisions each year, and shall hold his office for three years from the time of his election: No person shall be elected from any Division unless he shall at the time of his election he a freeholder, and have been a resident of said city for si least three years, and of said Division for at least six nonths next preceding such election.

"In case of any vacancy in office of any one or more of said Commissioners, the vacancy shall be filled by the election by the Common Council of some citizen of said city duly qualified said resident as aforcest, who shall have power to act as such Commissioner must be expiration of the fall term for which the Coamissioner was elected in whose place he is appointed: Provides that no person shall be considered elected by said Common Council naless he shall receive a majority of the votes of all the Aldermen by law authorized to be elected. The first election under his act shall be for a Commissioner from the South Division and shall be annually thereafter."

By virtue of the section, at the election held in May, 1855. Origina Latt, Egg., was elected a member of the Board in place of J. H. Woodworth, whose term of office had expired.

ORDINANCES,

OBDINATORS.

About this same time the Common Connect of the city passed the first ordinance which protected the water works; roperty, by prohibiting the deposition of any filth in the lake near the works.

An ordinatic was sled passed to restrict and pre-went all uneconsery waste of water, and to regulate the payment of water rants. FIRE RYDRANTS.

During the year 1854 some considerable trouble was occasioned to the Board by the indiscriminate manner in which the fire hydrants were used by the critices at large. To obviate the difficulty, the sid of the Coracti

May 8. To obtate the cinically, use ma of the covacu-was select, and, in consequence, an ordinance was presed declaring all the hydrasts constructed for the purpose of exingguishing first to be pathic hydrasts, and not to be opened or interfaced with except by members of the Pire Department or other authorized

THE BREAKWATER.

On the 6th of June, 1856, the breakwater, commenced the previous year to protect the inlet pipe, was completed, at a total cost of \$13.005.30. Upon the cost-closion of the important work, the basin thus form dwas diedged to a dapth of from eleven to thirteen ice.

During the same year, in order to increase the cost of the factors of the same year. If the primite from the lake to the pump well the

tained by the failing of the waters of the lake.

PUBLIC HYDRAMTS.

As early as the year 1855, the hydrants erected in verious portions of the city for the use of that portion of the public who could not receive the water in their dwellings were found to be more plague then profit, speaking of them in his report of the year's labors, he Superintendent ead: "They were put up to accommodate the poor, and those living outside the water districts, but they are troublesome to keep in reput, and no profit to the works. No new ones have been put up this season; some have been discontinued as they got out of repair; and others have been removed further out, as the pipes have been extended."

PIPES.

PIPES.

Upon the close of the year 1835 there were in the city 217.649 feet, or about 42% miles, of distribution

pipes of the following sizes:	1100, 01 0131110011011
8-inch pipe	80,301 fect,
4.irch pipe	106 047 feet.
6-inch pipe	49 191 feet.
8 inch pipe	14.069 feet.
16-inch pipe	5,206 feet.
12-ii ch main	9.112 feet.
16-inch main	3,723 feet.
	2.11.2.2.2
Total	217,619 feet.

amount being the balance of the sum of \$3 0,000 an thorized by the Lexislature in the act of February,

horized by the Legislature in the act of legislibring pipe was added to the amount already laid down, and a 24 inch river main was placed under the North Branch. The river mains then in operation were four in number, consisting of a 30-inch pipe, two hundred and eighty feet long, under the river at State street; a 24-inch pipe, two hundred and thirty-six feet long; at Chicago avenne; a 12-inch pipe, one hundred and seventy-six feet long, at Adams street; and an 8-inch main, one hundred and seventy-five feet in length, at Enzle street.

nozie etreet.
In the year 1856, the following number of dwellings in this city used, or aid not use, the company's safer:

nates .	With	Withou
Division.	Water.	Water
Division.	2.312	28
North	1,452	30
West		3:
Total	4.821	95
NEW ENGIN	E.	-
In this same year it was deeme	d necessary	to obtai

NEW ENGINE.

In this same year it was deemed necessary to obtain an additional engine for use at the Water Works, as descordingly a contract was made with George W. Quantar of New York for a condensity aream engine and pumps, at a cost of \$51,000. The couract was raitsfacturily filled, and the new engine put up during the succeeding winter. The small non-conducting engine previously used wis then removed and sold. In April, 1857 the extension of the min on Union street was commenced, and in May the connections were made with the river pipes at Chicago avenue, and with the distribution pipes on Kenzle street. In June, in making the connections between the mains at wolcott street, on Chicago avenue, and also with a new main at the engine-house, it was discovered that a pile had been driven through the top of the river pipe at Chicago avenue, and that in consequence the delectable water of the river was entering largely into the domestic aqueous economy of the city. The work of repairing this accident was performed at a repairing this accident was performed at a WATER- WORKS SELF-SUSTAINING.

WATER-WORKS SELF-SUSTAINING.
Of course it was the derign in projecting the water works that they should be s-fi-gustainly, and that without aid from the city, other than what was needed while the works were being constructed and affording no revolue, the expenses for operating and interest on the money borrowed to build the works, should be met by the income from the rents, and that from this course also provision should be made for the ultimate redemption of the boads issued by the Water Commissioners

The pieces were first tapped and water first simplified.

Water Commissioners

The pipes were first tapped and water first supplied to the cuizens of Chicago by the city, in 1534, and so steady was the increase of revenue and the gradual relative gain of the income over the cost of operating the works, that at the close of 1857, when the undertaking was barely fur years of age, the Board reported that the water works were, as they were intended to be, and as they ought to be, cell supporting and sufficiently remittentive to show that they would in due time extinguish the debt contracted for their construction.

In support of this assertion the Board presented the following highly satisfactory figures:

Operating exponential.

nunge- and interest for Income for Defici- 
 Years.
 year.
 year.
 fmcy.

 1854.
 \$33 125 51
 \$36 808 56
 \$11,319 95

 1ec5.
 59.651 27
 54,739 19
 4,312.08

 156
 73,087 23
 75,603 36
 ...

 1867.
 85,170.61
 97,108.35
 ...
 Surplus. 11.837.94

Totals . \$255.437.62 \$255.362.63 \$15.632.03 \$15.557.07

The cost of the works at the close of 1857 amounted to \$758.436.51.

"In this connection," said the Board in the same report, "it will not be out of place to consider what amount will be required to be paid yearly, in order to pay the several leans of the Board within the time they become due. The whole of the present leans of bonds amounts to \$345.003, all sx per cent bonds, and payable at various times from July 1, 1874, to July 1, 1852. Admi.ting that, commencing with 1853 and ending with 1852, there be year by year a surplus revenue of \$14,000 from the works within their present imits, and as paid for by the bonds already issued, the surplus to be increased only by the interest, which would have been paid on only by the interest, which would have been paid on the refred bonds, this surplus, with the accumulations from interest thus saved, will be sufficient to purchase the whole fence within the dates when they

the whole is no within the dates when they become one, if it be possible to buy the bonds at their seven per cent. par value "

SECRETARY.

In the year 1857, A. W. Tinkham, E3q., was appointed Secretary of the Board, and has ever since held that position. Mr. Tinkham has proven himself eminently efficient in the discharge of his daties, and has filed the position he has occupied so long with satisfaction to our cluzeus, and with great credit to himself. At the expiration of the year 1857, the amount of water pipe laid in the city was ulti-eight miles in

height
LD 1858. Noah S'urtevant was elected a member of
the B ard of Water Commissioners, vice John C.
Haines, whose term of office had expired.

About this time, the heacequacy of the single reservoir in the South Division to answer the requirements of the city, was felt so perceptibly that two new reservoirs, one in each other division of the city, were creeted. The one on the West Side was located on the corner of Morgan and Monroe streets, and possessed a tank sixty jest in dameter and twenty eight in height, giving it a capacity of nearly 5.00.(10 gallons. It was constructed of Athera marble, and cost \$45,200. A reservoir was built on the corner of Sedgwick street and Chicago svenue, at a cost of \$47,100. It was built of Joliet stone, and the style of architecture was very signiar to that of NEW RESERVOIRS.

the corner of Sedgwick street and Chicago scenne, at a cost of \$47,100. It was built of Joliet stone, and the style of architecture was very similar to that of the one on the West Side. In addition to these extensions of the works, the Board laid down 14 miles of main and distribution pipe at a cost of \$3.9 Se6 and put in hydrants and stop-cocks to the value or rearly \$6.000.

The new reservoirs had hardly been in running cordition a year when the old one on Adams street fortistined a series of socid-nits, which so far disabled it that it had to be placed on the rick hat for some weeks, and subjected to repairs to the amount of about \$3.000. The principal expenditure of the yearless, in the way of enlargement, was in the extension of the water pipes. Some twelve and two third miles of distribution pipe were laid during the season, and a river pipe of wrought from, ten I ches in diameter, was laid below the bed of the North Branch of the Chicago river at Wandansia av. nue.

The revenue of this year amounted to \$123,670. The revenue of this year amounted to \$123,670. The conditions reached \$18 Si9 48, leaving a halance of \$14.791.30. The total excending that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding that time was \$481, 572,75, causing a total exceeding thit time was \$481, 572,75, causing a total exceeding the first ti

The total timber of minings supplied with water in December, 1859, was \$,752.

QUALITY AND QUANTITY OF WATER.

We hear in this year for the first time of fears that the accommodations pessee-ed by the water-works will ere long prove insufficient to snoply the growing city with a sufficient on antity of water; while in relicion to the quality of the water the Board combined that, dispite their most earnest efforts, they could not prevent the existence of myrads of small sich in the several pipes. They had forced the water in its passage from the lake to the pump well through three brase wire sciews of different degrees of dineness, but discovered that, even whin the smallest fish could not enter the welf, large quantities of spawn would continuisly finat in, and be converted into representatives of the relicated tribe in the very pipes themselves. The water also commenced to be frequently muchly and otherwise impoure. For the pump se of obtaining the aqueous rescaled in as great a condition of parity as possible, it was proposed to extend the lake. This interests log, however, it was considered, involved so much expenses, and such doubtful prospects of encess, that it was shall died as impracticable.

In the following year, (35), the subject was a zain abai dated as impracticable

In the following year, 18%, the subject was again retried and discussed so carneally that the Board, for the puriods of obtaining the 5-st information moon the subject, early in March passed the following resistance. int on:

Resolved, That the Chief Rogineer of the Sewerage

Board, Mr. E. S. Chesborough, be requested to submit a project and estimate for extending the later-pips
sof ir out into the lake that the water thus obtained
hall be free from the wash of the lake shore and the
fl. wo fithe river; and that he also take under coneideration and report on the matter of erecting additional pumping works, in such locality as shall secure
a supply of pure water.

Mr. Cheeborough's report—an exhaustive and most
ably written document—was presented to the Board
some months after the passage of the resolution.
R-garding the project of extending the inlet-pipe,
he considered it would be expensive, uncertain, and
nesatificatory. The labor of laying a pipe five feet
in diameter, a mile out in the lake, would be, he coneidered, beset by difficulties on every side, while even
if successfully laid there was reason to fear that the
pipe would sooner or later be injured, if not destroyed,
by the dragging of ship's auchors

THE LAKE TUNNEL.

After discousing the above proposition, the report

After discussing the above proposition, the report

avoid the various risks and uncertainties at-

continues:

To avoid the various risks and uncertainties attendant upon the laying and maintaining of the proposed pipe, it has been thought a tuanet might be made.

If the clay formation which is known to exist on the shore continues under the lake, and soundings indicate that it does, then it would be quite featible to make a tunnel as a substitute for the pipe, with three shafes, one at each end, and one in the middle, with the mederate progress for clay ground of four feet a day, at such pace such a tunnel could be made in less than 13 months after sinking the shafes. It is proposed to protect the outer that by a hollow crib, equal in weight to one 50 feet square, which according to experience on this lake shore would be immovable. The middle shaft should be projected in the same way. It is proposed to make this tuanel circular, with a clear diameter of six feet, and to line it with brick work twelve inches thick—the inner ring, four inches thick, to be laid in pure cement, and the others in mottar made of equal parts of cement and sand. The cost of masonry in the tunnels on the Boston Water Works, laid under more unfavorable circumstances than would incobably be met with here, was \$18,35 per cubic yard, including not only all expenses of materixia standard, but of purpoling, and all other incidental.

But for this tunnel the estimate will be \$15 a cubic

of materials and labor, but of pumping, and all other incidentals.

But for this tunnel the estimate will be \$15 a cubic yard. or \$25 a.housand of orick lad for majonry, and \$2.0 a cubic yard for earth work. The probable cost would then be

For 10,060 cubic yards excavation at \$2.50... \$26,400 For inner shaft...... ... \$126.0.0

the currents on this side of the lake are strongly conthward.

The idea of erecting new pumping works sixteen miles north of Chicago at Winetka, where the shore rises 80 feet above the lake, affording a good opportunity for constructing a large and convenient reservoir, had been strongly favored by many people, but falled to meet the approval of Mr. Chesborough He considered that its cost would be immease, walle in fact the same difficulty with regard to the turbiness of the water would be found to exist there, during and after storms, that had been complained of all Chicago.

The report considered the erection of additional numping works to be unrecessary. In a misanre it favored, as the most feasible plan, the construction of a flater b d at the east end of the lot on which the present works are located, for the purpose of removing all floating substances from the lagist, but, on the whole, recommended that all active measures be postponed until analyses of the water as received at the pumping station had been made, and the whole subject carefully considered.

Consumption of Water. CONSUMPTION OF WATER.

The following tabe, showing the average daily consumption of water for three years, prepared by the superintendent for his report of the labors of 1880, is a good indication of the rapidity with which the demands of our citizens increased:

BOARD OF PUBLIC WORKS.

BOARD OF PUBLIC WORKS.

On the 6th of May, 1861, pursant to the amended city charter, the old Board of Water Commissioners terminated its corporate existence to give rise to the Board of Public Works, a branch of the manicipal government which was charged with the care of the water works, sewerage works, the public parks and other public places of the city, the streets, the river and hirbor, the public buildings, the bridges, the tamps and lights for the lighting of the public places and buildings of the city, and the direction of all contemplated or fature improvements to be commenced by the city. The officers of the Board were as follows:

Commissioners—Benjamin Carpanter, President;

as follows:

Commissioners—Benjamin Carpenter, President;
Freactick Letz, Treasurer, and John G. Gindele
(Afficers—A. W. Tinkham, Secretary, and E. S.
Ch. shorough, Chief Engineer.

The first year of office of this new organization was marked by the laying down of 13,761 feet of distribution pipes at a cost of \$12,608.11, and a construction of a new main from the pumping works south on Pine street to the river, thence under the river below Rush street kiddee and along Burge Chief.

too pipes at a cost of executive, and a construction of a new main from the pumping works south on Pine street to the river, thence under the river below Rush street bridge, and along River street to Wabish average, thence to Adams street, where it connected with the South Division reservoir, at a cost of \$19.032.53.

The impure condition of the lake water continued to be a fruitful topic of discussion; and the Board considered and reconsidered the various projects for effecting a reformation, with great pertinactly though little apparent satisfaction. In addition to the fish unleance, the sewers, distilleries, brewerles, gine facturies, packing houses, etc., etc., proved fruitful sources of offense, while in addition to them all, and worse than all together, it was found that the water which washed the city cemeteries carried with it many evidences of deed humanity, and drifted directly into the region where the dinking water of Chicago was obtained. One of the most traitful causes of complaint proved with justice to be the Chicago river, and many were the means deviced to purify its waters.

THE RIVERS.

The proposed plans for freeling the river permanently from effensiveness could be divided into three classes:

Those which would drain the city into the Illinois

Those which would drain the city into the Illinois

2. Those which would divert the Desplaines river into the South Branch of the Chicago river, and thus

into the south Branch of the Chicago river, and thus maintain a constant current.

3. Making catals from the lake to the North and South Branches, and driving water enough through them from the lake to keep the river and branches comparatively pure at all times.

The first class was rejected as one which demanded far greater means than the Board could current.

The second class was considered defective in that a water from the Desplaines would fail when

supply of water from the Desplaines would fail when most needed.

The third class was reported to be undoubtedly feasible, completely under the control of the city, and possessing overy element of succes. From experiments with the pumps at Bridgeport, the Board demonstrated that fact that it would be possible to completely change the water in the branches every twenty-four hours, by throwing into them the clearer water of the lake.

nours, by inrowing into them the clearer water of the lake.

Ore plan, urgently suggested by many, was to build a series of intercepting rewers, similar in their nature to those which have lately been erected in the city of London for the purification of the river Themes. These it was thought by some could be no estructed along the margin of the river, as reservoirs for the filth passing within its borders and from the sewers the contents thus received being empited into the lake or distributed over the country for agricultural purposes. This suggestion had a theoretical value. The largest city in the world had adopted it at an enormous expense, but then no certain results of the experiment had reached this constry, and the project appeared to be too extensive, and to present too much risk to be adopted here.

PLANS FOR OBTAINING PURER WATER.

The above plane were for the purification of the

PLANS FOR OBTAINING PURER WATER.

The above plans were for the purification of the Chicago river alone, but it was speedily seen that, while it was advisable to purify the river, it was absolutely necessary to obtain the water used by our people from some point where, it could be supplied in a purification were made in this relation, but it e following were the only ones which received the serious consideration of the Board.

1. The construction of an iron pipe, with fixible joints, said pipe to be five feet in directive, extend two miles out into the lake, and cost \$250 (0)

2. To bring the water from a point on the lake shore about five miles both of the pumping works, where there existed a beach considered to be admirably applied for the pumposes of a natural filter. This plan contemplated the conveyance of the water from the direction hash to the city, through a brick aqueduct, at dwelld cost \$30'9.575

3. The construction of a tunnel two miles in length, the lake halper Retimated cost \$377.552.

as d would cost \$30'.575
3. The construction of a tonnel two miles in length, ort into the lake. Estimated cost, \$377,552.
The uncertainty with regard to the permanent scorrily of the flexible pipe was considered to be so much greater than that of the tunnel, even supposing that all difficulties in placing it in its proper position were overcome, that it adoption was rejected, and the question for decision rested between the lake tunnel and the lake shore plan. The advantages of the tunce!

were claimed to be the supply of a much superior quality of water during a considerable portion of the year, and, with the same head, a larger quantity. The tunnel, it was said, would be capable of delivering into the pumping-well, at a level of 2, 8, or 18 feet below the level of the lake, as much water as an aqueduct on the lake shore, of the length proposed, ten inches larger in diameter would.

The advantages believed to be possessed by the lake shore plan were: Fewer difficulties and uncertainties in the construction and cost of the work, and greater certainty in cleaning or making renairs, should

duct on the lake shore, of the length proposed, ten Inches larger in diameter would.

The advantages believed to be presessed by the lake shore plan were: Fewer difficultes and uncertainties in the construction and cost of the work, and greater certainty in cleansing or making repairs, should these become necessary.

THE CANAL BILL.

In February, 1863, when the water subject of our city was engrossing the attention of every citizen, the Congressions' slangthering of the sate canal bill—a legislative act from which Chicago and the wast expected much—proved most conclusively that what the city did for the purification of her waters must be done by berself. Had the canal been completed, a great change for the better would have taken place in Chicago, and it was to this end that the Board had hesitated in taking effective measures which the contomplated great work would render unnecessary. The Board now determined to act instantly, and after a forther discussion as to the rival merits of taonel and aqueduct. decided in favor of the former, and speedily obtained the passage of an first act and the power to extend aqueducts or inlet pipes that Lake Michigan, so far as may be deemed necessary to insure a supply of pure water, and to erect a pier or piers in the navigable water, and to erect a pier or piers in the navigable water, and to erect a pier or piers in the navigable waters of said lake, for the making, preservine, and working of said pipes and aqueducis: Provided. That such piers shall be first in the navigable waters of said lake, for the making, preservine, and working of said pipes and aqueducis: Provided. That such piers shall be first in the navigable waters of said lake, for the making, preservine, and working of said pipes and aqueducis: Provided. That such piers shall be lighted at all such seasons and hours as the light on the pier at the entrance of the Chicago river."

This act was passed by the State Legislature on the 18th of February: 1803, and was approved by Congress in the following factors.

for the doing of the work

THE BIDS

were received and opened September 9, 1963 most of the parties submitting proposals below present at the opening. The following were the proposals.

James Andrews, of Pitt-burgh. Pa. \$239,548

Duil & Gowan, of Harrisburg. Pa. ... \$15,133

Waker, Wood & Robinson, of New York. 315,000

Williams, McBean, Brown & Nelson, of Chicago. 420,000

LOCATION OF THE TUNNEL.

The point selected by the Board of Public Works for he commencement of the undertaking was the lot occupied by the pumping works on the lake shore, on he east end of Chicago avenue. Here the land shaft was to be sunk. was to be sunk. THE LAND SHAFT.

THE LAND SHAFT.

According to the specifications, this shaft was to be twelve feet in diameter from the surface of the ground to a depth of diffeen feet below the level of the lake, Then, by a sloping offset of three feet all round, it was to be contracted to six feet. The whole of the shaft was to be lined with brick masonry twelve inches the kwhere the shaft is twelve feet in diameter, and eight inches thick where it is six feet in diameter.

thick where the shalt is twelve feet in diameter, and eight inches thick where it is six feet in diameter.

CRIBS.

The specifications proposed the construction of four cribs, upon the supposition that that number of lake shalts would be required for the successful termination of the work. Subsequently, it was discovered that only one crib was necessary, it only being regulate to have one lake shalt. This shalt was sunk at the eastern termination of the tunnel As this crib is a most important and difficult portion of the great undertaking, we append a brief description:

It is forty feet and a half high, and built in pentagonal form, in a circumscribing circle of ninety-eight and a half feet in diameter. It is built of logs one loot equare, and consists of three walls, at a distance of elever feet from each other, leaving a central pentagoral space having an inscribed circle of twenty five fiet, within which is fixed the iron cylinder, nine feet in diameter, running from the water line to the tunnel, sixty-four feet below the surface and thirty one feet below the bed of the lake at that point. The crib is thoroughly braced in every direction. It contains 750,100 feet of lumber, board measure, and .150 tons iron boits. It is filled with 4 500 tons of stone, and weighs 5 700 tons. The crib stands twelve f-et above the water line, giving a maximum area of 1,20 feet, which can be exposed at one sweep to the action of the waves, reckoning the resistance as perpendicular. The outside was thoroughly calked, equal to a first-class vessel, with three threads in each team, the first and last being what is called "norsed." Over all these there is a layer of lagging, which will keep the caulking in place and protect the crib proper from the action of the waves. A covered platform or house was built over the crib, enabling the workmen to prosecute the work uninterrupledly by rain or wind, and afforcing a protection for the carth brought up from the excavation, and permitting it to be carried away by scows, whose return carg THE TUNNEL PROPER.

THE TUNNEL PROPER.

From the shore shaft the tunnel extends two miles out in a straight line at right angles to the shore, pointing about two points to the north of east. The clear winth of the tunnel is five feet, and the clear beight, five feet and two inches, the top and botton arches being semi-circles. It is lined with brick masonry eight inches thick, in two rings, or shells, the bricks being laid lengthwise of the thunel, with tootning joints. The bottom of the inside surface of the breat the east end is sixty-six feet below water level, or sixty four feet below city datum, and has a gradual elope toward the shore of two feet per mile, fai ing furfeet in the whole distance to admit of its being thoroughly emptied in case of repaire, the water being that the crib by means of a gate. The work has been laid in brick eight inches thick all round, we lest in cement. The lower half of the bore is constructed in such a manter that the bricks lie ag thus the clay, while in the upper half the bricks are wedged in Division the two might result from the transitional predeture which night result from the transitional predeture which night result from the transitional predeture which high result from the transitional predeture which it was feared might burst in the tunnel.

ture which it was feared might burst in the tunnel.

CAPACITY OF THE TUNNEL.

The tunnel as now constructed will deliver, under a head of two feet, 19.(00,(00), callons of wa'er daily; under a head of eight f'et. 83,00,001 gallons daily, and under a head of eighten icet, 67,000.00 gallons daily. The velocities for the above quantities will be one ard four tenths mile per hour, head being two feet; head being eight feet, the velocity will be two feet is head being eight feet, the velocity will be two feet the velocity will be two find three tenths mile per hour, and the head being eight en feet the velocity will be four and two tenths mile per hour. By these means it will be compatent to supply one million people with fifty seven gallons each per day, with a head of eighteen feet.

or the works, with a peak of victories less.

THE WORK.

On the morning of the 1 th of March, 1851 after a delay of two mouths, caused by the non-strivil of the cylinders for the shore shaft from Pittenburgh, the first ground was broken by his Hoson. Mayor Sherman, the work of his his shore shaft teen commanced. As stated above, it was the original intention of the contractors to line the estire shaft with masonry, but the presence of a suffring onick-and demanded an absolute ment of any such mode of proceeding. With the content of the Board of Public Works, the content has deviated from, and the contractors authorized to

run down an iron cylinder as far as the bottom of the sand bed, or about twenty-six feet.

At the close of the facal year ending March 31, 1835, the tunnel had been finished from the land shaft out under the lake 2.139 feet. On the 10th of Valy 3.033 feet had been excavated, and the work was progressing at the rate of twelve feet a day. On the 35th of July, 1863, the crib was towed out to its position, and filled with stone. The work of sinking the cylinder or cast iron shaft for the eastern terminus of the tunnel, then commenced. Notwithstanding the prevalence of a severe storm, which threatened the destruction of the crib, the labor upon it was performed most satisfactorily. In the early part of the precent year, the regular work of tunnelity from the crib end commenced, and has been continued ever since.

The ventilation of the first half mile of the tunnel was effected by drawleg the foul air out by a pipe connected with the chimney of the boiler farnace. Subsequently this method was found to be unrefashle, and un Alden clower was used with great success.

CHARACTER OF THE WORK.

With regard to the character of the work, the material met with in the process of excavation has been stiff blue clay throughout, so that the anticipations of the contractors have in this respect been fulfilled. The soil has been found to be so uniform that only one leakage of water through the tinnel ever occurred, and that only distilling through a crevice at the rate of a bucketfull in five minutes. This occurred in September, 1865. The wokmen left in dismay, but soon returned and repaired the crevice. From that time no accidents of any importance have occurred to him der the progress of the work, with the exception of one or two elight escapes of gas, which resulted in nothing more serious than the singeling of a workman's whiskers.

Several stones, varying from the size of an egy upward, have been mot with, but very few in compariwhickers.
Several stones, varying from the size of an egg up-

Several stones, varying rom the size of an egg upward, have been met with, but very few in comparison with the great mass of clay. The only fault to be found with the clay was that it contained too much calcareous matter to make good bricks. The contractors claim that they have just money on this execunt. The bricks formed of the clay found in the tunuel would not burn solidly, so that they were obliged to get bricks elsewhere.

PRGINNARY DIFFIGURATE PECUNIARY DIFFICUL/TIES.

get bricks elsewhere.

The contract price of the tunnel was \$315,139, with the allowance of a few insignificant extras. For that amount the contractors believed they could complete the work, but speedily complained that the compensation was not adequate. According to the contract it was agreed that monthly estimates of the work would be made by the Board of Pablic Works, during its progress; and that seventy-tive per cent. of the amount should be paid to the contractors from time to time; the remaining 25 per cent. being retained by the Board, until the completion of the work, as security for the faithful performance of the duties of the contractors, as exertify for the faithful performance of the duties of the contractors, as security for the faithful performance of the duties of the Council granted by reducing the amount of month by estimates reserved by the Board of Pablic Works from twenty five to fifteen per cent.

Subsequently in the fail of 1866, the contractors petitioned for an increase of the contract price, claiming that they took the work when gold was 125. When, however, the contract was signed gold was at 160, and although it has been higher since, it has also been lower. The price of material has certainly been higher, but then it was claimed on the other sice thas the contractors went in with their eyes open, and could have contracted for all their material at the low prices.

The question was referred to the committee on

could have contracted for all their material at the low prices.

The question was referred to the committee on Fibrance of the Commonicouncil, who on the 18th of February last presented a long and carefully compiled report, amounting to nothing save the recommendation that the subject be sgain referred to the Board of Public Works for further investigation. On the 19th of the same month, after a sharp contest in the Council, an ordinance was passed by a vote of 18 to 11 giving to Messrs. Dull & Gowan, in addition to the sam of \$316,139, named in the original contract, the further amount of sixty per cent on said contract price. This addition amounted to about \$189 (CO, certainly a handsome little present. On the 5th of March this yordinance was returned to the Council without the approval of the Mayor, for the reason that it had not been nance was returned to the Council without the approval of the Mayor, for the reason that it had not been drawn by the law officer of the city, and was in violation of the charter. The Council then passed an order, advancing the contractors the sam of \$50 000, said sum to be deducted from the moneys due raid contractors, upon the completion of the work.

The expenditures on the tunnel reported by the Beard of Public Works to the date of their last published report is as follows:

To March 31, 1861.

\$2.9 9.62

To March 31, 1865.

230,220.68

To March 31, 1805. 106 339 24

To March 31, 1806. 230 220 08

Total 230 220 08

Total 330 528.99

Of which sum the contractors are debited to March 31. 1806, \$228.221.71. The amount expended since the date I ained has not yet been accertained Probably the entire cost of the undertaking, when completed, will be fully six hundred thousand dollars.

CONGLUSION OF THE WORK.

The first Prick was laid at the crib end on the 22d of December, 1805, and on the last day of the cert the workmen b gan to excavate from that end, at which time they had already 4.825 feet done from the shore Since that time the work has progressed steadily, and with few interruptions of any concequence. Within three weeks some unlimportant delays have occurred, the workmen having met for the first time with sand pockets, which occasioned some leakages and put a temporary slop to the excavations.

On Saturday morning, the workmen at the different ends of the bore approached to within two feet of each other, and then, with great rejocioge, abandoned work for the day. An examination of the bore by Assistant Engineer Clark showed that the two lines, from the shore and from the crib, coincided within nine and a half inches, and that the levels of the bottoms agree very closely. The total leugth is 10,557 feet, being but a few inches out of the original calculation. To day the remaining two feet of the tunnel will probably be re arved, where his Honor the Mayor, and other city officers, will make the first trip through this great triumph of engineering skill. The engine at the crib will be taken out as soon as possible.

To the bold and earnest contractors; the percevering and progressive Board of Pablic Works; the skillful and undaunted supervising engelineer, R. S. Chesborough, and the superintendents and laborers on this great work, the people of Chicago owe a debt of gratifunde.

on this great work, the people of Chicago owe andebt of gratitude.

OTHER WORK OF THE BYARD.

Since the commencement of the Lake tunnel, the Board has been unable to perfect any other very extensive operations. A new pumoing engine, sufficiently powerful to jump 18 000,000 gallons of water in twenty-tour hours, has recently been purchased, from designs by D. C. Crezier, the engineer at the water works, at a cost of \$112 330, and will be put up as speedily as possible. For its reception, a new engine house will be built at the works, at a cost of \$55,000. In order to admit of this extension, the Board purchased from Mr. William Lill 18714 feet of land west of Pine street, and obtained the vacation of said street.

of said street.

The total length of pipes of all sizes, including the msin, laid d.wm in this city up to March 31 last, was 145 miles and 3,069 feet. TOTAL RECEIPTS AND EXPENSES.

The following figures represent the total income and expenditures of the Water Works from their com-

Total surplus revenue over expendi-

\$283,631.79

tures 5788,531.79
This surplus has been invested as follows:
Used in part payment for Water Works. \$236,639 05
Expended in purchasing supplies on hand. 61,992 74 Total.....\$2:\$,631.79

## HOMICIDE AT CICERO.

A Drunken Bow and its Results—A Sa-loon-Keeper Kilis a Man in Self-Defense. The Coroner's Inquest.

The town of Cicero, lying west of Chicago,

adjoining the city, has been thrown into a state of intense excitement, caused by a shooting affray which occurred there yesterday morning, the particulars of which are as follows: Last Saiurday night, some six or seven roughs went into the saloon of Peter Schlopp, and drank several

times. Previous to this they had been drinking in another saloon, and had got intoxicated to a degree which rendered them exceedingly botsterous, and a Mr. Schlopp, foreseeing that a disturbance was imminent, requested them to leave the saloon. This request they refused to comply with, and raison. This request they refused to comply with, and at once commenced a general demolition of property, breaking chairs, and threatening to kill any one who interfered. At length, det rained to put up with each conduct no longer, Mr. Schlopp came from behind the bar, opened the door, and put them out one after another. In the scoffle, one of the fellows got pretty severely handled. The crowd then went into another saloon, and there concocted a plan for revenge. They swore that the "Dutchman" should be sammarily death with and that he should not pass another night alive in Cicero.

alive in Cicero
Sunday morning came. At about nine o'clock
the same crowd that had been put
out of Schlopp's saloon the night before, returned
there, under the leadership of one Marc Finan, a min
who had not been mixed up in the quirel of the orevhus night. They came up to the door of the saloon
in a body, and demanded admission. Receiving to
snawer, they renewed their threas to kill the "d—d
Duct man," and repeated, in his hearing, the remark
that they would burn down his house; that he had
passed his last night in Cicero. Mr. Schlopp then told