

THE CHICAGO WATER WORKS AS THEY APPEARED BEFORE THE LATE FIRE.

This building, which was, before its destruction, entitled to be considered one of the representative buildings of Chicago, has acquired renewed interest from its connection with the recent catastrophe, and we herewith append an engraving of it.

As our readers are aware, the city supply of water was drawn through a conduit from the lake, the water being taken two miles from the shore. Previous to the construction of these works, the water supply had been of inferior quality. Their completion furnished an abundance of pure, wholesome water to all parts of the city.

In all their appointments these works were as complete as any in existence, and were the pride of the city.

THE LAKE TUNNEL.

The plan of tunneling two miles under the bed of the lake was proposed by E. F. Chesbrough, Esq., the city engineer, and was executed under his superintendence. It is one of the most novel, successful, and economically executed engineering enterprises of the time.

THE PROGRESS OF THE WORK.

Ground was first broken for the work on the 17th of March, 1864, when the construction formally commenced. The iron cylinders, which had been ordered to protect the land shaft against the influx of the very wet sand and gravel known to overlie the clay for about twenty feet, did not arrive till after two months of detention. The progress at first was much slower than was anticipated, owing to the troublesome nature of the sand and gravel; but the hard clay was reached about the first of April, and the iron cylinders had been sunk through the sand. No serious difficulty afterward arose in the prosecution of the land shaft and shore end of the work. At the end of the year the tunnel had been finished from the land shaft out under the lake 2,139 feet, and July 10, 1865, it had reached 3,023 feet, and was extending outward at the rate of about twelve feet per day. August 25 it had reached a distance of 3,505 feet, and the masonry was about twenty-five feet behind the face. In some places an average rate of progress of fourteen feet per day was made for a week at a time, but for the whole period this average was considerably less, owing to occasional interruptions from the breakage of machinery, strikes among the workmen, the meeting with and occasional explosion of gas, and other causes. The average for the year ending April 1, 1865, was thereby reduced to nine and one tenth feet per day.

The back filling between the regular brick work and the irregular surface of the excavation of the tunnel, which was originally intended to be of well packed earth, was made of masonry, because it was found very difficult to get the puddled clay used, faithfully packed into the spaces. The ground generally was so uniform and favorable for excavation that the tunnel was cut with great precision, and an average of one inch thickness of cement mortar between the bricks and the clay walls was all that was required.

A tendency in the clay to swell was found at an early stage of the work, but the masonry resisted it perfectly. It, however, gave some trouble in the grading, for one portion would swell more than another. In order to facilitate the work, chambers and turn tables were placed at intervals of one thousand feet. These were used for the storage of materials and for mixing cement, and for turn-out tracks for the cars. As the work progressed iron rails were substituted for wood in the tram ways, and small mules were used to draw the cars instead of men. By all these facilities the economy and rapidity of execution of the work were increased.

VENTILATION.

The ventilation of the first half mile of the tunnel was effected by drawing the vitiated air out through a pipe connected with the chimney of the boiler furnace, but toward the last this method was found to be so ineffectual and unreliable that it was abandoned, and one of Alden's blowers was used with complete success.

PLACING THE CRIB.

The crib through which access was to be obtained to the bed of the lake for the excavation of the tunnel from that point shoreward, simultaneously with the progress of the shore end, was not placed in position before the 25th of July, 1865, when it was launched and towed out to its place in the lake. The work of sinking was delayed somewhat, in consequence of defective arrangement of and accidents to the anchors. Just as it reached the bottom a storm came on, and as the crib was not sufficiently loaded to rest firmly upon the bottom, it was filled with water, by means of a wrecking pump. After the storm had subsided, it was found that the crib had moved thirteen feet north of its true position, and that it had become firmly imbedded in the clay of the bottom of the lake. It was therefore deemed best not to disturb it, as the variation from the exact position was of no practical importance, and it was immediately filled with stone. It was afterward built up three feet higher, so as to be secure from the wash of the waves, and it was covered in by a building to serve for the protection of the workmen, the materials, and machinery. The seven iron cylinders making the iron part of the shaft, and sixty three feet of it in height, were

connected together, one by one, and lowered inside of the crib, to the bottom of the lake, within the thirty feet wide open space in the centre of the crib. The gates or valves, by which the water of the lake is admitted to these cylinders, are placed near to their upper end.

After the cylinders had been placed in the right position, they were forced downward into the clay some twenty-five feet, the water being wholly excluded. The masonry was then commenced. In the meantime the engine for hoisting, and the necessary machinery, were made ready, and the bricks, cement, and other materials and supplies were collected and stored in the building, upon the top of the crib. For all these preparations a much longer time was consumed than was anticipated, and the work upon the tunnel at the end did not commence before the first of January, 1866, after which the work steadily progressed.

In commencing the lake shaft end of the tunnel, it was excavated for about sixty feet, to the eastward, in order to

pumping works, no flames being seen from the eastern portion of the grounds, which were occupied with coal sheds etc. On the other hand, the employes at the water works say that the fire commenced about half past 3 o'clock in the morning; that it commenced in the eastern part of the water works, which took fire from the shed. Another gentleman testifies that the carpenter shop, or the cooper shop, as he called it, was burned down before the fire commenced in the water works, and that when the water works were in full flame, the main body of Lill's brewery, with the exception of the carpenter shop, was intact. The time of the commencement of the fire in Lill's carpenter shop and the water works, however, differs one hour; the last named witness asserting that the water works commenced burning at about half past 2 or 3 o'clock. But whatever may have been the origin of the fire at the water works, it is certain that when it did commence the whole building was soon in flames, and in a few minutes the engineers had to rush out of the building to save their lives. The machinery was very considerably injured. The water tower, however, to the west of the pumping works, was almost entirely uninjured.

Our readers will find, in another column, an interesting letter referring to Holly's system of fire protection and water supply, with some remarks on the water system of Chicago, which will be interesting in this connection.

Chameleon Barometer.

M. Lenoir, of Paris, an inventor as fertile as ingenious, and who is especially known by the gas engine that bears his name, and by a system of autographic telegraphy, has just introduced a kind of barometer which at least has the merit of ingenuity. It is composed of a dial, in the centre of which is traced a circle, the diameter of which is almost half that of the dial. The annular space comprised between the two circumferences is divided into four sections; on the lower one is inscribed the name of the inventor and that of the apparatus, "*baromètre caméleon*;" the compartment to the left is pink, and bears the inscription "much rain," the top one is gray, with the word "variable," and that on the right greenish blue, with the words "set fair." The paper in the center circle changes color according to the state of the atmosphere, conforming to the tint of one or other of the three colored compartments, according as it may be very damp, tolerably dry, or extremely dry. The apparatus is, in fact, more a hygrometer than a barometer. The change of color in

the central paper is produced by atmospheric humidity. This sensitive paper is prepared with a mixture of chlorine of cobalt and of marine salts, added to glycerin to attract the humidity. Salts of cobalt, nickel, copper, etc., are largely employed in the production of sympathetic inks, with which writing or drawings can be made, invisible at ordinary temperatures, but which are made visible under a slight heat, and which disappear when the temperature falls.

THE NEW CITY POST OFFICE.

In architectural importance this building is, perhaps, only second to the Capitol at Albany, among those now projected and in process of erection on the continent. Built of granite in the most substantial manner, it is probably one of those structures that will long rank as a prominent feature of interest in the American metropolis. Our office commands a distinct view of the building and the progress of the work; and, from the general interest manifested by those who daily visit us in the course of business, we are assured that our distant readers will be glad to see the engraving of this magnificent building as it will appear when completed.

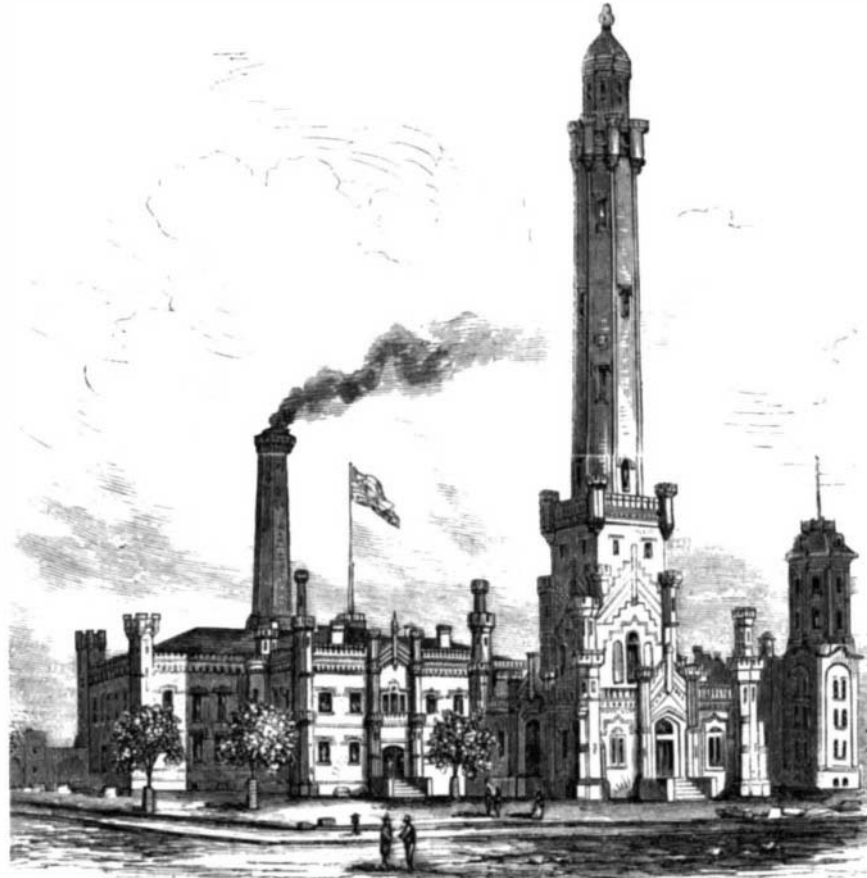
The building stands at the south end of the City Hall Park, and fronts both Broadway and Park Row.

It is built, with some modifications, in the style of the classical Italian *Renaissance*, with French roof. Three stories, in different styles of the Doric order, are placed one above another, the ornamentation increasing in richness towards the top of the building.

In plan, the structure is that of a triangle, with the apex truncated, the narrowest frontage looking down Broadway towards the Battery. In the center there is a triangular court along the main story. There will be a sub-basement, basement, and three stories, surmounted by the roof story.

On the side fronting the City Hall, there is a wide drive way, so that the building stands, and will remain, entirely isolated from contiguous structures, and may be approached from every side. A large entrance will be left at the southwest front, communicating with an ample corridor, and surmounted with a handsome portico. There will also be two other principal entrances, one at the corner pavilion on Broadway and another at the corner pavilion on Park Row. These entrances communicate with broad elliptical stairways, leading to the upper stories. Lateral entrances will also be provided on Broadway and Park Row, and to the delivery offices on the Park front.

The sub-basement and basement extend under the entire building, central court, and sidewalks. The former is lighted and ventilated through ample areas under the sidewalks and court, and will be used for the reception of fuel, heating apparatus, boiler, and steam engine. The Post Office proper will occupy the basement and principal story. The latter in-



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facilitate the alignment. The ground at the lake end was found to be very similar to that at the other, but more liable to cave in, and consequently, rather more difficult and expensive to work.

The masonry uniting the two parts of the tunnel was formally closed up December 6, 1866, by his honor Mayor Rice, and the citizens were permitted to inspect the work. There then remained the side chambers to be filled up, and the entire tunnel to be cleaned out. This was all carefully done, and the water was first let into the tunnel, from the lake, on the 8th day of March, 1867, and on the 11th it was filled to the level of the lake. The water was then pumped out sufficiently to allow a boat to pass upward of half way from the crib to the land shaft. Not a brick was found to be displaced, and it could not be perceived that the slightest fracture had anywhere taken place by the pressure to which the masonry had been subjected. As it was very desirable to use the tunnel as soon as possible, it was thought unnecessary to pump out the whole of the water, and the tunnel was again filled. The formal and public opening took place on the 25th of the month, and since that time Chicago has been free from the annoyances of impure and fetid water. The buildings for the pumping engines and water columns were unusually commodious and beautiful, and were constructed of stone in the castellated style, from designs by W. W. Boyington, architect.

Two double acting pumps, twenty eight inches in diameter and eight foot stroke, were used. The cylinders were forty-four inches in diameter, and their stroke the same as in the pumps. They took their water from a pump, or well, lined with brick and communicating by means of a curved tunnel with the main lake tunnel through the shore end shaft.

The following description of the burning of the building is extracted from an interesting book entitled the "Great Fires of Chicago and the West," of which the reader will find a notice in another column of the present issue:

Before tracing the progress of the fire further northward, must be mentioned the burning of the water works, and the curious, or rather incomprehensible, manner in which it caught fire almost two hours before the time that the fire first reached the north division across the main branch. As stated above, the Galena Elevator, at the edge of the main branch, caught fire from the south side at about 20 minutes to 6 o'clock. At about 20 minutes before 4 o'clock a fire was discovered in the carpenter shop of Mr. Lill, built on piles above the shallow water of the lake. Standing between the burning carpenter shop and the water works, extending northwest of the shop, stood one of Mr. Lill's book keepers. Turning round toward the water works, he exclaimed, "My God, the water works are in flames!" This gentleman states positively that the flames from the water works, when he first saw them, were issuing from the western portion of the