THE MORNING HERALD.

SECTION TWO. PAGES 9 TO 16.

The Lexington Press—Established 1870. | The Press-Transcript—Consolidated January 1, 1896. | Morning Transcript—Established 1876.

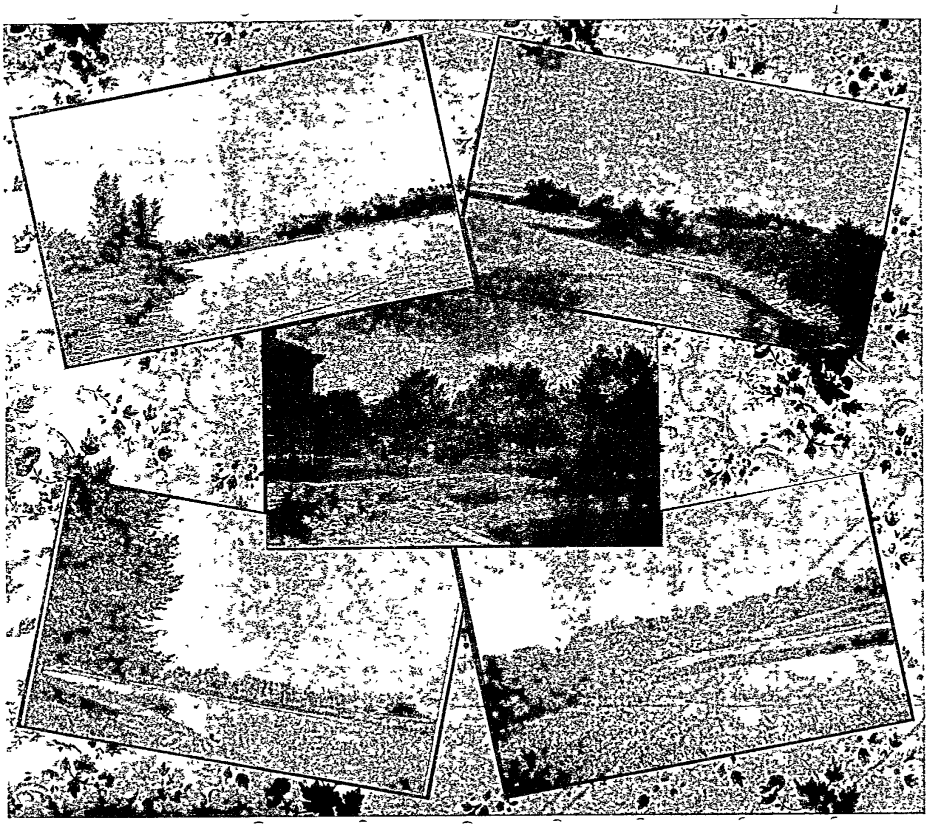
THIRTY-FIRST YEAR--NO. 265. | LEXINGTON, KENTUCKY, SUNDAY, SEPTEMBER 22, 1901. | 15 cents per week by carrier. Single copies 5 cents.

A Bit of History

Lexington's Water Supply

Water Works of Past Centuries

SCENES ABOUT THE RESERVOIR, SHOWING BOAT HOUSE OF ELLERSLIE FISHING CLUB IN THE UPPER RIGHT HAND CORNER.



(Made for The Morning Herald.)

"I often come to this quiet place,
To breathe the airs that ruffle thy face.
The flowers of summer are fairest there,
And freshest the breath of the summer air:
And sweetest the golden autumn day.
In silence and sunshine glides away."

—BRYANT.

INDEX TO ARTICLE.

(By Walter S. Hiatt.)

In many respects water is the most .. portant of substances. It covers the ..er part of the earth's surface, ..ates its interior, and in clouds ..es it. In the early history of ..nan race it was venerated as ..versal element from which all .. in creation sprung For this reason wells, fountains and rivers were ..pped and religious feasts and ceremonies were established in honor .. them, or of the spirits which were ..ieved to be hovering near The ancient Syracusans held great annual festivals at the fountain of Arethusa and sacrificed black bulls to Pluto at the fountain of Fontanah, when wells and ..untains were adorned with flowers and wreaths were cast upon running streams The early Egyptians worshipped the River Nile as the source of Fertility and Abundance, offering to it human sacrifices As late as the twelfth century the custom of worshipping water was so general that Kings and Bishops issued regulations strictly forbidding it. The ancient peoples worshipped water because of the air of mystery about any pool or stream, and then, too, because they were forced to recognize in it the first necessity of life Nature is continually at work in collecting, storing and distributing ..ater In the night the dew is formed ..he dawn of day the sun's rays burst ..h and invisibly pump the water in ..erfect purity to the distributing reservoirs, the clouds. The winds distribute ..m in the heavens, from which the ..rying temperatures cause the water ..fall as rain, or snow, or hail, re..eshing the earth, giving drink to ..an, filling the brooks, rivers and ..akes and oceans

Because of the importance of water, it has since the earliest times been the effort of man to obtain it from a pure and convenient source. As society becomes more complicated and towns and cities are formed and grow the value of these conditions increase.

ANCIENT WELLS.

The earliest work in the knowledge .. collecting and storing of water .. the construction of wells. These firs.. were shallow, with steps lead.. down to the water, so that it could ..ched with the hand. When the ..vere made deeper several meth.. .. lifting the water were used. In ..thern India water was obtained .. ..lls by means of a vessel called .. It was made of an entire ox.. ..d on a wooden ring. It was .. animal power

The ancient inhabitants of the Island of Aradus (now called Ruad) obtained their water supply from a spring in the bottom of the Mediterranean Sea at a depth of eighty-five feet. The island is about three-quarters of a mile in circumference, and is situated about two and a half miles off the coast of the southern portion of Turkey in Asia. In ancient times it was very populous. The water was obtained by sinking over the spring a wide-mouthed funnel of lead, to which was attached a long leathern pipe. The water was discharged in vessels in boats and conveyed to the city. This spring is known as "Abraham's Fountain." It is located between the island and the mainland. The inhabitants of modern Ruad still tap it in the same fashion.

Hezekiah, King of Judah, who reigned in the years 717 to 688, B. C., was a pioneer in constructing a system of water works, bringing water into the city of Jerusalem. The Bible reads: "He made the pool and the conduit, and brought the water into the city, stopping at the upper part of Gihon and bringing it straight by an underground way. He stopped the upper water course of Gihon and brought it straight down to the west side of the city of David, and Hezekiah prospered in all his works." From the Pools of Solomon, near Bethlehem water was conveyed to Jerusalem, a distance of six or seven miles, through a conduit of earthern pipe, about ten inches in diameter. The pipe was encased within two stones, hewn out to fit it, then covered with rough stone and cemented together.

JOSEPH'S WELL AT CAIRO.

In the northwestern part of Arabia there is a well which the Arabs claim to be the work of pre-Islamatic times. It is five feet in diameter at the top and gradually enlarging until it reaches the water at the depth of nearly 200 feet. It is lined with hewn stone throughout. However, the most remarkable well in the world is Joseph's Well at Cairo, Egypt. Its shaft was excavated through solid rock to a depth of 916 feet, at which depth it was enlarged on one side to form a chamber, in the bottom of which a reservoir was made immediately under the shaft. At one side of this reservoir another shaft was excavated through rock to a bed of gravel, where water was found. The lower shaft was 139 feet deep making the total depth 295 feet The upper shaft was rectangular twenty-four by eighteen feet The

ILLUSTRATIONS.

History of water works traced from earliest times to present day:

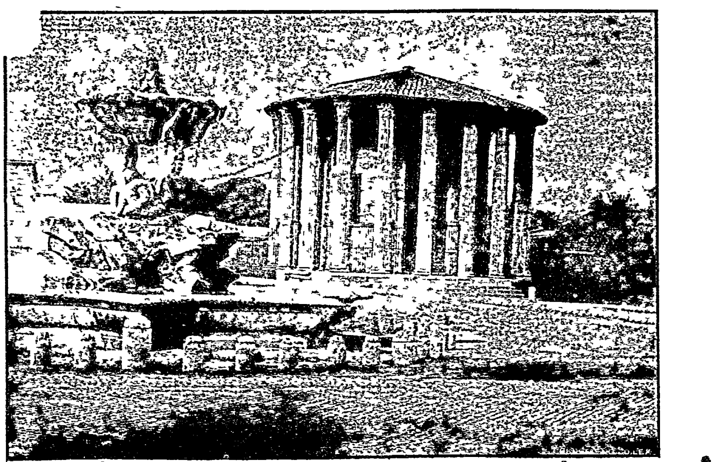
1. Ancient well in Cairo.
2. Syrian women at well.
3. Well of Beersheba.
4. Roman aqueduct and fountain.
5. Well of a hundred years ago.
6. Pump house and reservoir of the present.

lower shaft was fifteen by nine feet. Winding around the well a spiral passage way six feet four inches wide, by seven feet two inches high, was cut with great care from the surface of the ground down to the chamber. Between the well and the passageway a wall of rock was left. Horses and oxen descended the passageway to the chamber, where they propelled machinery to lift the water in pots attached to a chain from the lower shaft to the reservoir in the chamber, whence it was again raised by machinery operated by power on the surface. In the lower shaft a path was cut in its side so that a descent could me made to the water. This work is said to have been constructed by Saladin, who lived in the years 1137 to 1193.

AQUEDUCTS OF THE GREEKS AND ROMANS.

The remains of aqueducts in many parts of the world show the care that civilized peoples of centuries ago took to secure supplies of water. The supply was generally discharged into fountains placed in different parts of the cities, and there conveyed by water carriers to the dwellings. The aqueducts of the Greeks were open or subterranean channels. They apparently never constructed any aqueduct bridges, hence they left no conspicuous monuments of their works. They were unlike the Romans, who performed work with a disdain to obstacles. Many of their bridge conduits across valleys still exist, and, though in ruins, excite admiration and astonishment.

The Romans bestowed unwearied pains to obtain pure and wholesome water. Their military and civil engineers were always on the alert to ascertain its nature and properties throughout the countries where they were employed. Vast sums of money were spent to provide abundance of pure water for the inhabitants of the imperial city and allied cities of the empire. In the year 312, B. C., water was for the first time conveyed to Rome from a distance. At that time Appuis Claudius, the Censor, constructed the Aqua Appia, the water way from the Alban Mountains, a distance of eleven miles. The channel was underground the entire distance with the exception of about 100 yards. In the first century, at the time of Emperor Nero, Rome was supplied with water by nine aqueducts, the aggregate length of which was 255 miles, with a capacity of over 200,000,000 gallons per day. After the construction of other aqueducts the capacity was increased to about 375,000,000 gallons per day. At the time of Constantine there were in Rome 926 public baths, 247 reser-



(Made for The Morning Herald.)
FOUNTAIN IN RUINS OF THE TEMPLE OF VESTA, ROME.

(Made for The Morning Herald.)
ANCIENT WELL AT CAIRO, EGYPT.

MR. ALEXANDER PEARSON.

(Made for The Morning Herald)
PRESIDENT OF WATER WORKS.

MR. S. A. CHARLES.

(Made for The Morning Herald)
SUPERINTENDENT.

voirs and 1,212 public fountains. Many of the fountains were works of art and of a monumental character. They were dedicated to some god who was supposed to keep the water pure.

AQUEDUCTS IN FRANCE.

France had many notable aqueducts. In the first century, in the time of Emperor Claudius Caesar, there was constructed a conduit from Mount Pila to Lyons. It crossed thirteen valleys on aqueducts, and three valleys by inverted syphons. The famous Bridge of Maintenon, across the valley of the Bievre, about fifteen miles from Paris, which was constructed in the seventeenth century by Louis the Fourteenth, to convey water to his palace at Versailles, is the most magnificent structure of the kind in the world. The bridge is about 4,400 feet long and about 200 feet high, built with three tiers of arches, one above the other This bridge still remains in excellent condition, a monument to the engineer and to the extravagance of Louis the Fourteenth.

The canal that supplies the city of Marseilles with water was constructed during the years 1839 to 1847. It is among the boldest undertakings of the kind in modern Europe. It has a capacity of 285,000,000 gallons per day. The water is conveyed about sixty miles through 400 tunnels and across many valley by aqueducts.

EARLY METHODS.

Through small holes bored in the ground water is often lifted above the surface by natural hydrostatic pressure. In Europe this mode of obtaining water was first practiced in the French Province of Artois, once called Artesium, hence the name artesian. At Aire, in that province, there is a well from which the water has continued to flow steadily to a height of eleven feet above the ground for more than a century. There is a flowing artesian well within the old Carthusian Convent at Lillers, that has been in steady operation since the year 1126. Unmistakable traces of much more ancient bored wells appear in Asia Minor, Persia, China, Egypt, and even in the great desert of Sahara. At Grenelle, in the vicinity of Paris, there is an artesian well which is 1,798 feet deep. It discharges water at the rate of about 850,000 gallons per day, and at a temperature of 82 degrees, Fahrenheit. The boring of this well commenced in the year 1834 and was completed in the year 1841. Previous to the latter date no well had reached a depth of 1,000 feet. The well at Passy, near Paris, is 1,923 feet deep. At its bottom it is two feet and four inches in diameter. It throws a continuous stream of water, at the rate of about 5,500,000 gallons per day, to a height of about fifty feet.

At Bourne, England, there is an artesian well ninety-five feet deep which yields over half a million gallons per day, with a pressure sufficient to supply the town and to force the water to the tops of the highest houses.

FIRST PUBLIC PUMPS.

The older cities of Germany were the first to use pumps to raise water for public purposes. There they were quite commonly used in the year 1550, operated by water-wheels. Pumping engines were first used in London in the year 1582. Water was raised from the Thames river to an elevation of 120 feet by sixteen force pumps. The wheels were twenty feet in diameter and were turned by the current during the rise and fall of the tide. When the water flowed rapidly the wheels made six revolutions per minute. The pumps had a total capacity of 2,500,000 gallons per day. About the year 1757 one of Newcomen's steam engines was erected to raise the water at ebb tide, when the water-wheels were not in operation. A water company, incorporated in London in the year 1691, to supply water from the Thames river, used a Newcomen's engine, but soon discontinued its use, and worked its pumps by horses. In earlier days the supply was obtained by the city company of water bearers, who brought water from the adjacent river in leather panniers slung on the backs of horses.

THE ATMOSPHERIC PUMP.

The suction pump was invented in the year 1641. It was a mystery at that time why the pump would not raise the water higher than thirty-two or thirty-three feet. Two years later Torricelli discovered that the water was raised in the barrel of the pump by air pressure on the surface of the water.

THE SIPHON.

The origin of the siphon is lost in antiquity. It was, however, used in Egypt as early as 1450 years before Christ. In the tomb of Amunoph II., who reigned in that period, there is a delineation which represents the siphon apparently in operation drawing liquid from one vessel to another. A siphon of extraordinary size was built for the Quindaro water supply of Kansas City. It leads from the intake crib to the pump wells, a distance of 745 feet. It is 42 inches in diameter; its rise is ten feet above low water and its capacity is about 50,000,000 gallons per day.

THE MARLI PUMPS.

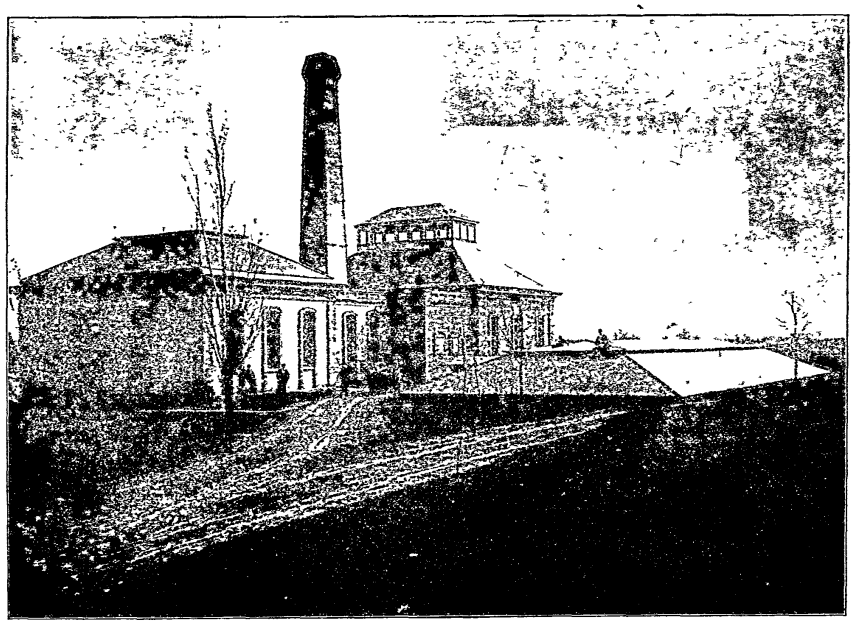
The most complicated machinery ever constructed for raising water was erected and set in operation at Marli, near Paris, in the year 1682. The pumps were divided into three groups. The first set contained 64 sucking and force pumps, raising the water 160 feet directly from the Seine river, through an iron pipe, to a cistern 600 feet from the river. The second set of 79 pumps was placed at this cistern and raised the water 185 feet to a second cistern 4,344 feet from the first. The third set of 82 pumps were placed at the second cistern and raised the water 188 feet in a distance of about 2,000 feet to a reservoir. Therefore, the water was raised 533 feet in a distance of nearly 4,000 feet.

The pumps were operated by water power from the Seine. The upper set of pumps was stationed 345 feet above and 1,944 feet distant from the power that operated them.

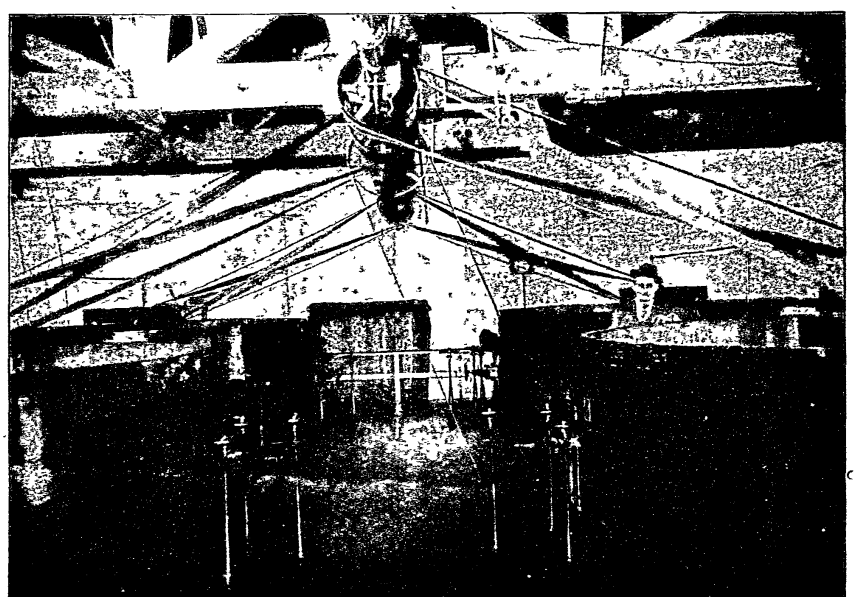
The feasibility of raising the water directly from the river to the reservoir was demonstrated by an attempt in 1738, but owing to the inability of the machine to stand the strain, they were operated as before until the year 1755. At that date a trial was made to dispense with the first cistern, but the pipes burst and the old plan was resorted to until Napoleon ordered a steam engine of 64 horse power to replace the water wheels. Consequently these pumps were in use and operated by water power for a period of at least 100 years. The hammering, rattling, creaking noise made by the machinery is said to have been frightful.

THE WATER RAM.

The first person who is known to have raised water by a water ram was Mr. Whitehurst, of Derby, England, in the year 1772. He conveyed water through a one and one-half inch pipe a distance of about 600 feet with a fall of sixteen feet to furnish water directly to the lower part of a building. When a faucet in the building was opened the water in the pipe was set in motion, and as soon as the faucet was closed the momentum of the long column of water opened the check valve and part of the water, after passing through an air chamber, rushed up a vertical pipe higher than the spring to a tank in the upper part of the building. This effect took place every time the faucet was opened and closed.



VIEW OF THE PUMP AND FILTER HOUSE AT THE RESERVOIR.



INTERIOR OF THE BUILDING, SHOWING TH E MECHANICAL FILTER TANKS ON SECOND FLOOR.

ADVANCES MADE BY USE OF PIPES.

Great and important advances in the science of engineering in the methods of distributing water have been made through the manufacture of pipes. The ancients made only a limited use of pipes. Although the Romans carried their system to a high degree of perfection, they preferred brick or stone conduits to lead pipe. Lead was the only metal at their disposal for this purpose, except bronze, which was difficult to manufacture. These leaden pipes were made in lengths of ten feet by bending sheet lead upon a cylindrical form and soldering the edges. They were ill adapted to convey water under pressure. Earthen pipes were also used. Water was rarely carried by pipes above the ground floor, the great houses and palaces being supplied from a continuous stream of water flowing through stone or marble basins.

Probably the first cast iron pipe was that used to construct a conduit in the year 1782 to supply Genoa with water.

In the early days of London's water supply the distributing mains were made of bored trunks of elm trees, six or seven inches in diameter. Owing to their small capacity it was necessary in many cases to lay additional lines. In the year 1810 there were nine lines laid side by side in one street. Towards the end of the eighteenth century cast iron pipe was first used there.

About twenty miles of wooden pipe were removed annually till the year 1820, when all the mains of the New River Water Company, about 400 miles in length, were replaced by others of iron.

Until about the year 1850 London and many of the principal cities of England were supplied by the intermittent method, the water being turned on and off in the mains once or twice a day, or once in two or three days after filling the tanks in the houses. Liverpool had an intermittent supply until 1847.

IMPROVEMENT IN MANUFACTURE.

The final improvement in the old method of making lead pipe was when wrought iron tubes with lead linings were made about ten years ago.

THE WATER METER.

The water meter was first patented in England in the year 1825, and in America in 1840. Where it is used it restrains waste of water. It is an honest arbitrator between the supplier and consumer, and saves many thousands of dollars in the cost of pumping.

FIRST WATER WORKS OF AMERICA.

Perhaps the first water works of America was that commenced in Philadelphia in 1799 and put in operation January 27, 1801. An engine was placed at the corner of Schuylkill, Front and Chestnut streets. The water was pumped from the Schuylkill river into a brick aqueduct six feet in diameter and 3,144 feet long, to the Center Square engine house, at the crossing of Broad and Market streets. Here another engine pumped the water into two wooden tanks set in the top of the building 50 feet above the bottom of the brick tunnel. The tanks were ten and fourteen feet in diameter and twelve feet deep. The engine could not fill them in less than 25 minutes. The pumps were double-acting force pumps. They were made of wood and lined with sheet copper to prevent leakage.

The steam cylinder of the Central

SEEKING T HE TRUTH.

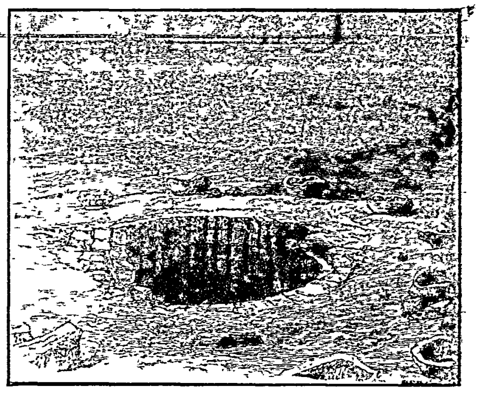
(Made for The Morning Herald.)

SYRIAN WOMEN AT ANCIENT WELL.

"O, weep for those who wept by Babel's stream,
Whose shrines are desolate, whose land a dream;
Weep for the harp of Judah's broken spell.
Mourn—where their God hath dwelt, the Godless dwell."
—Jewish Lament.

(Made for The Morning Herald.)

In Catholic countries it was once the custom of maidens to look into a well on the eve of All Saints' Day, when, tradition had it, they would see reflected in the water the image of their future husbands.



(Made for The Morning Herald.)

ONE OF THE WELLS OF BEERSHEBA, SHOWING WATERING TROUGHS FOR SHEEP. THESE WELLS WERE FIRST BUILT BY THE SERVANTS OF ISAAC, AS TOLD IN GENESIS, XXVI. 32.

Square engine was cast in two pieces, united by copper. The joint was secured by a cast iron sleeve 18 inches wide. The cylinder was 30 inches in diameter and six inches long. Nearly four months were spent in boring it. The steam boilers were made of five-inch white pine plank. These were boxes nine feet high, nine feet wide and fifteen feet long, securely bolted and braced. Inside of each was a wrought iron fire box with vertical cast iron flues The lever beams, shafts, fly-wheels, etc., were also made of wood. The water was distributed through the city in pipes or bored logs about six inches in diameter.

HISTORY OF LEXINGTON WATER SUPPLY.

It is the tendency of men to congregate on water courses and near large springs where the first essential of life can be easily obtained. But this rea very fact destroys in time the usefulThress of the water for its original pursued by.e. 't was so with Lexington and at t. the wooded little valley, well that he w. d with water, drew the atassed with of the first comers to Lexinguptoms. Th bout a century and a quar- ter ago. The magnificent springs which fed what is now known as Town Branch were considered a rich treasure. They remained so for many years. The people of the little settlement obtained their water, as do primitive peoples, from the very spring itself. Then wells were dug and the town pump became a factor in society. As the settlement became a town, private wells and cisterns were dug These satisfied the needs of individuals. But again the growing population demanded fire protection. This want was met by the building of city cisterns on which the fire department, composed largely of volunteers, relied.

But in time these proved inadequate and in 1883 Mayor Johnson agitated the matter of fire protection, until in December of that year the city contracted with a company, to be known as the Lexington Hydraulic and Manufacturing Company, to furnish the city with water for fire and other purposes. The company employed Mr. S. A. Charles, the superintendent of the present company, as constructing engineer and built the upper reservoir of the present water works and put in a pumping and filtering plant. The plant was in operation January 1, 1885.

This plant, however, did not prove adequate to supply the growing demand, since in the years '91 and '92 the domestic supply was cut off. In the summer of '92 there was a continued drouth and the domestic supply was cut off for two weeks. During that time water was peddled about the streets. This water famine drove the citizens to demand a new reservoir. This was commenced in 1893 and completed in the spring of 1894 However, the national financial crisis of that period affected the company. It was unable to pay its workmen The Italians who had been employed in the construction of the reservoir struck and made alarming threats, floating the red flag on the dam.

Mr. S. A. Charles, who had been made superintendent by the company, was appointed receiver by the courts. He continued as such until 1896 when he had succeeded in placing the plant in better condition that before it was placed in his hands

In that year practically a new company was organized, it being the same that now has control of the plant. This new company has paid all the old indebtedness, doubled the pumping and filtering capacity, added largely to the pipe lines, has taken up small mains and replaced them by larger ones, has purchased ground for the protection of its water shed until it now owns 700 acres of land.

It is also in a financial condition to construct an additional reservoir, should one become necessary. The present reservoir holds about 300,000,000 gallons, which capacity can be increased to more than 600,000,000 by the construction of an additional reservoir. This would increase the area of Lake Ellerslie from 110 to 188 acres. The company has made its plans and is preparing to make this improvement when the growth of Lexington, or other causes, should demand it. As shown by this, the present company is a progressive one and does its utmost to furnish Lexington with good water.

The quality of its water compares favorably with that of Louisville and Cincinnati. In fact these latter cities have adopted the same filter system as that of the Lexington company, after heavy expenditure in experiments. According to Mr. Clemens Herschel, hydraulic engineer of New York City, in a paper read by him at the twenty-first annual convention of the American Water Works Asosciation the Lexington Water Works Company ranks third best in the United States.

DESCRIPTION OF WATER WORKS

The ideal public water supply is drawn from a mountain stream or lake that is and will always continue to be uncontaminated. Few places are so located as to make it worth while to waste much in seeking this ideal supply. It is either a myth or a practical impossibility because of financial conditions

The source of Lexington's supply is almost directly from the clouds. The rainfall which is gathered into the reservoir comes from a watershed which is partially owned by the company and all of which drains a healthful soil of pasture land and meadow and fields of corn and grain. This water, then, is practically pure when it enters the reservoir.

A number of years ago the filtering plant of the company consisted of a large number of sponges, through which tne water was passed. This method didn't prove entirely successful, and so the mechanical filter was adopted. Mr. Charles was one of the pioneers in introducing it. This method consists largely in passing the water through a bed of sand. Though it is a comparatively recent American device, it is being generally adopted. Both Cincinnati and Louisville have recently introduced it. The water taken from the reservoir is pumped from a tremendous brick well built in the lower reservoir. The water which enters this well is all taken from near the surface of the reservoir, since air and light act stronger on the surface of the water.

From the reservoir is pumped each day a million or a million and a half gallons of water, according to the season. The water is forced into pipes leading to the top of the pump house, where it is dropped through sprays into large wooden vessels about 15 feet in diameter.

The spraying is for the purpose of aerating the water and thus removing the odor of any impurities. Leaving the spray it falls through air into a filter of river sand about 18 inches in thickness. The leavings of the first water which falls upon the sand forms a film which assists in the work of filtration. After percolating through the sand bed, the water passes over charcoal beds into the filter basin and thence to the water basin, where it is taken by the pumps to the main leading to the city.

The various filters become clogged two or three times a day and, each time that they are clogged, a scraper is used to stir the sand, and water passes in from below which carries the clogging matter entirely out of the filter. About every six weeks the sand is cleaned with steam Eve y ye r i is boiled with caustic soda and reple- ished. Under these conditions the company believes it can furnish water purer than any other used in Lexington.

There is but one living organism which can pass through the filter, and that is the microscopic spores of a vegetable growth known as the algae Like all organisms, the algae has its period of birth, of life, death and decomposition. The decomposition of the algae is the cause of the necessity for flushing the pipes of the water system. While it is not specially injurious to the water, it causes the offensive odor which is sometimes found in the water. It is said to be harmless. The algae, after slipping through the filter, at once begins to grow It clings to the sides of the pipes and soon forms a network of minute strings, if undisturbed, In order to break up this growth a swift stream of water must be shot through the pipe. Then the algae is torn loose, carried with the streams and cast from the system at the flush pipe.

THE FLUSHING SYSTEM.

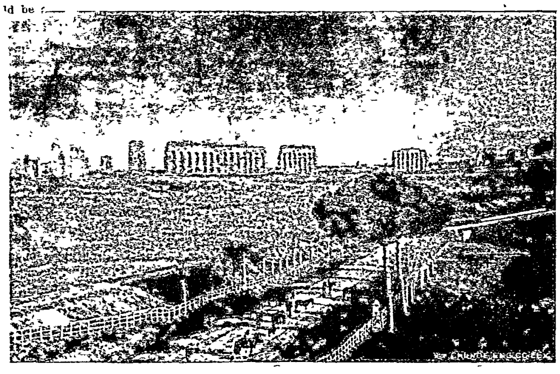
In order to free the pipes a system of flushing is used by the company. In summer the flushing is done once a week the company claims, because it is then that the algae grows rapidly. In winter it is done but rarely, since the cold saves the work.

The great pipe leading from the pump house to the city is flushed in two places, at the Clay spring and at the city limits, late every Sunday night in summer. While it is being done a man is always kept at a telephone . ad, o g. a. against a possible fire

In the city the main lines, known as "feeders" are flushed from the lowest point in Lexington, on Patterson street, between Main and Water streets. The "feeders" are thrown into complete circuits with this flush point as the drain. In this way about 80,000 gallons of water is passed into Town Branch in the period of two and a half hours. The flushing of the "feeders" is done in this way: The valve at the corner of Patterson and Main streets is closed, thus preventing the water from flowing further in that direction. The pressure at the pump house is then ordered increased, and a powerful stream of water sweeps the entire main line to Patterson street, where it escapes. A circuit is then formed by cutting off the main street pipe near Drake street and turning the stream up toward Third, across Third to Broadway, down Broadway to Main and thence to the flushing point. All of the large pipes are thus flushed.

The branches from main pipes known as "dead ends," and private lines, are flushed by a special man sent to the place where the hydrant or fire plug is located.

THE CAMPAGNA, SHOWING THE REMAINS OF THE CLAUDIAN AQUEDUCT.



(Made for The Morning Herald.)

"Type of the antique Rome! Rich reliquary
Of lofty contemplation left to Time,
By buried centuries of pomp and power'
I kneel, an altered and an humble man,
Amid thy shadows, and so drink within
My very soul thy grandeur, gloom and glory!"
—POE.

INTERIOR SHOWING FILTER ARRANGEMENT ON FIRST FLOOR.

GENEROUS.

"He married a fortune, but he is too generous to keep it long" "Yes?" "Way, even his wife has only to ask him for money and she gets it."—Detroit Free Press.

"Why is the Isle of Wight a fraud?" "Because it has Needles you cannot thread Freshwater you cannot drink, Cowes you cannot milk, and Newport you c nno c ttle," Tit-Bits