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The Omaha Water Company and Its Up-to-Date Plant at Florence

Everything is Provided to Meet the Enlarged Demands of the Inhabitants of Our Rapidly Growing City and Its Adjoining Suburbs that Are to Become Greater Omaha



TWENTY MILLION GALLON LOW-SERVICE PUMP AT FLORENCE.

IEN the heart of a man stops although it is now being extensively even for a second his life goes copied.

The Minne-Lusa pumping station, as it out. A great city, like Omaha, is no less vulnerable than a man. has been named, is one of the favorite re-It, stoo, has its heart which sorts of Omaha's citizens on Sundays and putsates censelessly, night and day. Every holidays. The interior of the building in second it is throbbing, sending its life-giv- cool and scrupulously clean. The grounds ing current through its v ins. Should it are marvels of the landscape gardener's cease operation for a brief time, the metrop- art.

of Nebraska, with its 125,000 people, Although there are 107 acres in the com would, under certain conditions, perish. Omaha's heart is made of brass and as the millionaire's lawn. Flower beds steel. The fluid it forces through the veins may be found here and there over the and arteries is water. Sixteen beats to the smoothly mown lawn, adding a bit of minute is its record, and at every one brightness to the expanse of green sward. more than 13,000 gallons rushes through Trees, trimmed with the most exacting iron network of pipes which penetrate to care, dot the lawns. every portion of the city. It is a wonder-

ful heart. For over fourteen years this one has been beating with scarcely a rest. Sometimes it stons, but before it does, an-

pany's plot, it is kept with the same care -2

Fine Views Possible.

On the reservoirs may be had one of the finest views in this part of the country

How the Supply of Water for Omaha Consumers is Brought from the Missouri River, Filtered and Then Distributed



VIEW OF FLORENCE BASINS TAKEN FROM THE TOWER OF THE PUMPING STATION.





THE LATE CAPTAIN B. F. REYNOLDS, FORMERLY CHIEF ENGINEER OF THE OMAHA WATER COMPANY.

which bears the fly wheets, measures eigh- station, where there are three high serteen inches in diameter. On an ocean liner, vice engines; one of 2,500,000, one of 3,500,000 this shaft would do all the work, carrying and one of 6,000,000 gallons' capacity, rethe acrews. On the pump it merely carries spectively. Ordinarily, this station is run the fly wheels. These are two in number continuously, and is able to take care of and weigh 80,000 pounds each. They are the higher parts of the city without the necessary to the smooth operation of the assistance of the Twentleth street station; machine.

to perform, especially when the fluid is pumped under fire pressure of 125 pounds, as at Omaha. The plungers to the pumps, which, by the way, are located directly down there is a pressure of 108,000 pounds scattered population than most cities. against the head of the pump plunger. As The mileage of water pipe is sufficient

but steam is kept on the boilers at the Fumping water is one of the hardest last named plant, which can be started duties which an engine can be called on at a moment's notice, if necessary,

Mains of 230 Miles.

The system of the Omaha Water com under the steam cylinders, weigh 54,000 pany has over 230 miles of mains and about pounds each. It is necessary, then, for the 15,000 services. The large mileage is due steam cylinder to lift this enormous weight to the very sparse settlement of our muas the plunger goes up. When it starts nicipal area. Omaha has a much more

there are three cylinders and three pumps, to serve two or three times the present the engine takes a practically instantaneous population, as is seen by comparison with load of 54,000 pounds three times during other cities. Here it has been necessary each revolution. The elasticity of steam to lay fifteen and one-third miles of main is so great that were it to work directly for every 1,000 services. Kansa service than Kansas City, The two cities have been built up in signed will also be observed. The plunger much the same way, but the population of weighing 54,000 pounds, is lifted by steam. Kansas City is more condensed. It may be partially due to the wider streets of takes the load of water. This being 180,000 Omaha. More than half of the territory pounds the steam has the difference be- coverred by the plat of the city proper is tween the weight of the plunger and the taken up by streets and alleys, without counting parks and public grounds. If Omaha had as many water services per mile of main as Kansas City we would

other one takes its place, and the city lives on.

ter, will soon pass into the possession of can see far up the winding river. On the the city, if all goes smoothly. The city west is the pretty little city of Florence has begun proceedings to acquire the plant with her wealth of trees. And down in the under the original contract, and the appraisers have nearly finished the valua-

rlant its like does not exist in the country long. today. Perfect in every detail, adequate with the new additions made in the last . There is a history to the reservoirs, and five years, to supply the needs of Omaha, as one stands at their sides, one little for years, it is a marvel of the architect's and designer's art. Concededly the finest plant of the kind in the world, Omaha may point to it with the usual "pride" so fawored by the political platform.

Begun in 1880.

The original plant was begun in the year 1880, at which time Omaha had a populastarted in the house at the foot of Burt street, they forced water through twentyeight miles of mains. Today the mains, if placed end to end, would extend 222 miles. The consumption of water in 1885 grown to 15,000,000. Addition after addition has been made to the plant, as the needs the good ship went ashore. of the service required, and the year 1905 finds it strictly up-to-date in every re- the rocks, and although we had managed spect.

be needed.

Pumping Missouri river water is not the and leave the intake pipes sticking into other. the air instead of the current of the river "At last I could stand the torture no

Inspected Hiver Bank. the only point on the river where a per- pure. manent station could be erected, with any present magnificent plant.

was riprapped along the west bank to pro- I learned that secret in a contest with tect it from eddying currents. On the hill death, and death almost won, too.", great reservoirs were laid out.

Completed in 1889.

Away to the south arise the bluffs, while The magnificent water works system, of the "Eig Muddy" is tumbling along below. which this immense steel heart is the cen. To the north lie more bluffs, though one To the north lie more bluffs, though one valley, close to the river, stands the pump house from which comes the soft musical throb of the monstrous engines which It is not boast to say that as a water send Omaha her water supply, in a solid stream three feet in diameter and six miles

> realizes that it almost cost several men's lives to wrest from nature the secret of purifying water without the aid of chemiimmense storage tanks, with the water whence it is drawn into the great thirtygently flowing from one to the other in six Inch main to the city. When the water thin sheets over what seem to be miniature has passed through the first four reservoirs falls, one wonders why this form of construction is used. The question may be

How the Plan Was Discovered.

"More years ago than I ware to remember, I was a sailor. The season to which for storage purposes, while the original was 6,000,000 gallons a day. Now it has I refer I was on a sailing ship, and when. Burt street basins may still be used in an we got among the Terra del Fuego islands

"There were many of our men thrown on to obtain some food, death in a horrible

It was in the latter part of the S0's that form stared us in the face. There was no the company officials arrived at the con- water on the island fit to drink. At least clusion that the little pumping station on that was the way it seemed to us. True, storage basin of 100,000,000 gallons' capacity. In diameter. It is here expanded the sec- has never been necessary to shut it down the river bank was all right, in its humble tumbling down the rocky side of the mounway, for the time being, but that, if the tain close by was a limpid stream of ture had not the city taken steps to ac- pressure cylinder of 104 inches diameter. future of the city was to be considered, sparkling water, but there were thousands another station of unlimited capacity would of birds which nested on that rock and their filth polluted the water.

"It was maddening. We lay in the shade sasiest operation in the world. Indeed, to and watched that water fail all around us, take the Big Moddy's fluid, separate it when we could not drink a drop. Some of from its sand and sediment and purify it the men made little water wheels with their antil it is fit for drinking purposes, is ex- jackknives, and in order to amuse themtremely difficult. Besides, the river is as selves took broad rocks and directed the fickle as a summer girl, and as will be course of the filthy stream from one to recalled in the case of Nebraska City, is the other in the shape of tiny waterfails. llable at any time to change its course Thus it turned one wheel and then an-

unless restrained by rock and riprap bonds, longer. I went to where the water diverted from the main stream, fell from

the last rock and, stooping down, tasted It was with no little degree of cars, it. It was fresh and sweet! We all drank therefore, that the officers of the company heartily, and in time were rescued. Later inspected the entire river bank, from the I began to wonder why that water had Burt street station to a point some miles purified itself and how. At last I discovered above Florence. When the examination the secret. In flowing over those broad was complete, one valuable hit of knowi- rocks it had broken itself up, been edge had been gained. At Florence was thoroughly aerated and made sweet and

"When I came to Omaha to take charge assurance that it could be maintained there, of the water plant. I determined to try The company at once bought a large tract the same principle with the Missouri river of land and began the installation of the water. We made the experiment, and it is an unqualified success. Flowing over The pump house was designed to be built the weirs in thin sheets, the water is of cut stone, situated near the river, and thoroughly purified, and where some cities canable of being added to as time should have to use filters, we use nothing at all require additions to the plant. The river but a system of miniature dams, or weirs.

Pumping the Water.

The water is taken from the river and All these improvements were completed pumped direct into the first reservoir, in 1889, and August 1 of the same year, the which has a capacity of 15,000,000 gallons. new pumping station was thrown open to Here it settles thoroughly. The bottom the public. If it was handsome then it is of this reservoir, and, in fact, all of them, perfectly handsome now. No smoke has is provided with a mud gate, through dimmed the dreased stone from which it is which to flush out the precipitated matter. built. The floors are just as clean today That this is a very necessary precaution as they were sixteen years ago; the brass will be understood when it is stated that work shines even more brightly, the there are 100 tons of sand a day pumped grounds have been beautified until they into this first reservoir with the river have put many a city park to shame, and water. Were it not emptied frequently, the achinery in the station is a marvel reservoir would become filled in a few days. to all those who see it. Hydraulic engineers From the first reservoir the water flows of reputs say it has no equal in the world, into the second, also of 15,000,000 gallons'

MINNE-LUSA STATION, FLORENCE.

capacity; thence to the third of the same Florence to the city are marvels of the back to the top of the cylinder. This engine was, in great part designed capacity. Here it passes into No. 4 reser- designer's art. They were the first of the voir, which holds 20,000,000 gations, and kind to be built, and are probably the by Captain Reynolds. His brother was cals and filters. As one looks at the five finally into No. 5, of equal capacity, from finest of the kind in existence today. for many years at the head of the Allis company at Milwaukee, which built the

it is perfectly pure, and so free from sedi- the usual form of pumping engine. Instead pattern for several years, arrived at the ment that but a very light precipitation of being of horizontal construction, they best answered in the language of Captain may be obtained by allowing a gallon or are upright, and are almost exact dupli- ing built on the wrong principle. He detion of only about 30,000. The system was Frank Reynolds, the late chief engineer of two to stand all night long in some cates of the engines in the steamers New signed the present machine and sent the

These are the principal basins of the company, but not the only ones. At Walnut hill there are two others of large capacity emergency, but seldom are. The Walnut hill basins are situated on the highest point within, the immediate environs of Omaha, save ones

vessel.

quire the plant.

Description of the Engines. machine. Captain Reynolds after running The engines are a radical departure from the old Holly pump of horizontal compound conclusion that pumping engines were be-

York and Paris, plying between American draft to his brother to figure on. When it and European ports. A feature of these was returned as satisfactory, the company machines is that they are of condensing purchased the engine, which cost about pattern, and there is no exhaust of steam \$125,000, without any of its connections. It was installed twelve years ago, and .teen revolutions per minute. It is occasion-

Just east of Krug park is a tract of pressure of 120 pounds. From here it is valve motion, or inserting a new piece of land a little more elevated, and there the exhausted into the second or intermediate packing in one of the cylinder glands, but company purchased a site for another vast cylinder, which measures seventy inches it has never broken a single part, and it which it would have built in the near fu- ond time, and is exhausted into the low for repairs.

Size of the Machine. The immense engines which force the densed into water. The vacuum resulting The size of the machine may be imagined water into the huge main leading from allows the air pressure to bring the piston when it is stated that the main shaft,



EIGHTEEN MILLION GALLON HIGH-SERVICE PUMP AT FLORENCE.

against the pump plunger, it would "stag- but eleven miles per thousand. Omaha, ger." The great balance wheels prevent therefore, has 40 per cent more main per

The nicety with which the pump is de-Going down, it falls by gravity until it load of water, or 54,000 pounds to work against. Thus the steam pressure is balanced in each cylinder all the time. There is another advantage to this type

of machine which is probably more apprecisted by the owners than by the public, Before it was installed it used to require about three pounds of coal per horse power per hour to work the then used pump. The new engine uses only one and one-half

pounds of coal per horse power per hour to of 50 per cent. This is said to be the most economical engine in the world. Its saving, where 20,000 tons of coal

burned yearly, as at Florence, is naturally 125 pounds.

recently installed a duplicate of this engine, save that it has a capacity of 20,000,000 gallons daily. This additional service is secured by making the pump cylinders sixinches longer than in the first machine. An improvement was made in building the

water chambers of gun metal instead of iron, which makes them three times as strong, and practically indestructable. With the new pump installed, the Florence station has a capacity of 52,000,000 gallons a day, against fire pressure, there being still kept, ready for service, the old double compound Holly pump of 14,000,000 gallons' capacity. These pumps are called 'high duty'' machines, forcing the water under high pressure. In addition, there are in the Florence power house three low service engines, which take the water from basins. Two of these are 1,400,000 galloas'

capacity. Steam for all this machinery is furperfectly reliable device, invented also by \$15,000,000. Captain Reynolds, which burns the smoke What, with larger mains, of at least

made to take a certain course over white selves.

Other Machinery Needed.

The machinery at the Florence station. owned by the company. It is comparatively ice and \$5,000,000 gallons low service. simple to pump water from Fiorence to the big pump is not strong enough.

10.000.000 gallons' capacity; one high sor- ty-eight pounds; in Omaha it is over 100 vice engine of 5,000,000 gallons and one of pounds. 7,000,000. At Twentieth and Poppleton there

Decessary. At Walnut Hill is still another pumping treasurer.

number a population of 170.000 or more. St. Louis has 9.37 miles of main per 1,000 services and at this rate Omaha ought to have 190,000 people to show for its 220 milles of water mains.

Los Angeles gets along with five and four-fifths miles of water main per 1,000 procure the same results, which is a saving services, while Omaha requires 164 per cent more. If we had as many people per mile of main as Los Angeles our present populaare tion would be 215.000.

Erle. Pa., has nine miles of main per 10,000 tons annually. This amounts to some- 1,000 services, which ratio would give thing like \$16,000, as the coal costs about Omaha a population of 200,000. Harrisburg. \$1.65 a ton. The capacity of this great Pa., has 1,000 services for each three and pump is 18,000,000 gallons a day, against a one-half miles of main. If the Omaha pressure of 140 pounds. It runs slightly in mains did as well as this we would have excess of this when the pressure is only more than 500,000 people-much more than Cleveland, Cincinnati or Buffalo, We The present owners of the plant have would have a city almost as large as Bal-

- A.---

Many Mains Needed.

timore or Boston.

As compared with Omaha's fifteen and one-third miles of mains per 1.000 services. Harrisburg represents the greafest density of population with three and one-half

miles per 1,060, and St. Paul the least, with twelve and four-fifths miles, out of forty or fifty of the principal cities having less than 250,000 people. In none of them has It been necessary to lay as much main per service as in Omaha,

In addition, Omaha's mains are of larger average diameter than those of other cities, partly because necessitated by long runs and partly because the water company has been liberal in providing for the futhe river and lift it only into the settling ture. For instance, the average diameter of all water mains in the Omaha system capacity each, the other, which has been is ten and one-fourth inches, while in Kanrecently installed, is of 20,000,000 gallons' sas City the average is seven and eightysix-one-hundredths inches.

Figures have been recently published nished by a battery of sixteen seventy-two to show that the Kansas City Water works and seventy-eight-inch boilers, burning the are worth \$8,000,000 to \$12,000,000. Anyone cheapest slack coal. Yet one seldom sees who knows the two plants must inevitably any evidence of the smoke coming from conclude that if the Kansas City works are the station chimney. The reason for this worth anything like \$10,000,000, the Omaha is that in each furnace is a simple but works are certainly worth not less than

perfectly. It consists of an arrangement equal inleage, better and larger pumps, of the fire bricks in the fire chamber, better pumping stations, immeasurably suby which the products of combustion are perior settling basins, the comparison is greatly in favor of Omaha. The Florence hot bricks until they are consumed them- system of settling basins is recognized as the most efficient in the country.

Kansas City has no excess pumping capacity, while the Omaha Water company has duplicate pumps for both services. The while the principal part of the pumping Florence station alone has a daily pumpplant, is not by any means all that is ing capacity of 52,000,000 gallons high serv-

The Omaha system pumps water against the city-that is, the lower sections of the the unusual high head of 307 feet, which city-under high pressure. But when it is the elevation of Walnut Hill reservoir comes to serving such sections as Walnut above the river. What this means may Hill, Hanscom park, Benson and Dundee, be understood when comparison is made with such cities as Detroit and other lake To overcome this obstacle the company cities, where water is pumped against less still maintains its Burt street station, than 100 feet head. In Detroit the preswhere there is a low service engine of sure in the business district is about twen-

The present officers of the Omaha Water is a high service, triple expansion engine company are: Theodore C. Woodbury, of \$,000,000 gallons' capacity, which pumps president: E. M. Fairfield, general manthe water into the high service mains when ager; A. B. Hunt, superintendent; Henry Rustin, chief engineer; Stockton Hoth,

Here it works the piston and is then con-

into the open air. By this means the atmospheric pressure in the largest cylinder- the perfection of the mechanism is such the engine is triple expansion-does as that it has run almost continuously ever much work as the steam in either of the since, making between fourteen and sixother two. The high pressure cylinder is forty inches ally necessary to stop the engine for the in diameter. Steam is fed to this at a purpose of taking up a little wear in the