POWERFUL ELECTRIC PUMP AT AUSTIN, TEXAS.

BY CHESTER HAILE.

Several years ago the city of Austin, Texas, at an expense of two million dollars, constructed the largest artificial dam in America. The site was upon the Colorado River, a stream of abundant supply, and of reasonably pure water, but at times, owing to heavy rains and other natural causes, the flow would become exceedingly muddy, and a continuation of such conditions threatened at times to endanger the general health.

With these confronting conditions, General Superintendent H. C. Patterson began a series of investigations, basing his operations upon the fact that a too common error is often made in taking water from neighboring rivers, which at the time may be of good quality, but afterward, owing to rapidly increasing population, become polluted and dangerous for drinking purposes, and sought to avoid such conditions in the manner hereinafter set forth. In his compilation of statistics bearing upon this subject, he submitted to the proper authorities the result of his investigation, and among many other interesting items has the following to say relative to typhoid fever as produced by impure drinking water.

TYPHOID FEVER.

(Taken from Mr. Patterson's report.)

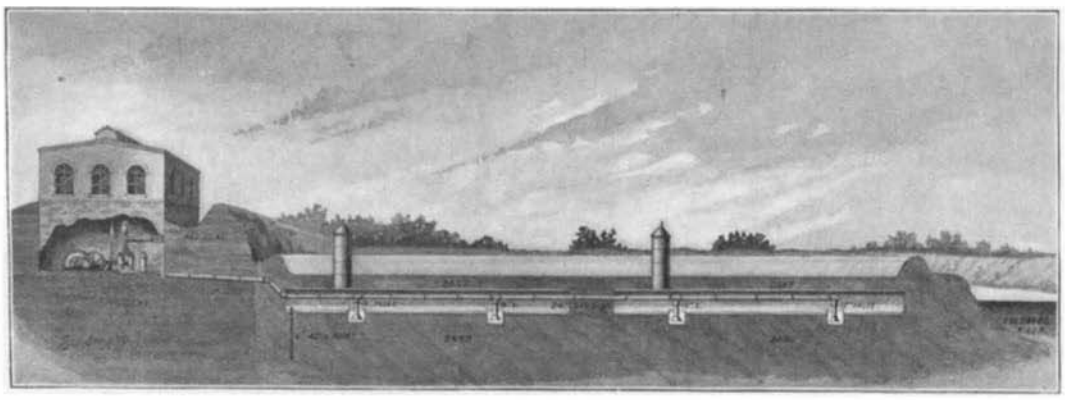
Typhoid fever death rate per 100,000 population, taken from American cities, on an average of seven years was 42 cases, where water was taken from lakes.

An average of five American cities over a period of seven years, taking their water from rivers, 58 cases.

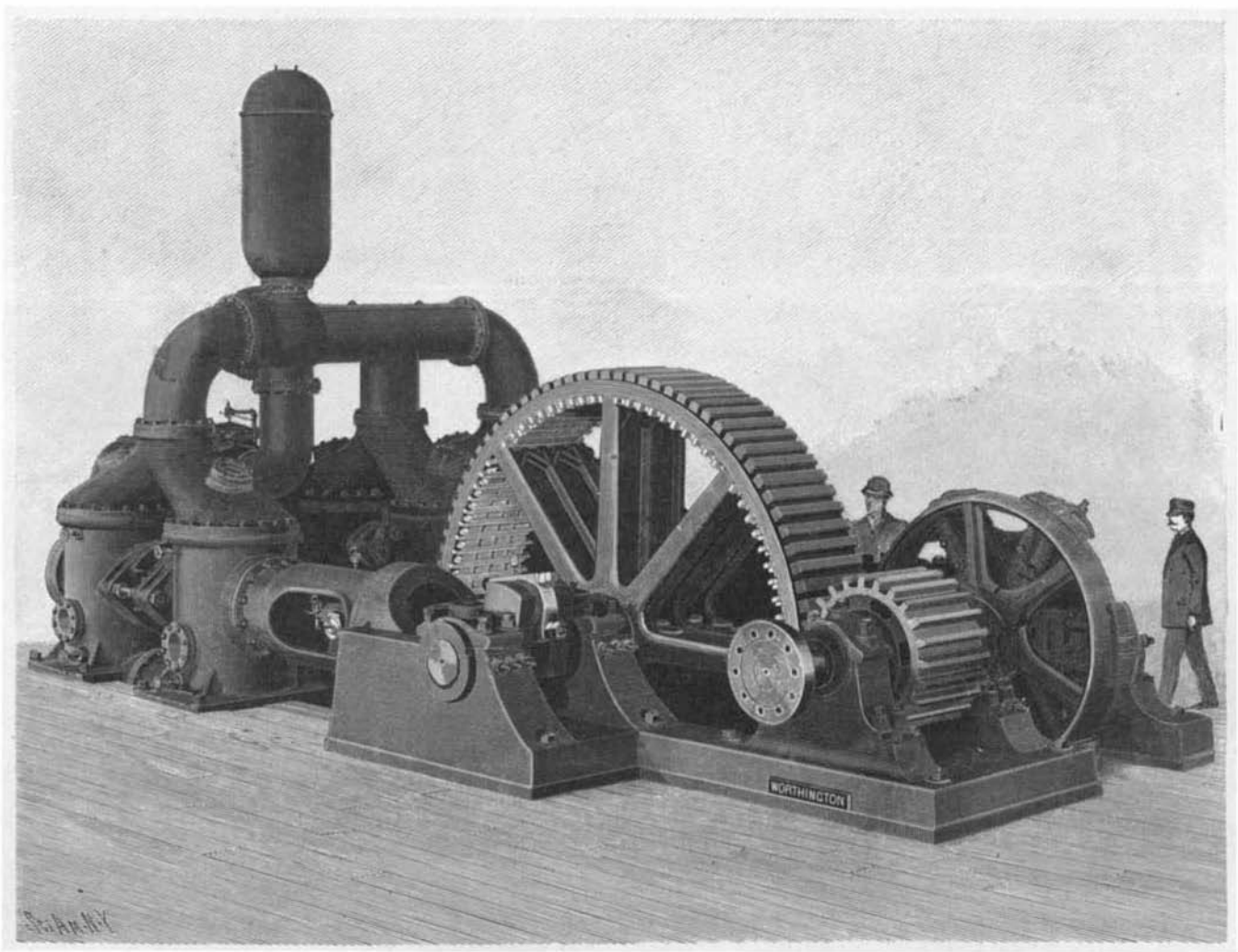
Average of six European cities, over a period of seven years, using filtered water, 12 cases.

The above comparisons apply more to the city of Chicago than probably any other city in the United States. Chicago uses lake water exclusively, and according to all statistics, has had as many as 154 cases of typhoid fever to the 100,000 population; while Munich, whose water is submitted to the filtration process, has had as low as three cases of typhoid fever per 100,000 population.

The true manner, Mr. Patterson contended, to secure a lasting supply of pure water was by the filtration process, either natural or artificial. Acting upon his suggestions, the city decided to build another pumping plant in addition to the one already in use at the dam, two and a half miles nearer the city, and on a large deposit of filtering sand beside the river. About two years ago this station was completed, its dimensions being 50 by 50 feet, and the pumping pit was so situated that the pumps would never lift water over fifteen feet. The water for this station was taken from filtering trenches by large, reciprocating, power pumps, driven by electric motors, power being transmitted from the main power plant.



SECTION THROUGH PUMPING STATION AND FILTERING TRENCH.



SIX MILLION GALLON, TRIPLEX, ELECTRIC PUMP AT THE AUSTIN PUMPING STATION.

THE FILTERING TRENCHES (FIG. 1).

The filtering trenches built in this sand bed, as mentioned above, are 10 feet wide and 180 feet long, three in number, and joined together by 20-inch tile pipe. These trenches are below the low water condition of the river, and as they are pumped the difference in level causes a supply of water to pass into them. Each trench also has eighty 2-inch well points driven to a depth of 25 feet. The three trenches are connected with the pumping station by 600 feet of 24-inch cast iron suction pipe. The first pump installed was a four million gallon Worthington duplex pump, with plungers 19½ inches in diameter and 24-inch stroke, making 26 revolutions per minute.

This pump is driven by a synchronous motor built by the General Electric Company, running 600 revolutions per minute. It has been in operation for about one year, and much experience was gained in the installation of this set, to assist the superintendent in the design of another pump. It was found after a careful examination that eighty-six per cent of the energy delivered to the motor came out in the shape of water to the general system.

The experience gained in the installation of the first pump pointed strongly toward a triplex pump and a slower running motor; and after several months of careful study and deliberate calculations, in November of last year a second pump, of the triplex pattern, six million gallons capacity, designed to run twenty-five revolutions per minute, was designed by Superintendent Patterson, and drawings of same made by Civil Engineer Charles R. Watts, and an order was placed with Henry R. Worthington.

This powerful pump has lately been completed, and delivered by its makers to the city of Austin, at a cost of $29,000. It is run by a 300 K. W. synchronous motor making 100 revolutions per minute. The advantages of the triplex pump are that it will maintain a more constant pressure on the mains, and be much easier on the motor. The pump is an outside packed plunger pump, 18½ inches in diameter, by 24-inch stroke, and the two pumps together will deliver 10,000,000 gallons of water per day into the mains.

A great deal can be said in favor of synchronous motors for work of this character, they being very efficient, giving absolute constant speed under all conditions, and standing an immense amount of abuse, their only failing being lack of starting effect, and this has been provided for by getting the motor up to speed, and starting the pump by a very large friction clutch. When once energized they can be overloaded to the extent of three hundred per cent before dropping out.

In the construction of this new filtering plant, Austin will secure 10,000,000 gallons of filtered water, which cannot be polluted and become dangerous for drinking purposes; a danger which exists as we have shown in water drawn direct from the rivers.

Action of Nitrogen Dioxide on Chromium.

M. G. Chesneau has presented to the Academie des Sciences a description of his recent experiments showing the action of nitrogen dioxide gas upon solutions of the salts of chromium. The previous experiments in this direction have shown that the gas is absorbed by ferrous and by chromous salts, but in the latter case it has been hitherto impossible to carry on the experiments properly, as the solutions decompose rapidly in contact with air. The experimenter has found a simple expedient to exclude the air, and has thus been able to study the reaction of the gas upon the chromous salts. These are produced in the first place by the reduction of a hot solution of a chromic salt, acid or neutral, by pure zinc. The liquid is preserved from the action of the air by a layer of heavy petroleum, sp. gr. 0·870; this layer, from 5 to 10 centimeters thick, is sufficient to keep the solution from decomposing for several weeks. To transfer a portion of it to another vessel, it is taken out by a pipette having a fine point; a certain quantity of oil is introduced first, which keeps the solution always covered. This method of protection may be used to advantage in working with ferrous salts or others easily attacked by air. A number of experiments have thus been made with the chromous salts; with a soda solution, for instance, a hydrate was obtained, of a fine turquoise blue.

The absorption of nitrogen dioxide by the salts has been successfully carried out. It may be remarked that the solutions formed as above contain zinc, but this has no appreciable effect upon the reaction. The gas is first purified and dried, then passed through a neutral solution of chromous chloride contained in a small flask. In this way an absorption of 0·257 gramme of the gas is obtained for 85 centimeters of solution. As the absorption disengages a certain amount of heat, the temperature of the apparatus is regulated by a refrigerating bath to about 15° C. The solution takes a fine dark red color, which is quite different from the brown tint assumed by the ferrous salts under the same conditions. This color changes to a greenish brown at the end of an hour; the change is immediate if the temperature is raised to 100° C. While the ferrous salts give off the gas absorbed upon heating or in vacuo, the salts of chromium retain it, and a veritable combination may be considered as formed in this case. The experimenters consider that the action is one of simple absorption, as the gas after passing through the solution has not been decomposed. The red liquid gives with soda a gray precipitate soluble in excess to a violet color, without disengagement of gas; this solution becomes green after a time. A like series of results has been obtained with acid solutions of chromous chloride and sulphate.

RUNNING from Phillipsburg to Newark, N. J., there is a most remarkable canal. It is 60 miles long, and was operated before any railroads were built in the State. At times it runs side by side with the Lackawanna Railroad. Locks are not used, the boats being drawn up and down elevations on great cars on a truck 18 feet wide. This is likely to be the last year of its operation, as an effort will be made at the next session of the New Jersey legislature to secure it as a means of furnishing Jersey City with an additional water supply.