Deterioration of Water in Reservoirs and Conduits.

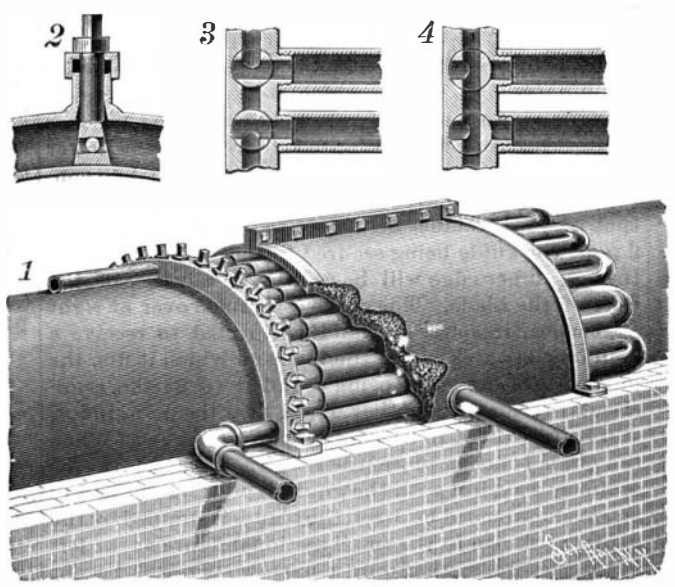
Some time ago at a meeting of the New Jersey Sanitary Association, Mr. C. B. Brush dealt with the above subject in a paper. He remarked that all water supplies are better at certain periods of the year than at others. In the hot, dry days the water becomes dead and lifeless, and if allowed to remain at rest for any considerable length of time, algæ formations appear on the surface. These, however, are destroyed and disappear as soon as the water is put in motion. If allowed to remain, the water cures itself—the algæ disappearing after a few weeks and leaving the water again in its normal condition. The algæ show themselves more quickly on water that has been filtered, either naturally or artificially. The author also stated that water is delivered in its best condition when taken from a running stream and supplied directly to consumers without coming to rest during its passage. Water discolored by sediment is very often in its best condition, because the sediment is due to the fact that an abnormal volume of water is blown off from the watersheds, and any pollution there may be is so diluted as to be incapable of harm. But there is such a demand for clear water that reservoirs are necessitated, with their attending evils. Water that is stored for twenty or thirty days commences to deteriorate. This is due to stagnation, and the stagnation begins to manifest itself as soon as the oxygen in solution in the water becomes less than 0·3 per cent. The best means of preventing stagnation consists in keeping the water in motion, and there is no better way than forcing air into the bottom of the reservoir, and keeping the water aerated. Mr. Brush gave an interesting account of his experience with a number of reservoirs where the water had become tainted in consequence of lying stagnant, and in every instance he obviated the difficulty by forcing air into the reservoir or the mains.

Electric Lights without Wires.

Professor J. J. Thomson has prepared a number of vacuum tubes in which there are no electrodes, but which are surrounded by coils of insulated conductors connected with batteries of Leyden jars. These tubes contain a little gas, of sorts, remaining after they had been exhausted in the ordinary way, and every time the jars are discharged through the surrounding conductors, the insides of the tubes are filled with light, which varies in color with the kind of gas contained therein. A Wimshurst influence machine furnishes the electricity, and the display is an exemplification of the connection between induced electricity and the phenomenon of light.

AN ATTACHMENT TO COOL WATER IN MAINS.

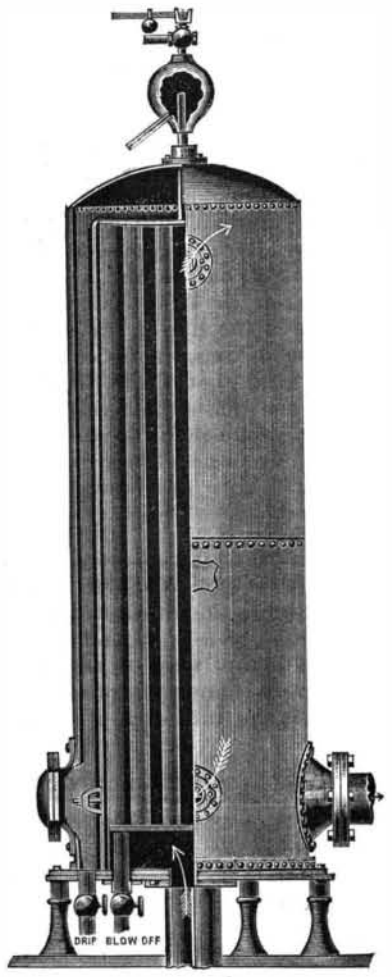
An improvement by means of which the water carried in main service pipes, for use in cities or towns, may be cooled during its passage to be fit for drinking in warm weather, without the addition of ice, forms the subject of the accompanying illustration. It has been patented by Mr. Arthur B. Wood, of Port Byron, N.Y. As shown in Fig. 1, the water main is supported upon a suitable foundation, and lying close to its top are cooling coils connected by a coupling to suitable nipples extending out from a heading, which is divided into a series of valve chambers having channels communicating with each other, and right angle channels leading into the coils. Fig. 2 is a detail view of one of the valves, a three-way valve having a bottom fitting on the base of the heading, and an outwardly extending stem with squared end and screw-threaded portion on which is a binding nut. The valves are opposite the ends of each pipe, to turn on or cut off the refrigerating material, Fig. 3 being a section through the end of two pipes and the valves, and Fig. 4 being a similar view showing the valves turned to cut off the sections. The inlet pipe through which the refrigerating material is forced from any suitable source of supply is connected with the heading opposite the top coils, the discharge pipe leading therefrom at its lowest portion. The coils are held in position by a top casing, made in flanged segments which can be readily placed in position or removed, the inclosed chamber formed by the casing and the water main to be filled with brine or cold air introduced by a pipe at one side and discharged by a pipe leading from the opposite side. The chambers are preferably covered with asbestos, sawdust or other non-conductor of heat. The sectional construction permits the ready removal of any coil, should it become rusted or stopped up, without interfering with the working of the system, the valves being turned to admit the refrigerating material only to the coils desired. In operation, it is designed to force anhydrous ammonia or other suitable refrigerating material into the heading and through the cooling coils, surrounding the top of the main for a short distance only at a convenient point for cooling the water for a certain district or town, the apparatus being duplicated as required when an extended territory is to be covered.



WOOD'S REFRIGERATOR FOR WATER MAINS.

A FEED WATER HEATER AND PURIFIER.

The accompanying illustration represents a feed water heater which is itself practically a boiler, and is designed to heat the feed water to or above the boiling point. It is a plain tubular heater, the whole of the shell of which is surrounded by a steam jacket. The steam enters a central compartment at the bottom, passing up through the tubes, around which the feed water circulates, and thence down on the outside of the shell, thus entirely preventing the radiation of



THE BARAGWANATH FEED WATER HEATER.

heat from the water. The feed water is fed in at the lower end of the shell and drawn off at the upper end. A hollow cast iron ball or scum chamber is arranged at the top for the purpose of collecting the impurities which rise when the water is boiled, this chamber being ordinarily blown out four or five times a day. A blow-off and drip is also provided at the bottom, as well as a suitable hand hole through which sediment may be removed.

This form of feed water heater and purifier has had such extended practical use that its merits have become well known. It is strong and safe, and cannot cause any back pressure, but rather, acting as a surface condenser, is designed to reduce any back pressure that may exist. The heating surface is very large in proportion to the size of the heaters, which are rated at 1 H. P. per sq. ft. of heating surface, so that it heats the feed water to or above the boiling point, keeps the boilers clean in ordinary water. This, it is claimed, is the special merit of the Baragwanath boiler, that the feed water is more effectually purified by being boiled before it is fed to the steam boiler, while the destructive practice of feeding cold or merely lukewarm water is avoided.

In this heater the tubes are of heavy brass, and the slight variation in the degree of expansion between the brass tubes and the iron shell is provided for by spring tube sheets, which are made slightly concave. Both the shell and tubes are in contact with the hot steam and not exposed to the air. The heater is also made in inverted form for use in locations where it is more convenient to have the exhaust enter and leave at the top, and a horizontal heater is provided for use in cramped engine rooms. The latter is adapted to be set on top of the boilers in saddles, or hung from the roof. It has also been found particularly convenient for marine use, as it is not top heavy and can be suspended from the deck.

The Baragwanath feed water heating and purifying apparatus also includes a live steam feed water superheater and purifier, which is not designed to do away with the exhaust steam feed water heater, but rather as an auxiliary to it in certain cases, as where heaters are used which do not boil the water, or where the water contains impurities that cannot be removed by boiling. The latter heater and purifier consists of a heavy boiler iron shell, with removable heads, and containing a series of slightly inclined shelves or pans over which the water flows in direct contact with the live steam from the boiler. When the shelves have become coated with scale they are drawn out and cleaned, the bottom of the superheater and the settling chamber being cleaned at the same time.

This line of steam jacket feed water apparatus is made at the Pacific Boiler Works, Wm. Baragwanath & Son, 40 West Division St., Chicago, Ill.

The Largest Plank in the World.

The *N. W. Lumberman* gives an engraving from a photograph of a redwood plank that is 16 feet 5 inches wide, 12 feet 9 inches long, and 5 inches thick, and is about 90 per cent clear. It was taken from a tree 35 feet in diameter and 300 feet high. According to its rings it was more than 1,500 years old. The tree was cut 28 feet from the ground, and the plank was hewed out of the stump, representing a section taken from near the heart to the bark. After it was displaced it was lowered by block and tackle, with a locomotive for power. In the way of labor its cost represents the time of two men for a month, simply to prepare it in the rough for shipment. To this the cost of transportation must be added, making a total of about $3,000. It was moved by water to San Francisco.

After being on exhibition some time, a car was specially prepared to transport it to Chicago. This was done by cutting a slot in the center of a flat car, in which stirrups were pendent. The plank was placed on edge in the slot, its lower edge being within about a foot of the ties.

The plank was cut on the lands of the Elk River Mill and Lumber Company, in Humboldt County, Cal., is the property of J. L. Harpster, of Eureka, and B. F. Noyes, of San Francisco, and is on exhibition in Detroit, Mich., whence it may be sent to East Saginaw and elsewhere, to finally bring up in Chicago at the world's fair. The plank shows coarseness of growth, with richness of figure, and a finish such as the highest quality of material and the best efforts of Berry Brothers, the varnish manufacturers, of Detroit, can secure.

Wolfram Mining in New Zealand.

Wolfram, or tungsten, belongs to a group of rare metals, and till a comparatively recent time was known only to the chemist, and its value was only in the laboratory. With the invention of 100 ton guns the demand for tungsten soon made that previously obscure metal well known throughout the mining world. It was soon found that the steel tube lining the bore of these enormous guns could not resist the shock entailed by discharging many shots without becoming fractured, when of course an expensive piece of ordnance became useless. Experiment proved that the addition of a small quantity of tungsten to the fine steel employed in gun making rendered the latter metal wonderfully elastic, so that the steel tube will expand under the tension of firing and contract again to its normal size a great many times before the quality of the metal is in any way impaired. The German gun factories consequently absorb most of the tungsten found in the world, and from being a mere curiosity seen only in the laboratory of the chemist, this rare metal has acquired considerable value. Wolfram (erroneously called tungstate of iron in the cablegram) generally occurs in combination with iron in Europe, but is also found in scheelite, or tungstate of lime. It is in the latter form that it occurs in Otago. The metal itself is of a white color, extremely brittle, and heavy, the specific gravity being 19·1, that of gold being 19·3. It will thus be seen that tungsten is a very heavy metal, being only very slightly lighter than gold.—*Otago Daily News.*

OF the entire human race, 500,000,000 are well clothed, that is, they wear garments of some kind; 250,000,000 habitually go naked, and 700,000,000 only cover parts of the body; 500,000,000 live in houses, 700,000,000 in huts and caves, and 250,000,000 virtually have no shelter.