Purification of Potable Water by Means of Ozone.

The purification of potable water by means of ozone formed the subject of an interesting lecture delivered by Dr. G. Erlwein, of Berlin, at the forty-third annual meeting of the German association of specialists in gas and water technology at Zurich, the essential points of which are given below.

The lecturer first discussed the practicability of the use of ozone in the purification of various kinds of water (surface and underground water) in municipal or central water-works, and the advantage of this method over the various proposed methods of purifying water by chemical means. He then gave a description, illustrated by diagrams and models, of Siemens' ozone works at Paderborn and Wiesbaden, which have been described by him in the SCIENTIFIC AMERICAN. The lecturer then pointed to what had been accomplished by the method as regards the destruction of bacteria, and showed results obtained by the Imperial Health Bureau (Ohlmuller) and by Koch's institute for infectious diseases (Proskauer-Schuder), also by Siemens & Halske in experimenting on ordinary and pathogenic bacteria in their experimental works at Martinikenfelde, and in the water-works at Wiesbaden. Special attention was directed to the main result arrived at, viz., that ozone practically reduces the ordinary water-bacteria to a minimum, and may be absolutely relied upon to destroy pathogenic bacteria of every nature, even in the most contaminated water.

Dr. Erlwein then tried to give his audience an idea of the expense attending the working of the system, and submitted a statement showing in detail the cost of treating one cubic meter of water in establishments of different working capacity and working under different conditions. Figures were given showing the comparative cost of working in establishments (*a*) of different working capacity (2,000 and 200 cubic meters per hour respectively), (*b*) working different hours (12 and 18 hours daily), and (*c*) with different kinds of motive power (gas and steam).

Before concluding his lecture, Dr. Erlwein described the systems of sterilization in vogue in other countries, using drawings, illustrating the principles of construction of the sterilization tower and of the ozone apparatus. The following systems were mentioned:

1. Siemens & Halske's older type of 1890 had an iron tower about 3 meters high, filled with water, through which ozone air is forced.

1a. Scrubber's tower was 4 meters high, filled with pebbles.

2. Tindal's tower was 8 to 10 meters high, with a series of rainfalls through which ozone air is passed. Another type of Tindal's tower consists of three to four wide earthenware pipes joined together in a row for the passage of water, into which ozone air is forced.

3. Abraham-Marmier's scrubber, about 4 meters high, the interior construction and contents of which are not known.

4. Otto's tower, in the upper division of which the ozone is mixed with water by means of an injector. The lower division is fitted with a scrubber, with a view to utilizing the unconsumed ozone.

5. Vosmaer's tower; an iron cylinder with a water column, through which a counter-current of ozone-air is forced.

Other systems mentioned were:

1a. Siemens & Halske's latest type, as used at Paderborn and Wiesbaden, with a discharge surface consisting of eight cylindrical pipes; outer positive electrode cooled by water; it carries a current of about 8,000 volts, one pole being grounded.

2a. Tindal's ozone apparatus with discharge surface of metal resistant to ozone. A Schneller glycerine-alcohol resistance is inserted into the high-tension circuit to produce a sparkless short-circuit-proof ozone discharge without insulation. The discharging surfaces of one electrode are the inner walls of a cooled double-walled metal box resting on the ground, the corresponding surfaces of the other being formed by insulated metal plates placed in the box. Current: 40,000 to 50,000 volts.

3a. Abraham-Marmier's box, with a series of glass plates, one square meter in size, as discharging surfaces. Both electrodes are cooled by water, and the cold water current is provided with two rainfall interrupters for the insulation of the high-tension pole. Current: 40,000 volts. A spark gap is inserted into the high-tension circuit for generating currents of high frequency.

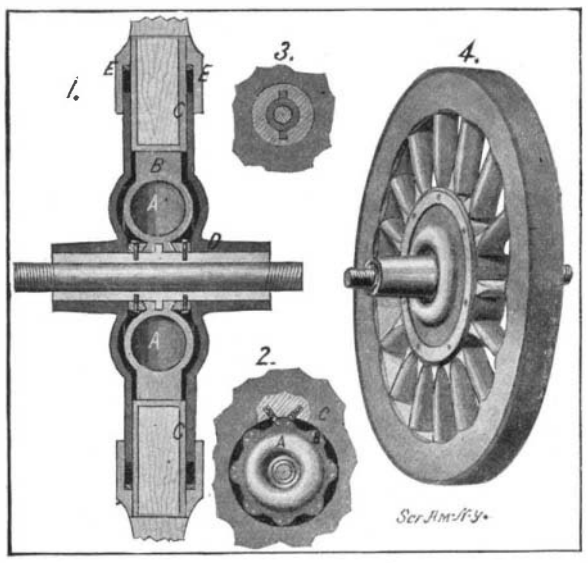
4a. Otto's apparatus. One pole is formed by the iron cylinder, resting on the ground, and the other by a concentric rotating metal axis with vertical aluminium disks. Current: About 12,000 to 20,000 volts. The discharges take place between the inner surface of the iron cylinder and the edges of the rotating aluminium disks without fixed insulation.

Vosmaer's ozone apparatus, with a grounded pole, has not been drawn, as the details of its construction are not known. It is said to consist of a system of combined iron tubes, between which the discharges take place without a fixed insulator. Current: 10,000 volts.

In conclusion, the lecturer discussed the prospects of the use of ozone in municipal or central water-works, and pointed out that the practical application of the treatment would be limited to the purification of surface water, the purification of underground water being only necessary in certain special cases, and appealed to water technicians to co-operate in insuring the success of the new process by developing its technical side as thoroughly as hygienists had developed the scientific idea. In the SCIENTIFIC AMERICAN SUPPLEMENT Dr. Erlwein's lecture will be published in full with drawings.

RESILIENT WHEEL FOR VEHICLES.

It has occurred to Mr. Brenton B. Weaver, of Glace Bay, Cape Breton, Nova Scotia, that by placing a resilient tire in the hub of an automobile wheel instead of on the tread where it is subjected to constant wear, the difficulties which now attend the use of pneumatic tires on automobiles would be entirely avoided. The construction of this wheel is shown in the accompanying illustration, in which Fig. 1 shows a section through the center of the wheel hub. The resilient member is indicated at *A*, and consists of a hollow tube of rubber provided along its periphery with a series of ears *B*, as best shown in Fig. 2. The tube lies in a recess formed in the hub casing and is separated from the axle by a bushing. Two metal rings are bolted to this bushing and they are formed with inclined walls to fit over a bead formed on the inner surface of the tube, thus holding the tube firmly in place. The bushing is also provided with two lugs which fit into sockets formed in the tube, thus preventing the latter from creeping. The hub, it will be observed, is formed of two flanges or circular plates, between which the ring *C* is held. Two flanges *E* are



RESILIENT WHEEL FOR VEHICLES.

secured to the ring and these fit over the flanges of the hub *D*. The ring rests along its inner edge on the ears *B* of the rubber tube which is held from moving circumferentially thereon by coil springs. The ring *C* is formed at intervals with sockets to receive the spokes of the wheel. When the wheel is in use any jolting caused by unevenness in the road will be taken up by the cushion tube *A*, the ring *C* being permitted to move between the confining flanges of the hub. As an extra precaution a rubber ring is placed in the bottom of the trough formed between the flange *E* and ring *C*, so as to prevent undue jarring of the parts should the edge or flange *D* be brought into contact therewith.

The Current Supplement.

Mr. Emile Guarini opens the current SUPPLEMENT, No. 1476, with an interesting article on "Automobile Fire Engines." The excellent discussion of radium begun in the last SUPPLEMENT is continued. The recently announced discovery of a new substance called by its discoverer, Prof. W. Marckwald, "Radio-Tellurium," has been made the subject of some interesting letters in Nature by Mr. Soddy and Prof. Marckwald. These letters on radio-tellurium are published in the SUPPLEMENT. "Our Flood Warning Service" is the title of an article by Charles A. Byers. Mr. I. C. Russell writes instructively on the recent volcanoes of southwestern Idaho and southeastern Oregon. His paper is accompanied by striking illustrations. Mr. Herbert C. Fyfe writes on a "New Invention for Rendering Vessels Unsinkable." Mr. E. O. Hovey discusses the "Crystal Cave of South Dakota."

The Atchison, Topeka & Santa Fe Railroad has purchased the Cane Belt Railroad, running from Sealy, Texas, to Matagorda, 90 miles. The building of a line to be called the Eastern Railway of Mexico, which will be about 500 miles long, and cost $13,000,000 to $14,000,000, is contemplated; also a line north from San Francisco.

Engineering Notes.

The Midland Railway Company is introducing a number of steel wagons of a novel pattern, which have been designed for either coal or ordinary merchandise traffic. Some of these trucks have been erected at the Derby works, while others have been built by the Leeds Forge Company. The wagons are 17 feet 6 inches in length (inside), 4 feet 6 inches in depth (inside), 7 feet 9 inches in width (inside), 8 feet 4¼ inches high from the rails, with a carrying capacity of 15 tons. Considerable economies will, it is claimed, be effected by having wagons which can be used for either coal or goods traffic.

North of the Thames the railways of London serve an area of 433 square miles, with a population of more than 4¼ millions. On the south the area served is 259 square miles, with a population of over 2¼ millions. In the former case there is just over three-quarters of a mile of railway for every square mile, and in the latter case just over one mile, the number of passenger stations per unit area being approximately the same in both cases, but in the northern district nearly 13,000 inhabitants have to be served per station, in the latter case 1,200 less. The inward trains on the northern section per week-day are 2,582 and on the southern 2,115, altogether 4,697. An examination of these figures shows that the south side of the Thames is better served than the north.

A pneumatic sanding device has been devised by an American company for electric street cars fitted with air brakes. It is simple, and consists of two traps placed beneath the sand-box. From each trap a rubber hose connects with a 1-inch iron pipe. The air supply is taken from the main reservoir, from which it passes through the motorman's valve with the warning port of the traps. The sand is then lifted from the traps and blown between the tread of the wheel and the rail. The operating valve in the cab is fitted with a warning port, and is so constructed that when the sander is in operation the warning port keeps up a continuous whistle. Should, however, the motorman wish to stop the whistle and still desire to keep the sander in operation, he can do so by simply pressing on the valve placed in the end of the operating valve handle.

A note presented to the French Academy describes an "electro-mechanical" coupling which allows a continuous change of speed from zero to maximum speed, and which is specially suitable when the prime-mover is near the axle to be driven. It consists of a combination of the prime-mover with two dynamos, one running as generator, the other as motor, and both being of a much smaller capacity than the prime-mover, say 1-3 or ¼. The prime-mover transmits always a certain part of its power directly to the main axle to be driven, while the rest of its power is absorbed by the electrical machine which runs as generator. A train of epicyclic gearing is used in such a way that the main axle is acted upon simultaneously by both the prime-mover and the dynamo which runs as motor. These two machines are separate, and may consequently have different speeds. For instance, an epicyclic gearing may be composed of a central toothed wheel and an external wheel with inside teeth, with toothed wheels between the two. The axles of the latter are fixed on a support. The desired result is obtained by connecting each of the three parts (internal wheel, external wheel, and support of the middle wheels) with one of the three axles—that of the prime-mover, that of the electric motor, and the main shaft respectively.

There is no doubt that one of the most important matters awaiting attention in the present day is the improvement of the existing canal systems, which might be reorganized to the great benefit of trade and commerce. A complaint frequently made by manufacturers is that they are seriously handicapped in competition with foreign rivals by excessive railway rates. Agitation sometimes results in the granting of small reductions, but still no substantial relief is given, nor can it be expected. The liberation of the canals from the stifling control of the great railway companies would be the first step toward affording the necessary relief, but considerable alterations in the existing waterways would be necessary before they could be of much use. An excellent scheme for the reconstitution of the canals has recently been submitted to the members of the Liverpool Chamber of Commerce, and there really seem to be no engineering difficulties to prevent its realization. The proposal is to make the canals at least 6 feet deep, with an average width of 80 feet, and to provide them with locks 235 feet long by 32 feet wide, large enough for a tug and five barges to pass at one time. The scheme in question relates to the improvement of 240 miles of canals connecting the most important manufacturing and mercantile districts of Great Britain. The cost would be no doubt heavy, but the benefit to be reaped in the reduction of freight charges would probably be sufficient to justify the necessary expenditure.