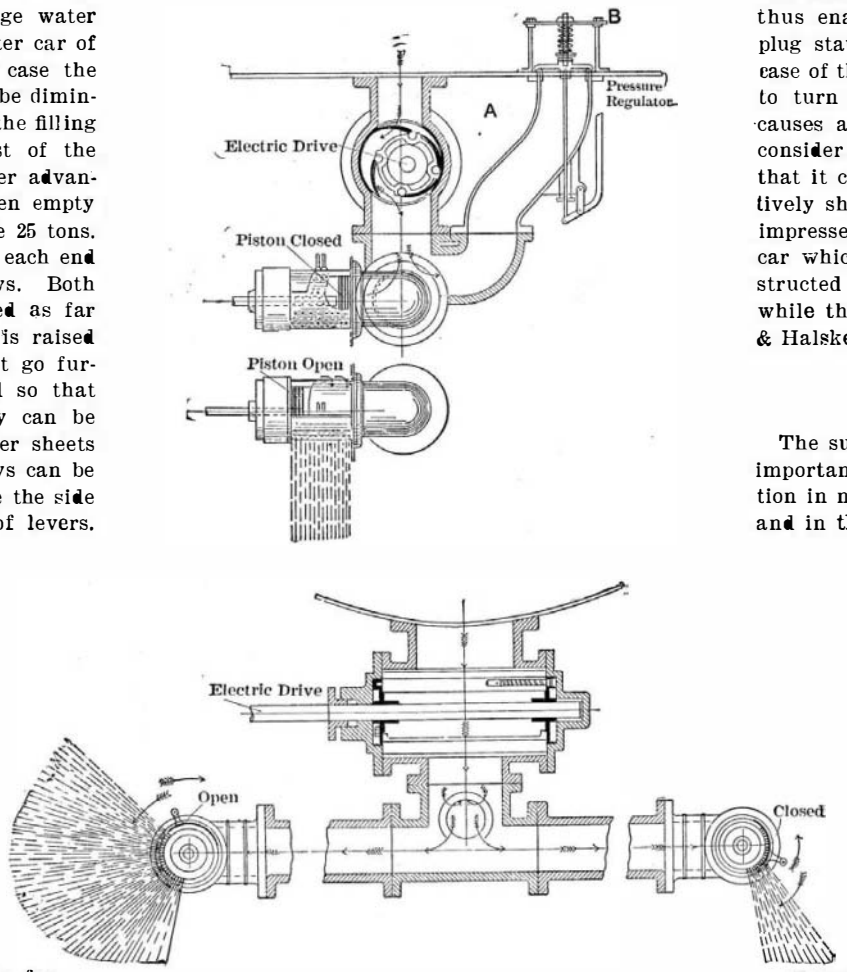
MOTOR SPRINKLER AT COLOGNE.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

A new type of motor sprinkling car is now in use in connection with the traction lines of the city of Cologne. It is intended to run upon the tramway tracks, and for this purpose it is equipped with a trolley pole of the loop pattern. The car is mounted upon two bogies, each of which carries a motor of the traction type giving from 35 to 40 horse-power. The reservoir has a large capacity, some 2,000 gallons, and it was considered an advantage to have a large water tank using a double bogie rather than a lighter car of smaller capacity, seeing that in the former case the number of plug stations for filling the car can be diminished, and besides, less time is consumed for the filling operation. This balances the increased cost of the larger car, and the latter has also many other advantages. The weight of the sprinkling car when empty is about 14 tons, and when filled up it is some 25 tons. There are two sprays on the sides and one at each end under the platforms, as our engraving shows. Both the sprinklers under the platforms are placed as far forward as possible, so that the dust which is raised by the car itself is laid at once and does not go further. The sprinkling apparatus is arranged so that the spread and also the width of the spray can be regulated. The maximum spread of the water sheets together is some 50 feet. Both the end sprays can be regulated by pedal from either platform, while the side jets are likewise controlled by another set of levers.

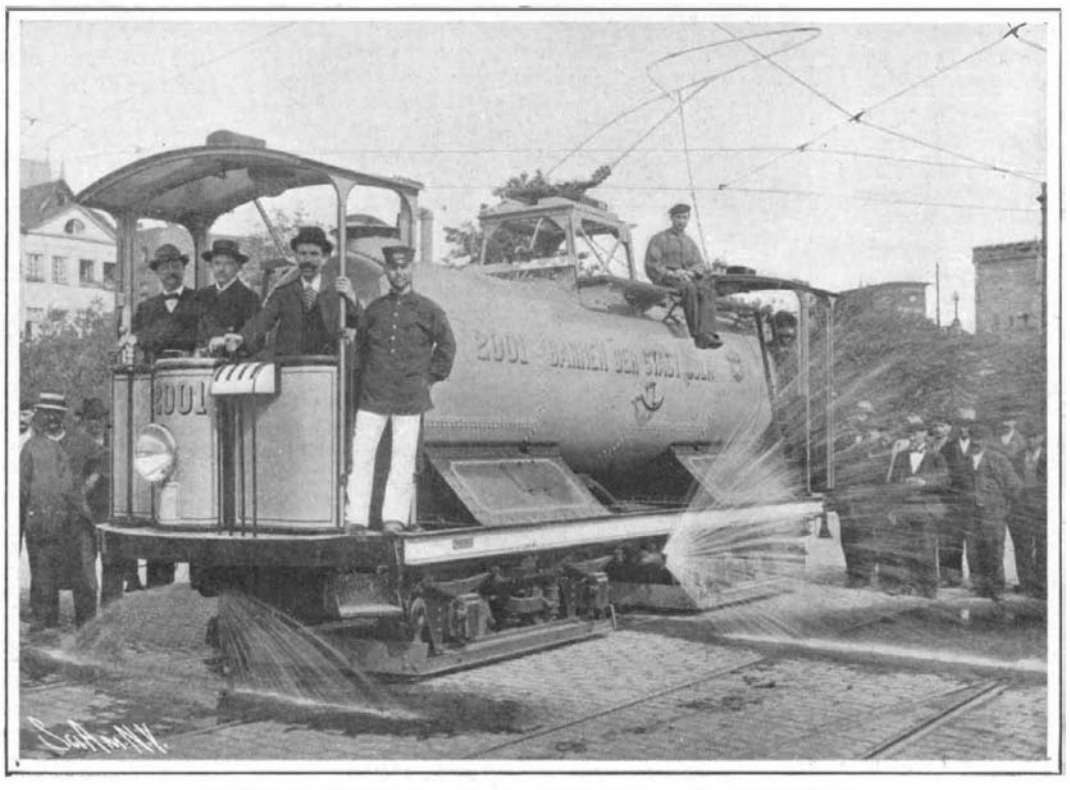
The platform sprays are shown in section in the diagram. The device consists of a sprinkling box which is connected by piping with the main water tank. In the box are two different outlets which the arrows indicate and each half is thus fed separately. A partition divides the box into two parts, and one side has larger sprinkling holes than the other, so as to change the feed. By using one side or the other, or else both together, we obtain three different strengths of water spray. An inner curved guide-plate gives an even distribution of the water. A strainer placed in the piping stops any floating matter. The two side jets are independent of the former. They are shown in the sectional views. One feature is that the width of the jet is independent of the water level in the tank and is kept constant down to the emptying point. To carry this out, a device is placed in the piping at *A*, which gives a constant feed. It consists of a rotating drum placed eccentric in a cylindrical chamber and driven by a small 4-horse-power motor situated under the tank. Upon the drum is mounted a set of vanes which can lie against the surface or can be raised by springs. During the rotation the vanes are thus made to work against the periphery of the cylinder and form a set of feeding pockets by which the water is drawn in from above and distributed to the lower pipe at a constant rate. By a pressure regulator in connection with the tank (shown at *B*) the pressure of the supply water can be controlled at will. This device is operated by levers from the platform. In this case the overflow or superfluous water is sent back to the tank by an appropriate piping. To give each of the side sprays the same pressure in the piping, the regulator can be used to control the strength of the jet. Again, the water can be let out of the sprinkler under pressure by using the motor-operated distributor, or the latter can be left open and the water flows out of the tank in the ordinary way. The former has the advantage of giving a stronger as well as a uniform jet, while in the latter case the spray varies with the water level in the tank.

The spray apparatus has also another method regulating the pressure and also the width of the jet. This will be observed in the second diagram. The sprinkler consists of a cylinder having a number of rows of holes, and inside the cylinder is a tight piston which can be pushed back and forth so as to close off a given row of holes, and so on to a full stop of the water. This controls the width of the feed. Another device, which is shown on the right, consists of a revolving shutter which turns around the feeding cylinder and is operated by a lever. By working the shutter the holes can be uncovered more or less and so the spread of the water can be adjusted from zero up to the full feed. By using these two devices together the operator can secure any desired adjustment of the spray, and each side is independent of the other. In this way the car can be made to water the whole width of the street, whether the car is on one track or the other. The sprinkling car is filled from plugs or hydrants which are situated at certain designated points, and a side track brings the car in front of the watering plug. It is filled by two 3-inch hose, and the time required is about ten minutes. As to the performance of the new car, it is very satisfactory, when we remark that with a tank capacity of 2,000 gallons, an average speed of seven or eight miles an hour and a width of spray varying from 25 to 50 feet total, it covers some three miles of road. During the summer season, when the greatest work is required, the new car will cover some 700,000 square yards of surface as compared with 150,000 square yards with an ordinary horse watering car. The operating cost of the motor sprinkling car is calculated at 20 marks ($5) per day, including electric power, maintenance, and wages. For the same service, five of the horse sprinklers of 400 gallons' capacity would be needed, and the operating cost figures 10 marks ($2.50) each, or a total of $12.50. We thus have an economy of $7.50 per day for the system, and for 100 working days this gives an annual saving of $750.



Details of the Motor Sprinkling Car.

In order to avoid interfering with the traffic of the electric traction lines, the sprinkling car is made to run close behind one of the passenger cars, and it is thus enabled to arrive at the next side-track at the plug station before the next car comes along. In the case of the horse sprinklers, the latter are often obliged to turn out in order to let the cars pass, and this causes a series of gaps in the sprinkling. When we consider the advantage of the motor sprinkler, and also that it covers a large extent of surface in a comparatively short time and with a smaller personnel, we are impressed with the utility of the new system. The car which is now operating at Cologne has been constructed by the firm of Zypen & Charlier, of that city, while the electrical equipment is supplied by Siemens & Halske.



MOTOR SPRINKLING CAR IN USE IN THE CITY OF COLOGNE.

STERILIZATION OF WATER.

BY EMILE GUARINI.

The subject of the sterilization of water is of prime importance because unimpeachable water is the exception in nature; it is found only in uninhabited regions, and in the soil at a level which it cannot reach without slowly percolating through thick strata of well-filtering sand. All other waters collected in populous neighborhoods, spring waters as well as surface waters, should be considered as suspicious. The conclusion is that with the exception of a very few cases, all waters should be purified bacteriologically before being distributed for potable purposes. The two practical methods of biological water purification on a large scale are: 1. Filtration, which reduces the number of bacteria water contains. 2. Treatment by ozone, which radically annihilates all pathogenic germs. Experience has shown that filtration is not always an adequate way of sterilization; moreover, it is stated that "filtration is not sterilization; it is a makeshift which should be improved upon."

Ozonization, on the contrary, is said to fulfill all the requirements of the improvement wished for. So long as ozonized water contains free ozone when leaving the sterilizing apparatus, it is practically sterile, i. e., free from pathogenic germs.

Ozone has exceptional advantages for this purpose. Without introducing any new element into the water, it destroys all discoloring organic matters, all unpleasant odors and tastes, and, with certainty, the pathogenic and other bacteria, with the exception of a few harmless spore-bearing bacilli which the water may contain. The ozone present in the water which leaves the sterilizers is retransformed into ordinary oxygen by from 15 to 20 seconds' exposure to the open air, at the very utmost. Ozonization, therefore, leaves in the sterilized water nothing but some ordinary oxygen—some atmospheric air, in fact. This is an improvement, because superaeration makes water, if anything, more palatable and digestible, and takes away all fear of injury to the distributing plant, because ordinary oxygen does not attack iron and lead mains and pipes. Several systems have been devised to sterilize water by means of ozone. The most recent among them, we believe, is the De Frise system, which embodies several new and interesting characteristics and is put in practical use at the experimental works of Saint Maur, near Paris (France).

The De Frise ozonizers are without dielectric and are kept at the proper temperature; they have sharp metallic points which receive the high-tension current, and are juxtaposed to metallic surfaces connected with the earth. They are worked with tensions higher than 20,000 volts. The air is aspired through them by pumps which force it, when ozonized, through the sterilizer. The apparatus are either horizontal or vertical. The vertical type occupies less room than the horizontal one, which is easier to survey, however. The sterilizers are made on the washer principle; they are provided with a number of

carefully leveled, finely perforated trays, making the ozonized air bubble several times through the water.

The ozonized air is used over again, the inlet of the ozonizers being connected with the outlet of the sterilizers, arrangements being provided to free the air from moisture, and to supply, by fresh air, the oxygen which has been consumed in the shape of ozone.

Count De Frise's ozonizing plant erected on the grounds of the Saint Maur pumping station of the Paris municipality has quite the size of a waterworks destined to supply with drinking water a town with several thousands of inhabitants. It treats up to 150 cubic meters of Marne River water per hour, taken either from the slow sand filters of the city of Paris or from the river, and filtered, without adding any coagulant, by mechanical filters filled with stamped silex. It shows that a plant of even much greater size can be worked by two or three men and does not want more than about 129 effective horse-power in all, pumping included, for a production of 1,000 cubic meters per hour, which is an economical result. The plant, a general view of which is shown in Fig. 1, is erected in a building of sufficient size to contain apparatus for treating 20,000 cubic meters per day. The cellars contain the motor, with its shafting, a centrifugal pump to raise the water, the alternators for the ozonizers and the electrical light, two air-dryers and the sterilizers, the tops of which reach the first floor. The first floor contains the office, the laboratory, the switchboard, the transformer, the ozonizers, and the ozonized air compressor. The motor is a semi-portable

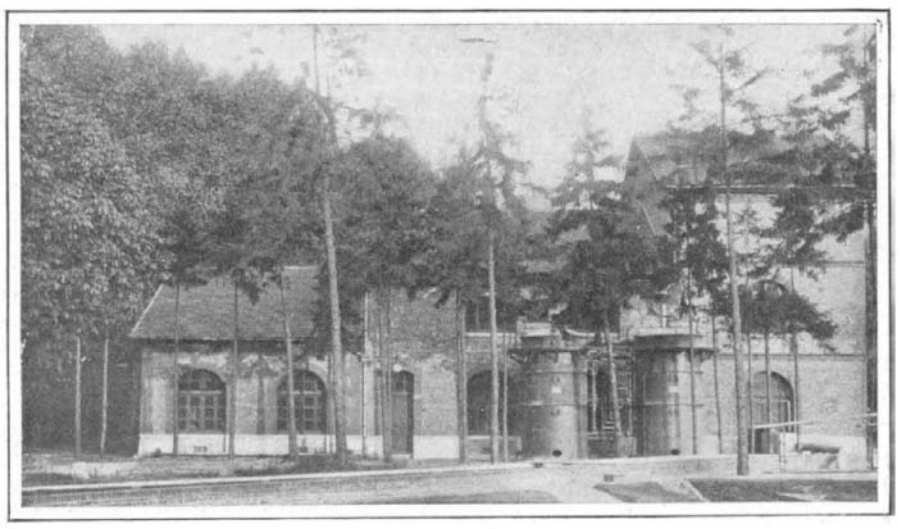


Fig. 1.—General View of the Plant, Showing Two Rapid Pressure Filters of 150 Cubic Meters Capacity per Hour.

45 I. H. P. steam engine. The centrifugal pump is able to deliver 150 cubic meters of water per hour against a head of 15 meters. The alternators are 110-volt Mordey dynamos. The transformer, shown in Fig. 2, raises the pressure of the current to a maximum of 80,000 volts. The switchboard is provided with the usual fittings. The ozonizers are horizontal. Fig. 3 shows one with resistance, and Fig. 4 with condenser. There are two series of ozonizers, each consisting of three groups of three elements. Each element is made of a horizontal brass half-cylindrical trough fitted with a plate-glass cover and a cast-iron water mantle. The trough is earthed and makes one of the poles. Across the trough, at regular distances, brass half-disks with serrated circular edges and of 60 millimeters less diameter than the trough are suspended from the glass lid by means

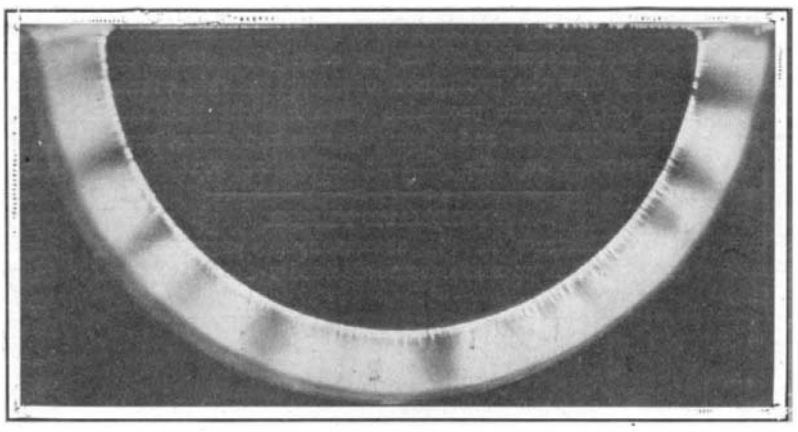


Fig. 5.

of screws which take the high-tension current from the liquid resistances fitted to each half-disk. The resistances are vertical glass tubes sealed at the bottom, in which is soldered a platinum wire projecting on both sides of the glass. The tubes are filled with an appropriate liquid, to which the current is transmitted by a platinum wire dipping in the top of it. The resistances perform the part of regulators, preventing the tension of the portion of current allowed to each semi-circular pole, to rise above the limit at which sparks or voltaic arcs are produced. Silent discharges are produced between the sharp points of the semi-circular poles and inner surface of the earthed troughs. The troughs are closed at both ends and fitted with an air inlet at one end and an air outlet at the other. The current of air circulating between both ends passes through the succession of half annular discharges which transform part of its oxygen into ozone. After its passage through each discharge, the air, heated by electrization, is partially cooled down by the cool surface of the trough. This cooling is periodically completed by means of surface condensers intermediate between the elements of each line of ozonizers. The ozonizers are placed in a dark room; this allows of judging from the blue-violet color of the flames that the apparatus are working in good condition.

The ozone compressors are double-acting vertical pumps of 150 millimeters diameter and 200 millimeters stroke. They draw the air through the ozonizers and force it into the sterilizers.

The sterilizers (Fig. 6) are cast-iron vertical cylinders, enameled inside. They are built up from parts, 50 centimeters high, between the flanges of which are fitted horizontal celluloid diaphragms perforated with a great number of small holes having a diameter of 0.7 millimeter.

The water and ozonized air are introduced into the lowest compartment of the sterilizers, by means of which an injector which makes use of the *vis viva* of the water arriving under pressure, to assist promoting the circulation of the ozonized air. Air and water ascend together to the top of the sterilizer, being intimately mixed at the passage of each finely-perforated diaphragm. The sterilizing columns are fitted with spyglasses and arrangements for collecting samples. The sterilized water flows from a general main into a tank placed in the open air, from which it goes into the covered reservoir for filtered water of the city. A third sterilizer at Saint Maur belongs to the type in which the water is injected in the shape of a fine spray into the mass of ozonized air. The spray collects, in the lower part of the column, as solid water, into which the ozonized air is forced through the apertures of a perforated diaphragm which makes it bubble, in minute bubbles, through the water before reaching the spray. The waste air of the three sterilizers is recuperated by simple connection of the outlet of the sterilizing columns with the inlet of the ozonizers, to be ozonized over again. Well-balanced air valves admit sufficient fresh air to make up any deficiency in oxygen of the recuperated air. The collecting tank is provided with a weir to measure the quantity of water discharged per hour. Fig. 7 gives a vertical section of one of the two rapid pressure filters (shown in Fig. 1) used in conjunction with the plant. Each of these filters consists actually of three separate filters built the one on top of the other. The three have a common central inlet pipe and each has its own bottom, its own outlet valve communicating with the discharge main shown on the right of the engraving, and its own outlet for wash water shown

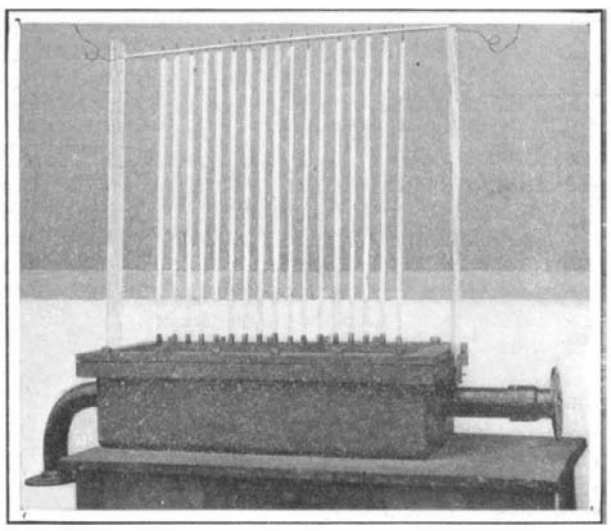


Fig. 3.—Ozonizer with Resistances.

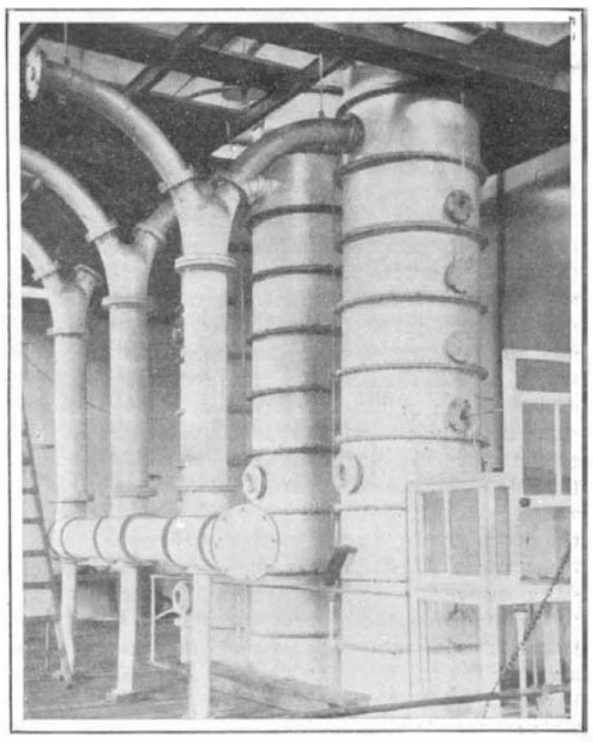


Fig. 6.—The Sterilizers.

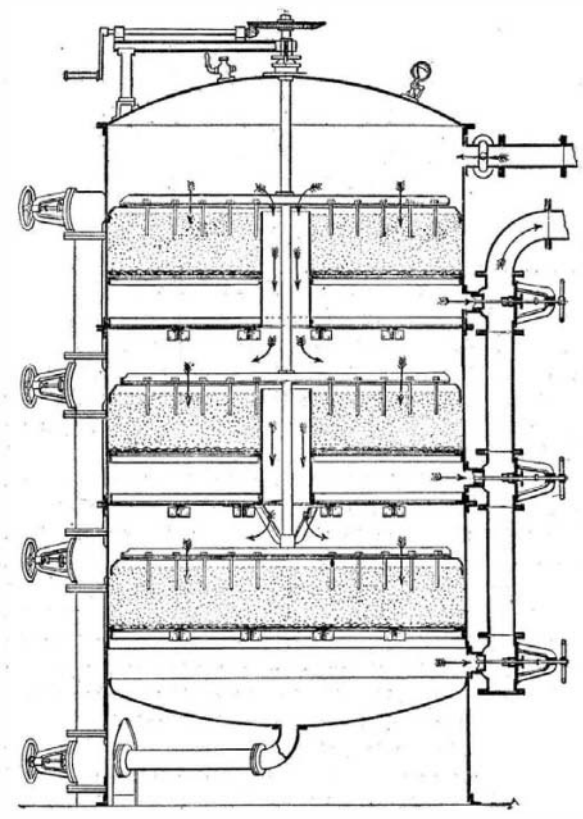


Fig. 7.—Diagram of the Sterilizer.

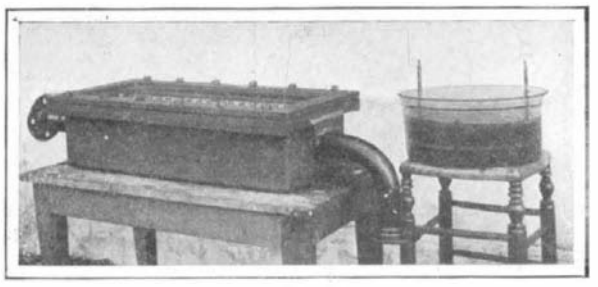


Fig. 4.—Ozonizer with Condenser.

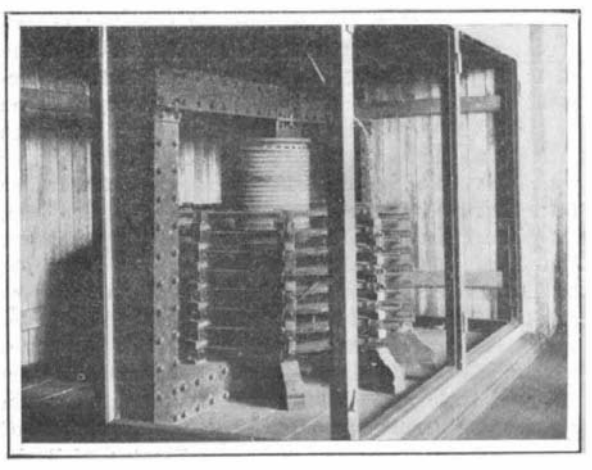


Fig. 2.—The Transformer.

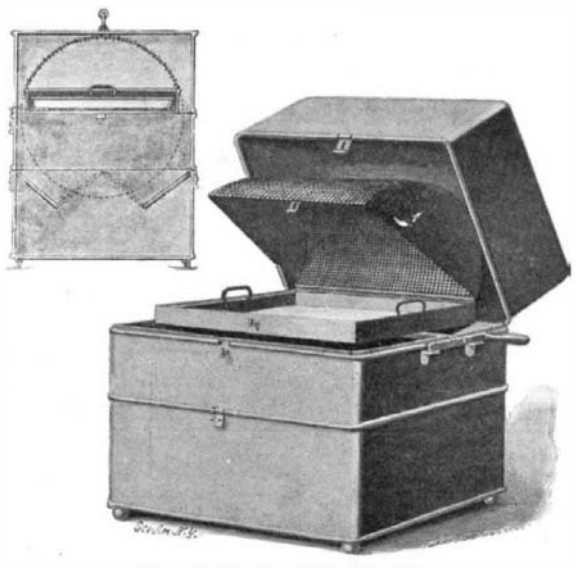
STERILIZATION OF WATER.

on the left. A central shaft works the three rakes which agitate, during the cleaning, the pounded flint with which each filter is filled. Each triple filter is washed by revolving the agitators and admitting, by the outlet valves, the filtered water of its neighbor under the layer of flint through which it passes upward to be drawn off by the valve system on the left.

In a recent test the ozone consumption per cubic meter of water was 1 19 grammes, and the current consumption 122 watts, the colonies were 149 before and 2 after ozonization. In another test the above figures were respectively 2.039 grammes, 236 watts, and 2,680 before and 3 colonies after ozonization.

AN IMPROVED ASH SIFTER.

Those who are in habit of building their kitchen fires afresh each morning will be interested in the improved ash-sifting device which we illustrate herewith. The device is arranged to permit of sifting the ashes without filling the surrounding air with dust. The improved sifter comprises a box consisting of the main or body section and an upper auxiliary section. These sections are fitted together with a tight joint and are securely fastened with hasps and turn buttons. The upper section is provided with a hinged cover which, when closed, forms a dust-tight joint therewith. A hasp and turn button lock the cover in closed position. A handle on this cover provides means for carrying the device. Sockets are formed in the upper edge of the auxiliary section, at opposite sides to provide bearings for a shaft. This shaft carries a tray which is rigidly attached to it. The cover of this tray consists of a screen of semi-cylindrical form. The shaft is operated by a lever thereon which carries a crank handle at one end. Normally the shaft is prevented from turning by studs at each end of the lever, engaging lugs on the outside of the upper section. In use the pan of ashes which is to be sifted is placed in the tray and the screen cover is then fastened down, also the main cover of the device. Then the lever on the shaft is pulled outward so as to clear the lugs. The handle may now be rotated to invert the tray and pan of ashes, after which it should be rocked back and forth to sift the ashes through the screen. When the screen has been sufficiently rocked, the lower section may be disengaged to permit removal of the ashes. This body section is provided with two bails which may be swung over to the dotted position shown in the section view, when the body part may be readily lifted and carried in one hand. Legs are formed on the bottom of this section to space it from the floor and thus prevent scorching the floor or carpet when



AN IMPROVED ASH SIFTER.

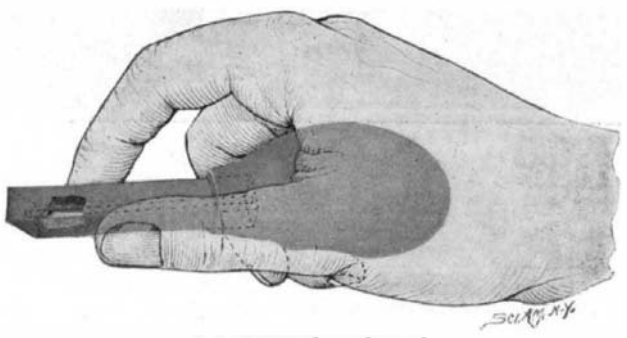
hot ashes are sifted. A patent on this ash sifter has recently been granted to Mr. Eugene A. Bagby, Bowling Green, Ky.

American Opium.

In view of the fact that the Department of Agriculture at Washington has inaugurated practical experimental study in the planting and cultivation of the opium poppy in one of the Southern States, it is timely that Dr. Emil Weschke, of San Francisco, who has most extensively worked along these lines, advances his views, deductions and conclusions in the August number of the Pacific Medical Journal. The author states that he knows of but one instance where opium, i. e., a marketable product, was grown in this country. Prof. Flint, of San Francisco, obtained good opium in the Sacramento Valley, which answered to requisite tests and possessed the physical attributes of a good article, but its production was unprofitable. It was a question of cheap labor to produce it, and this was not procurable. For his own experimental opium farming the doctor was furnished with varieties of poppy seed grown at the Jardin des Plantes, of Paris, and the Royal Botanical Gardens, Berlin. In addition to this, he procured some seeds grown in the State of New York. The seeds were planted in rich dark loam. He incised the capsules of the poppy in the usual way in the evening and the following morning gathered the concrete juice by scraping it off with a blunt knife on to porcelain plates. The product was of a rich, dark-brown color, had a bitter taste and strong odor, and, when dry, was of conchoidal fracture. The amount of morphine yielded from this opium was 15.28 per cent, narcotine 0.325 per cent, codeine 0.416 per cent, meconic acid 3.5 per cent. The author concludes that the production of opium in this country can only become profitable when the cheapest labor can be procured, and when scientific and expert supervision rules over the planting, cultivation, etc.

A PNEUMATIC ERASER.

We illustrate in the accompanying engraving an eraser which possesses some decidedly novel features.



A PNEUMATIC ERASER.

The inventor, who is a stenographer and court reporter, felt the need of some simple device for brushing or blowing away the dust of an erasure. The common habit of using the hand to sweep away the particles is objectionable when operating on manuscripts written with a copying ribbon, for unless the hand is perfectly dry it will smear the ink. Neither is the alternative of clearing away the dust by blowing one's breath on it entirely satisfactory, for moisture blots are liable to occur which sometimes destroy a whole page of matter. Furthermore, the inventor found that bending over to blow away the dust every time he made an erasure was very trying on his patience. As a solution to the difficulties it occurred to him to use a rubber syringe to blow away the dirt and a further development was to combine the eraser and the syringe, as shown in the illustration, so that the two operations could be done with one tool in the hand. An eraser of standard type is used in which a hole is bored, as indicated by dotted lines. The eraser is fitted into a rubber bulb and serves as a nozzle of the syringe. In use the eraser is held as illustrated, with the bulb in the palm of the hand. After rubbing out the desired mark, the eraser is lifted a trifle from the paper so as not to close the air duct, then on squeezing the bulb the dust and dirt of the erasure will be blown away. When one eraser is used up it may be removed and another inserted in the bulb. Mr. C. S. McGill, of Owensboro, Ky., is the inventor of this novel eraser.

Power Transmission to Stockholm.

According to a note in "Tekniek Tideskrift" an agreement has been arrived at between the managers of the Stockholm Gas Works and the Söderfors Bruks A. B. with a view to the purchase of two waterfalls of the Dalelf. These waterfalls, which are situated on the same branch of the Dalelf River, give a head of 7 meters with a volume of 250 cubic meters of water per second, which will be obtainable after regulation. With a minimum water supply of 100 cubic meters per second, about 10,000 electrical horse-power is obtained in Stockholm, and with 250 cubic meters as much as 26,000 horse-power. The cost of installation in the latter case has been calculated at 525 to 550 kronor per transmitted electrical horse-power, the purchase price being 1,150,000 kronor. The distance is 125 kilometers from Stockholm.

Water Power in the German Alps.

Since the construction of the numerous valley dams in Rhenania, Westfalia, and Silesia, more attention has been paid to an adequate utilization of the water power stored up in the German Alps, which has so far been rather neglected. According to a statement of the Hydrotechnical Bureau, only 75,000 horse-power, that is to say, 10 per cent of the available amount, has been utilized so far in the Bavarian Alpine districts. Out of the numerous mountain lakes, Walchen Lake, according to a recent article in the Kölnische Zeitung, would be especially suitable for power purposes. This lake, 6 kilometers in length and 5 kilometers in breadth, extends through a magnificent mountain region at the considerable height of 803 meters above the level of the sea. Now, the most remarkable feature of this lake is the fact that it approaches close to the edge of the mountains, where the latter abruptly fall to the plateau for a distance of a hundred meters. Near the foot of the latter (some 2 kilometers distance as the crow flies), Kochel Lake is situated at only 601 meters height above the level of the sea. Now, as this lake is likewise of considerable size, the head of 202 meters between the two lakes would no doubt have long been utilized for the production of electrical power but for the fact that Walchen Lake would be exhausted very shortly in case a juncture be effected with Kochel Lake. Now, nature seems to have afforded a possibility of supplying enormous amounts of water to Walchen Lake from the immediate neighborhoood. In fact, the Isar River, which has an extremely heavy flow of water in the spring and summer, passes at a few kilometers to the south of Walchen Lake at a still greater height above the level of the sea. Whereas, throughout the larger part of the distance a high mountain separates Walchen Lake from the Isar, two rivulets joining the river and Walchen Lake respectively pass close by one another in the neighborhood of the Munich-Mittenwald-Innsbruck road. To lead the water of the Isar into Walchen Lake, this relatively level ground could be made use of, or else a tunnel would have to be pierced. In any case the cost of a similar installation would be relatively low, the dam basin being available. The amount of power that could be derived with the head of 202 meters from the water masses of the Isar is thought to be sufficient to warrant the electrical operation of a great part of the Upper Bavarian state railways. As the neighboring district has up to now no industries worth speaking of, the electrical power would, indeed, have to be used for a similar purpose, unless it be preferred to transmit it to Munich. From the fact that the above projects are at the present moment being considered by the department of communications, we may infer that it is the intention to introduce an extensive electric railway system.

A NEW TOY.

In the accompanying engraving we illustrate a recently patented amusement device, a novel form of see-saw, the invention of Mr. Edwin D. Smith, of 248 Fourth Avenue, Pittsburg, Pa. The device was designed to provide a light, simple, and portable construction adapted more particularly for the entertainment and amusement of children, and for this purpose the inventor made use of the principle of the lazy-tongs, as shown by the illustration.

The central post, consisting of two similar and parallel pieces, is erected upon a suitable base. In this case the longitudinal member of the base is firmly bolted between the two pieces of the central post, rigidly joining it with the base, and at the same time separating the said pieces at the proper distance. The

A NEW TOY.

cross-piece of the base may be turned about a pivot bolt into a longitudinal position, to facilitate the storing or shipping of the see-saw. Three parallel bars, the upper one shorter than the other two, are pivoted by means of bolts between the two sections of the central post. Vertical shanks carrying seats are pivoted to the two lower bars at their extremities. Two other vertical bars pivoted to all three longitudinal bars, and at the extremities of the upper, shorter one, are provided with handle bars and foot-rests. The see-saw is shown in the drawings adapted for persons of approximately the same weight. The parallel longitudinal bars are provided with several bolt-holes so that it is possible to adjust the device for persons of varying weight by shifting the bars lengthwise upon the posts. The operation is easily understood from the illustration. The persons see-sawing when in the seats, as well as in mounting and dismounting, rest their feet upon the foot-rests, and grasp the handle bars. Then to operate the see-saw it is merely necessary for the two ocupants to push and pull with both hands and feet, if desired, in opposition to each other. This see-saw is simple, light, and an inexpensive article, which may be easily shifted from place to place, while at the same time affording much pleasure and amusement.