AN ELECTROLYTIC STERILIZING PLANT.

A recent application of electrolysis to the industrial sterilization of water has been used in a plant in England of which the details have just come to hand. At a textile mill, which is devoted to the woolen dyeing and finishing processes, a supply of water is obtained from moorlands on which cattle are grazed, so that there is some slight contamination from this source; the result was formerly the rapid growth of algae in the storage reservoirs, which filled up the supply pipes. Grids were useless, as the fine silky threads lay across the grids in a felted mass which had to be removed with rakes every half hour, and the threads thus broken and released got into the mill and on the goods, whence they were irremovable.

Chloride of lime solution destroyed the weed but hardened the water; the result was that scale formed in the boilers and curdled the soap used in the fulling and finishing of the woolens, so the use of this chemical had to be abandoned, and the weed soon reappeared. Copper sulphate was tried, and this at once affected the dyes.

Mr. Toyne, the consulting chemist, was acquainted with Dr. Samuel Rideal's investigations into the subject of water purification, wherein the use of electrolytic sodium hypochlorite was advocated, and as a last resource he tried the electrolyzer made by Messrs. Ernest Grether & Co., of Manchester. After three days' trial this proved entirely successful; the weed was killed, and the water—which had previously been tinged slightly yellow, owing to the infiltration of peaty matter—was changed to the ordinary blue-green of pure river water. The proper strength of chlorine to effect the purpose was ascertained by experiment, and amounted to about two parts chlorine to 1,000,000 parts water. The little "Manchester" electrolyzer which was used is illustrated in diagram herewith. A couple of planks were thrown across the little stream which fed the reservoir, and the apparatus was mounted on these, so that the electrolytic sodium hypochlorite, as made, trickled into the brook, and was thus intimately mixed with all the water that entered the reservoir. An automatic feed tank was provided at a higher elevation, and a hogshead of brine, higher still, as shown, so that, after filling the hogshead once a day, the operation of the plant was entirely automatic. A little roof, not shown in the diagram, protected the apparatus from the weather. Current was provided from the mill-lighting circuit at 110 volts by means of an overhead line; the current amounted to about 8 amperes, and the overflow from the electrolyzer was at the rate of 1 litre per minute, with a strength of 3 grammes active chlorine per litre. The brine had a strength of 4 per cent.

When the amount of chlorine required had once been determined, it did its work in the reservoir, and spent itself on the organic matter therein; there was no chlorine present at the outflow. Daily chemical tests failed to show either chlorine or nitrogenous matter, and the dyes were not affected. If any free salt was present, the quantity was too small to be detected, and in any case it was harmless. The water was excellent for drinking purposes, and, in fine, the experiment was a great success from every point of view.

The subsequent development of this experiment is even more interesting: as winter set in, it was decided to stop the electrolyzer, as no growth of algae takes place in cold weather; at the end of a fortnight complaints were made of the reappearance of peculiar markings, or stains, on the material in course of treatment, which excited comment, seeing that this old trouble had been absent during an exceptionally hot summer. The bacterial action of the water was at once suspected, and the electrolyzer was restarted, when the fungoid growths at once disappeared. Needless to say, instructions were issued to run the electrolyzer henceforth summer and winter.

Further experiment has shown that in winter, when the growth of vegetation is suspended, the amount of electrolytic sodium hypochlorite may be reduced to 1 part per million, the contaminated water thus treated refusing to show any action on gelatine plates.

The importance of this later discovery calls for special emphasis, for it appears to have a much wider bearing than the original application of the system to prevent the growth of algae. The bacterial growth or mildew above-mentioned has long been a source of continual trouble in many bleach works, and has previously been ascribed to local infection, such as contact with old wood on floors or stillages infected with mildew, inferior sizing materials, etc., whereas it is now traced to the true cause—contaminated water supply—and simultaneously the remedy has been revealed, in the shape of the electrolytic sterilizer.

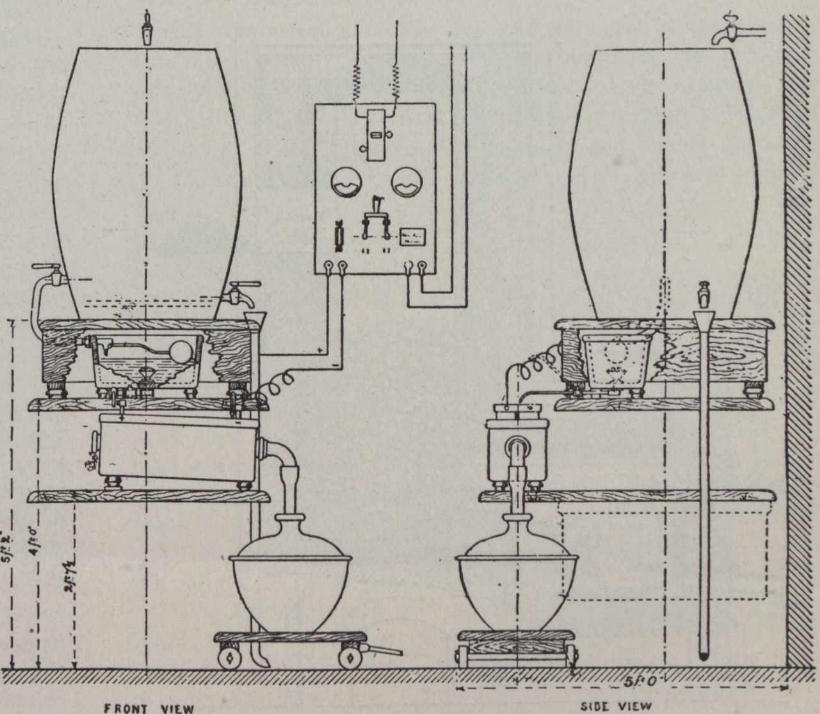

Diagram of Electrolytic Sodium Hypochlorite Sterilizing Apparatus.

The cost of working was estimated as follows:—Taking the cost of energy as derived from the mill at about 5 cents per unit, and running the plant at 8 amperes for 10 hours a day, the consumption of energy was $110 \times 8 \times 10 = 8.8$ units, costing, say, 4 cents a day. The brine used amounted to 132 gallons of 4 per cent. density per day, requiring 52 lb. of salt, which, at the price paid by the dyehouse, cost 10 cents. The labor and attendance required was negligible, and the total cost thus came to about 14 cents a day.

The installation was at work all last summer during the exceptionally hot season, and has been in operation for nine months to the entire satisfaction of the owners of the mill. The system is, of course, applicable to a great variety of cases in which water is contaminated with organic impurities—for example, it can be used to purify the water of swimming baths, as is already done at Poplar by Dr. Alexander, with excellent results.