as well as at noon time when the factories partly shut down their machines, a sudden jump occurring early in the morning and at 1 o'clock noon. The lamp, owing to the resistance through which it is operated, burns at 375 volts across the terminals and remains lighted with considerable reduction (10 per cent.) of voltage. A sudden change of voltage of such magnitude as encountered here, or the supply of over 375 volts, breaks the arc. Frequently on Monday mornings the lamp was found out, the watt-meter indicating that the interruptions had occurred between 6.30 a.m. and 7.00 a.m. These abnormal conditions should be controlled in all installations. It is inadvisable to have other machines on the same inside line. Machines occasionally get out of order and a fuse will blow out, resulting in an interruption of the current. The lamps do not light up automatically, and consequently falling off in disinfection must result.

In most municipal plants, auxiliary lines or storage batteries can be installed, and the unit will consist of several lamps burning at all times, the water passing each lamp in succession. In such an installation the behavior

Table II.—Adjustment of Baffles.

Opening in the inclined baffles.	Turbidity. P.P.M.	Voltage.	Percentage bacterial removal. 18-22° C. count.	37·5° C. count.
December 24—Horizontal Baffles in Place				
¼ inch	1	350	99.84	98.7
½ "	1	350	99.3	99.2
1 "	1	350	99.8	99.67
1½ "	1	350	99.8	99.7
2½ "	1	350	99.84	99.72
December 26—Horizontal Baffles Removed.				
¼ "	30	350	97·5	98.5
½ "	20	350	97·5	98.4
¾ "	1	350	99.6	99.9
1 "	20	350	98.7	99.0
1½ "	30	350	98.5	98.6
2 "	20	350	99.4	99.4

of one lamp or the going out of a lamp will not affect materially the disinfection going on. Such plants can always be operated under a factor of safety. Overdosing with ultra-violet rays has no such effect as overdosing with chloride of lime, which causes an increase in the objectionable taste and odor.

As regards the tank used in the experimental D.F. apparatus, the water came in through a riser pipe, bent to an oval shape, the water discharging against the cylindrical quartz protection tube. It was found a very difficult matter to regulate the flow so as to have an equal velocity through the apparatus on both sides. The riser was made of sheet metal, and irregular in shape. The bottom of the tank being made of thin flexible metal, the centering of the riser was unsteady on account of a springing action. A slight deviation threw the majority of the water to either side of the lamp, thus introducing a possible loss of efficiency. A better arrangement is to introduce the influent through a pipe at the side or bottom and past fixed baffles, similar to the exit.

The ventilation of the lamp box on the same apparatus introduced some new trouble. The location of the apparatus was in a particularly dusty part of the plant and the method of ventilation of the lamp box allowed the dust to be carried in. It then circulated into the quartz protection tube carried by the current of air due to the difference in temperature between the lamp itself and the tube. The dust deposited on to the inside surface and in time became dense enough to interfere materially with the action of the rays. Attention was drawn to the accumulation of dust by the decrease in sterilizing power of the lamp. The tube was then removed and cleaned out; at the same time it was found that the tube had been cracked, but whether by a knock administered during the many changes of baffle plates, or whether by temperature extremes, is not known. The tube was replaced after the crack had been repaired and from time to time a piece of absorbent cotton was used to wipe out any dust that had collected there. The only way to guard against this trouble would seem to be the separation of the resistance and the lamp box proper. That is to say, that if the source of most of the heat were removed so much ventilation would not be required and the possibility of dust getting in and interfering with the operation would not be so great. Also, a fine metal screen might be provided over any ventilation openings in the lamp box.

Table III.—Progress of Sterilization in "D.F." Tank.

Sample Point	Average Bacterial Count 18-22° C. Count	37.5° C. Count	*Colon Fermentation	Percentage Removal 18-22° C. Count	37.5° C. Count	Colon Fermentation	Average Removal
Influent	730	200	1,230	....	....	....	....
A	50	17.4	31	93.2	91.3	97.5	94.0
B	49.5	12.7	29	93.4	93.6	97.6	94.8
C	23	4.2	29	96.9	97.9	97.6	98.1
Effluent	26	16.4	20	96.4	96.8	98.4	97.2

*B. coli per 100 cc. presumptive test.

Character of Water Treated.—The source and method of addition of pollution, and the nature of the solids (organic, inorganic or colloidal) thus introduced into the water, are all important points which affect the interpretation of the results, and in order to have all information in connection therewith thoroughly understood the case of each installation is taken up separately.

The accompanying diagram (Fig. 1) shows the arrangement of the B2 apparatus in the system. The tap water and the Imhoff effluent were mixed in the overflow tank A, the quantities being regulated by the valves on the sewage and water pipes, a constant head being kept on the overflow. A mixture of the two enters the coagulating tank B. The storage was two hours. This tank, in turn, overflowed to C and D, D being the mechanical filter while C is a slow sand filter to which the mixture was also supplied. The discharge of the mechanical filter was regulated by a float valve keeping a constant head over a standard adjustable orifice. The sterilizer was supplied from a pipe inserted in the effluent pipe of the filter, and was arranged so that it could also be supplied from the raw water in tank C, or with tap water directly from the main by opening valve W and closing valve F to the filter.

Other points marked on the diagram indicate points from which the samples were taken. Thus, when filtered water was being treated, the influent sample from the filter was obtained by immersing a sterile bottle attached to a piece of copper wire into the water and allowing it to fill. The filter effluent, or water going into the sterilizer, was sampled at H by holding a sterile bottle under the stream, the effluent from the sterilizer being sampled similarly at K. When treating tap water, the influent sample was obtained at H as before, an excess of water being allowed to escape here.

Tap water, when used with sewage and turbidity added, passed through tank C, which was converted into a mixing tank, the added turbidity being well stirred into the water by means of a paddle, and the sample taken through a tap placed in the line at C, as shown.