of a few different places in the spectrum. For convenient tabulation the unit μ is used equal to 1/1,000 millimeter or equal to 10,000 angstrom units.

The upper limit of the very bactericidal ultra-violet is a wave length of 0.28μ. It is seen that the lower limit of the solar spectrum shows a ray length of 0.295μ, and this just approaches the length required for maximum bactericidal activity.

Ultra-violet radiations of solar origin, of length smaller than 0.295μ are entirely absorbed by the atmosphere and hence do not reach us. In order to obtain light which is truly bactericidal (of wave length less than 0.28μ), we must have recourse to artificial means.

The quartz mercury-vapor lamp is the most powerful of these. Luminescent mercury-vapor is very rich in ultra-violet light. Its ultra-violet spectrum reaches from 0.3650 to 0.2225μ. Quartz is transparent to all light of greater wave length than 0.15μ and to all the rays of the spectrum given out by the luminous mercury-vapor.

The ultra-violet rays of smaller wave length than 0.28μ and especially bactericidal; those between 0.28μ and 0.2225μ from the quartz mercury-vapor lamp are very destructive to all living cells, and dangerous to any one handling the lamp without proper precautions.

The spectra of sunlight and of quartz mercury-vapor lamp with wave lengths noted are compared in Fig. 5. Here is shown graphically, what Prof. Courmont states in his article, the overlapping of the quartz lamp spectrum into the field of bactericidal activity, while that of the sun, due to its passage through the atmosphere, stops before this point of maximum activity is reached.

Some work has already been done concerning the efficiency of the rays in the killing of bacteria, with pure culture of different forms, using a small 66-volt lamp, burning 3.5 amperes. Dr. M. Von Recklinghausen, at Sorbonne University, gives the result in graphic form (Fig. 6) showing a comparison of the resistance of different types of bacteria to the rays.

In the progress of the work carried out by Mr. Parkinson pure cultures of the different bacteria were not experimented with; a comparison between ordinary water bacteria and those growing at body temperature was, however, carefully made. The exposure was either in the ordinary commercial types of apparatus or by means of a quartz tube of dimensions and form as shown in Fig. 7. In the bulb of this tube the water containing the organisms was inserted by means of a pipette, care being taken not to wet the sides of the tube in doing so. Then the bulb was immersed in the tank until it was in the plane of the lamp, and at a predetermined distance. The screen was then removed from between the bulb and the lamp and the exposure timed carefully, the screen was then replaced and the bulb removed, the water being examined in the usual manner.

Results obtained in this way point out the fact that the sterilizing action is largely accounted for in the first close contact that occurs. Thus in five minutes' exposure at a distance of 22 inches from the light the action is not as great as in two minutes at 9 inches from the light, while it takes three minutes at this latter distance to sterilize the water. However, when the water is exposed

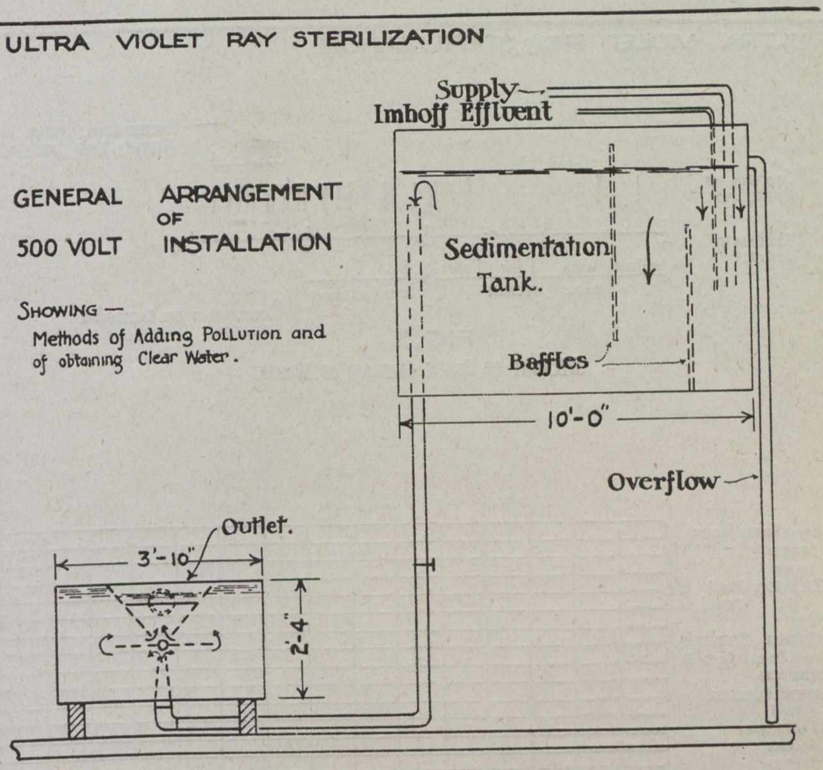


FIG. 3

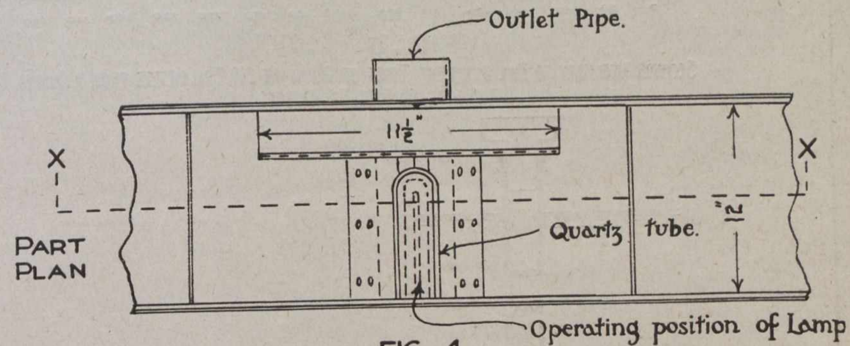
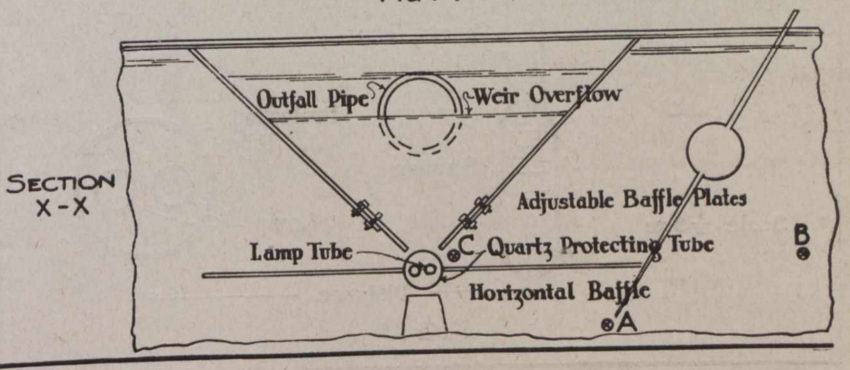


FIG. 4



as close to the lamp as possible, that is the sample tube touching the protection tube and creating a film of water about ⅜ inch in thickness next it, the sterilizing action is completed in a very small fraction of a minute and if