general observations given above, demonstrate that the initial exposure on leaving the riser is responsible for the most of the sterilization taking place, the presence of the baffles and the second exposure being simply a means of procuring a safety factor in the operation of the lamp.

The treatment of turbid waters is now brought to our attention. With baffles adjusted unfavorably as regards the treatment of water of this character the removal of bacteria was exceptionally high, being well over 99 per cent. with turbidity of 20. With turbidity of 30 and a direct path between the initial and final exposure, that is to say with the horizontal baffles entirely removed, the removal was 97.5 per cent. and 98.4 per cent. as regards the bacteria growing at temperatures of 18-22 degrees C. and 37.5 degrees C. respectively.

The action as regards coli was not ascertained, due to the fact that the pollution of the water was greater than expected and the dilutions used did not define the limits. The bacterial count of sewage varies greatly from day to day, being affected by drainage conditions, and with apparatus arranged for a constant dilution it is difficult to judge as to the colon content of the treated water at any given time.

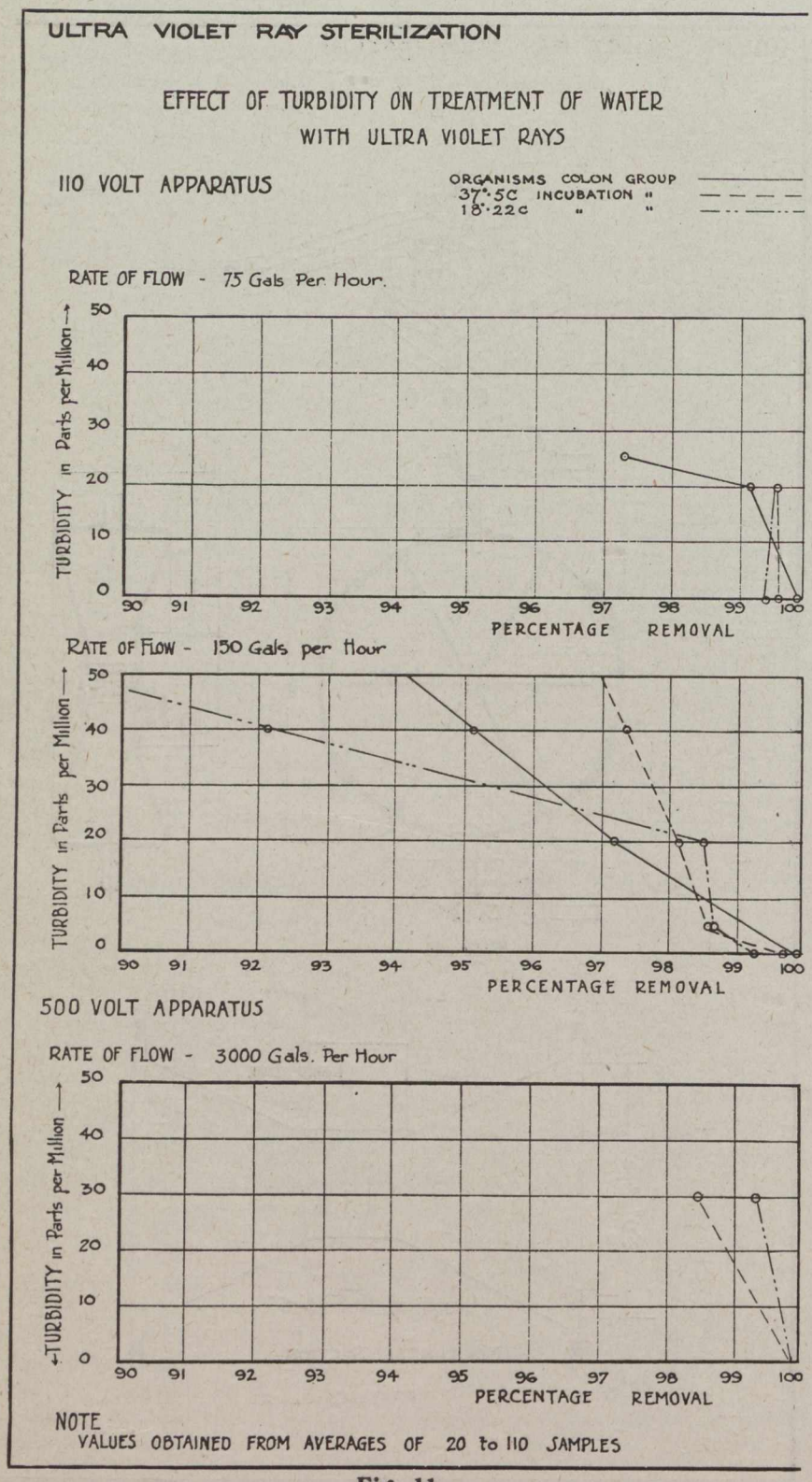

Fig. 11.

Following this work, other experiments were undertaken to determine the progress of sterilization in the tank itself. The samples, withdrawn through pipettes (Fig. 4) from the three different points marked A, B and C, were taken at the same time. By comparison of the counts from different sampling points with that from the influent the progress of the sterilizing action throughout the course of the water in the tank is followed.

The results (Table III.) show once more that most of the sterilization takes place on the first contact of the water with the rays; sample point A shows a reduction in count of 94 per cent. while the increase due to the action of the rays during the passage of the water from the lamp to the side of the tank, back again and past the lamp a second time is accountable for another 3.2 per cent., making a total reduction of 97.2 per cent. from influent to effluent.

As regards the operation of the lamps, the small one or B2 apparatus is first considered. Very few difficulties were encountered with this lamp after it was put in running order. Duplicate lamps were sent with the apparatus, which were both broken in transit, and both were repaired by Mr. Menzen, of the Department of Physics, University of Toronto; these lamps afterwards operated constantly. The lamp burns with a resistance on a 110-volt line and requires 75 volts across the terminals. On one occasion when the water was turned off and the lamp left burning it overheated and the composition protection on the top of seals burnt off, resulting in an expansion of the mercury in the terminals. The mercury which evaporated condensed on the surface of the water in the form of a white powder. Attention was drawn to this the next day by a dropping off in the sterilization due to the presence of this shield between the light and the water. The lamp did not go out.

The operation of the 500-volt lamp gave some trouble and this is of interest as regards supervision of installations. The power for the lamp was taken from a 500-volt direct-current line, which also supplied power for the pump used for lifting sewage. The voltage on the power line was very unsteady and varied from 450 to 560 volts. On holidays it was low, the supply being cut down on account of low requirements of other customers on the line. During the night this happened to a certain extent.