good bacterial purification in spite of the fact that the flock usually appeared to form quirker than was the case with a colder water.

4. Turbid waters generally flocked quicker.

5. In waters containing large numbers of microscopic organisms the flocking was invariably retarded.

6. The final flocking and clarification at the end of 18 hours of waters that in the earlier stages had shown considerable physical differences was substantially the same.

7. The employment of cheaper brands of alum containing an insoluble matter content, exceeding .5 per cent., was uneconomical and gave correspondingly poor results.

Conclusions

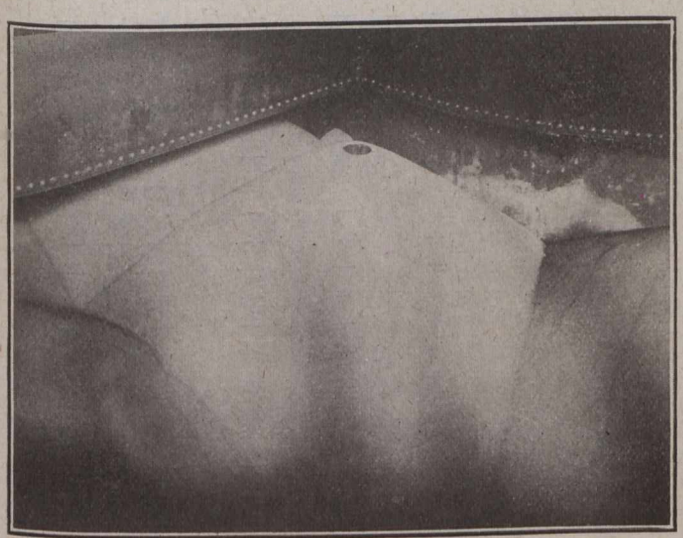
In a large number of cases we were unable to definitely ascertain the cause, judging by chemical, physical or bacteriological tests, as to the differences in action of the coagulant upon the resultant purification. As we have previously stated, there was a considerable effect due to changes of temperature, but this did not appear to account for all the differences noted. Obviously, the nature of the colloidal content in some waters prevented flocculation, this being particularly demonstrated by a laboratory test in which gelatine (.01 p.p.m.) was added to the water, and the bacterial efficiency was seriously affected thereby. We are also of opinion that fine suspended matter and the organic microscopic content play an important part in interfering with this process.

Observations on the purification effected by the new plant, covering a period of 18 months, has shown that the quality of the effluent does vary when conditions cited above occur. A high purification takes place when favorable conditions occur, whilst on occasions when the conditions are unfavorable, it has been necessary to increase the dosage of alum to obtain the required results.

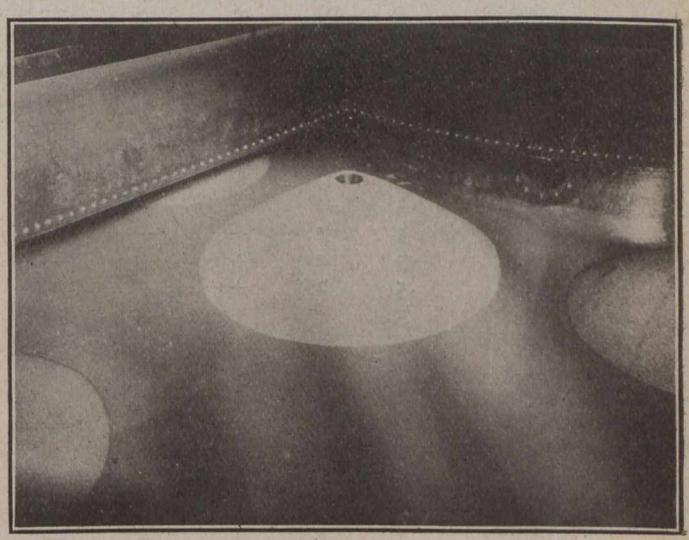
In a great many cases mechanical water plants operated in American cities have chlorine applied with the coagulant, thereby considerably reducing the cost of operation and at the same time maintaining a high bacterial efficiency. In the near future this practice will be adopted in Toronto, and a considerable economy effected by the procedure.

The decision we arrived at when the tender for the mechanical plant was first let, "That our former conception of a filtration plant was undergoing a material change; that sterilization of the water was the vital thing, from the public health standpoint, but that a filter was essential to clean the water, keep sand and dirt out of the water supply, and thereby prevent the wear and tear of machinery valves, taps, etc., as well as prepare the water for efficient sterilization; and that for a great portion of the year only a fraction of a grain of alum in conjunction with a slight amount of chlorine would be essential for filtration, thereby resulting in a great saving in the cost of operating," has been generally confirmed as a sound one, not only by ourselves, but by sanitarians in civilian and army work the world over.

Operating Gallery



Illustrates the Sand Cones of the Drifting Sand Filter



Shows Water Partly Drawn Down