design water filtration works, which will give satisfactory service, under practically any set of conditions.

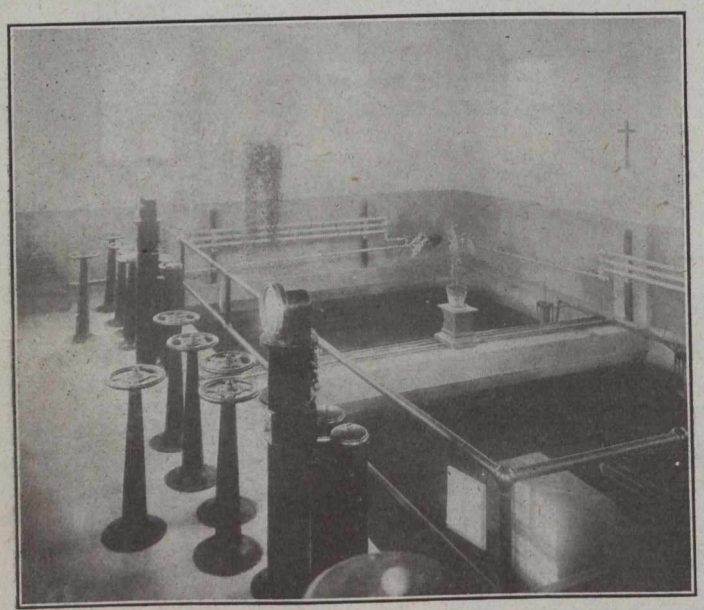
Water Filtration in Canada.—At this time there are in operation or building in Canada some 70 municipal water filtration plants, having a total daily capacity of 214,000,000 gallons, or enough to furnish 30 gallons daily to every inhabitant of the Dominion. Quebec has 177 public water supplies, with a daily capacity of 134,000,000 gallons. Over 30 of these supplies are recorded as having filters with a daily capacity of over 82,000,000 gallons.

In the city of Montreal and within a radius of 15 miles there is a population of about 750,000, supplied with water. Filter plants are constructed, which will in the near future, be supplying 95 per cent of this population with filtered water.

The following tabulation contains certain details of filter plants, recently constructed:—

NOTE—Capacities are daily capacities, gallons are Imperial gallons, coagulating basin time period and velocity of flow are theoretical.

Longue Pointe Asylum, Longue Pointe, Que.—Constructed, 1911. Source raw water supply, St. Lawrence River. Capacity, 625,000 gallons; two filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 1 hour and 45 minutes. Lineal velocity through basin, .25 feet per minute.



Filter Operating Room, Longue Pointe Asylum.

Montreal Water and Power Company, Montreal, Que.—Constructed, 1911-12. Source raw water supply, St. Lawrence River. Capacity, 25,000,000 gallons; 15 filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 1 hour. Lineal velocity through basin, 3½ feet per minute.

Bordeaux Jail, Bordeaux, Que.—Constructed, 1912. Source raw water supply, Back River (Ottawa River water). Capacity, 625,000 gallons; two filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 1 hour and 45 minutes. Lineal velocity through basin, .25 feet per minute.

St. Rose, Que.—Constructed, 1913-14. Source raw water supply, River Jesus (Ottawa River water). Capacity, 415,000 gallons; two filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 2 hours. Lineal velocity through basin, .25 feet per minute.

Laval des Rapides, Que.—Constructed, 1913-14. Source raw water supply, Back River (Ottawa River water). Capacity, 300,000 gallons; two filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 3 hours. Lineal velocity through basin, .17 feet per minute.

Cartierville, Que.—Constructed, 1915. Source raw water supply, Back River (Ottawa River water). Capacity, 830,000 gallons; three filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 3½ hours. Lineal velocity through basin, .17 feet per minute.

MacDonald College, Ste. Anne de Bellevue, Que.—Constructed, 1915-16. Source raw water supply, St. Lawrence River (Ottawa River water). Capacity, 240,000 gallons; two filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 4 hours. Lineal velocity through basin, .11 feet per minute.

Berthier, Que.—Constructed, 1916. Source raw water supply, St. Lawrence River. Capacity, 250,000 gallons; two filter units. Rate of filtration, 1.66 gallons per square foot per minute. Coagulating basin period, 1 hour and 15 minutes. Lineal velocity through basin, varies; circular baffled basin.

It will be noted from the above description that there is considerable variation in the coagulating period and the velocities through the coagulating basins. The experience gained from these several plants is, that all of the basins produce a water properly coagulated and in the desired condition to pass to the filters.

The first large mechanical filter plant constructed in Canada was for the Montreal Water and Power Co. The plant was placed in operation in June, 1912, and has been in continuous service since then. While the plant is located on the St. Lawrence River, it handles at one time or another, straight St. Lawrence River water; a mixture of St. Lawrence River and Ottawa River water; and straight Ottawa River water. A very complete description of this plant, by Mr. W. H. Sutherland, was published in *The Canadian Engineer*, January 23rd, 1913.

Perhaps one of the most successful plants in Canada, that is, from the point of perfect operation, is at Longue Pointe, Que. This plant takes raw water from the St. Lawrence River below the city of Montreal. The bacterial content of the raw water sometimes runs as high as one million per cubic centimeter and B. coli are always present in one hundredth of a cubic centimeter sample. The filtered water is used in the Hospital St. Jean de Dieu, a Catholic institution for the insane. Previous to the installation of the plant, typhoid and other intestinal diseases caused a death rate probably as high as 12 per thousand. Since the installation of the plant typhoid fever and intestinal diseases have been practically eliminated; in fact, there has not been a single case of typhoid fever since the plant was placed in operation. The raw water handled in this plant is so dangerous that those in authority at the institution provided for expert supervision of the plant about one year ago. The plant is operated and cared for by a woman, the wife of the engineer of the pumping station, under the direction of the expert.

At Longueuil, Quebec, there is a pressure filter plant without coagulating basin. This plant has a capacity of 1,250,000 gallons and is successfully filtering straight St. Lawrence River water.

Kinds of Water Filters.—Rapid sand filters is a generic term implying two essential types of filters, the gravity and the pressure. The gravity filter is one wherein the water is passed through the filtering medium by the force of gravity. Such filters are contained in open tanks and the raw water always passes through a coagulating period before reaching the filter. The pressure filter is enclosed in a steel tank and operates under pressure. The arrangement of the underdraining system is quite similar in both types of filters, and each has a bed of filtering material of about the same kind and depth of sand. The chief difference is as before stated, in that one operates under pressure and the other by gravity. The pressure filter requires less space than the gravity filter and is particularly applicable in certain cases where