

the pumps installed, which included in addition to the pumps, 2 Crocker-Wheeler 75 h.p., 2,200-volt induction motors, with a 25 per cent. continuous overload guarantee, also the compensators, oil switch, integrating watt-meter, the necessary piping connections and valves, including two 12-inch suction pipes and a 14-inch Venturi meter. The local commission purchased and connected up some 250 feet of 14-inch cast iron pipe, connecting the discharge from the turbine pumps with the discharge from the steam pumps and force main. It also erected a brick building with a pitch and gravel roof and did all the necessary rock excavating for the pipe trenches, building the necessary foundations.

After the installation was completed an official test was conducted on the pumps and motors. The electrical end of the test was conducted by Messrs. Fisher and Dandene, of the Hydro-Electric Power Commission, and the pump tests were in charge of Messrs. Chipman and Austin, of the Turbine Equipment Company and also the writer. The efficiency and power factor of the motors slightly exceeded the guarantee given by the Crocker-Wheeler Company. The pump readings were checked up with the readings on the Venturi meter recorder. The recorder indicates the ratio of flow from hour to hour. The results of the tests made on the pumps also slightly exceeded the guarantee given by the Turbine Equipment Company.

The total cost of the installation, including foundations, excavations and a brick building, was \$13,777.91. Debentures were issued for \$13,000 twenty-year term. The debentures realized \$13,480.69 and 5½ per cent. interest. The yearly fixed charges on these debentures is \$1,087.83. The approximate cost of electric power per year is \$1,500. Coal for heating the building and carrying 40 pounds steam on one boiler as requested by the underwriters, approximated \$450. In other words, the \$1,500 here mentioned is only transferred from the water department to the electric department and goes back to the users of Hydro in the way of a reduction in Hydro rates; thereby effecting a cash saving in electric power over steam of \$3,850 per year, and an actual net saving to the waterworks system of \$2,350 per year.

The motor-driven pumps are not operated during the local peak hours, unless, as frequently happens, such additional load can be carried without affecting the maximum monthly peak on the town system. When such conditions exist, however, the pumps are operated 24 hours daily for the remainder of the month.

The intake pipe extends out into the lake 1,000 feet in a depth of 15 feet.

A chlorination plant has just been installed at the request of the local health board. The plant is the liquid process, model F, gravity type, regulating apparatus with a capacity of 10 ounces per hour, having a sight reading meter graduating from ¼ ounce to 5 ounces per hour under 25 pounds back pressure. The chlorine is purchased in 100-pound cylinders from the Electro Bleaching Gas Company, of Niagara Falls, N.Y. The object of the health board in authorizing that the water be sterilized was to guard against any possible infection which might be caused by pollution from boats and also the spring and fall freshets.

The Canadian Government Railways recently placed an order for fifty locomotives with the American Locomotive Company.

The Council of the Canadian Society of Civil Engineers has approved of the change in name of the "Regina Branch" to that of "Saskatchewan Branch."

## THE ELECTRIC FURNACE.\*

By Leo G. Denis, B.Sc.,

Hydro-Electric Engineer, Commission of Conservation.

The use of the electric iron and steel furnace has made exceptional progress under war conditions. When the demand for steel exceeds the supply, and junk piles are searched for available metal, the electric steel furnace experiences a boom because it is capable of making an excellent quality of steel from a comparatively poor quality of iron and steel scrap. As more and more careful conservation of natural resources becomes necessary, electrical processes steadily gain ground because of their greater economy in the use of raw materials.

At the beginning of 1916 there were 73 electric steel furnaces in the United States producing 100,000 tons per year; to-day there are over double this number with a yearly production exceeding 1,000,000 tons. These furnaces require in the neighborhood of 150,000 h.p., one of the largest single installations having a total capacity of 70 tons in units of 15 and 20 tons.

The relative growth in Canada is even greater; the electric furnace steel production has increased from 61 tons in 1915 to 43,790 tons in 1916. In Montreal alone, according to figures supplied by the Civic Investment and Industrial Co., there are in operation, or being installed, 11 electric furnaces requiring a total of 17,000 h.p. The larger furnaces, when fed from high-tension lines and properly controlled, offer no serious disturbances to their circuits, but a plant of less than 5,000 h.p. capacity should not attempt to carry single-phase furnaces of 400 k.w. or over. The possibilities as an off-peak load are good as the usual length of heat is only about three hours, which condition would adapt itself excellently to a limited service operation. The furnaces can be operated economically at from 1c. to 1½c. per k.w.h. and such rates are now in force in many Canadian centres for ordinary services such as house lighting.

\*From "Conservation."

## G.T.R. WILL OPPOSE NATIONALIZATION.

The Grand Trunk Railway is opposed to the nationalization scheme outlined in the Drayton-Acworth report. A. W. Smithers, chairman of the board of directors, arrived in Montreal last week. Newspaper reports state that the London board of the G.T.R. resent the references made in the report to the finances of the Grand Trunk. It is said that they will fight the nationalization of the G.T.R. and claim to have the financial resources to make any required improvements or additions to equipment. It is understood that a Canadian board in charge of policy and management will be forthcoming if the road remains an independent company.

It has been reported in Washington, D.C., that negotiations looking to the purchase of more than \$100,000,000 worth of railway locomotives, cars, rails and other equipment in the United States will be one of the main purposes of the Italian war commission, which is expected to reach that country in about three weeks. A large part of the \$100,000,000 already loaned by the United States to the Italian government also is likely to be spent for railroad materials, and orders probably will be placed during the Italian commission's stay here. Italian railways, which are government-owned and operated, are reported to be suffering greatly from lack of equipment since most industrial plants formerly supplying the roads now are making munitions.