

day. The 24-in. pipe was surrounded by class B concrete (1: 3: 5 mix, city of Toronto specifications) with a minimum thickness of 3 ins.

The 3 ft. 9 in. section was constructed of approved hard red-shale brick, laid in two courses. The brickwork in the invert was laid true by template; the joints and the courses were kept straight between templates for the entire length. The upper part of the ring was laid in centres 3 ft. in length.

In this eastern section there were constructed four new typical manholes, and a fifth manhole was reconstructed. This was the first part of the second contract to be constructed, due to shallow covering and approaching winter.

The western portion was constructed as a 4 ft. 3 in. circular two-ring brick sewer, connecting with the existing brick sewer at the south side of the Canadian Pacific Railway Co.'s right-of-way. This latter sewer, upon completion, had been provided with a wooden bulkhead which was removed for the new connection.

A ramp 2.55 ft. high and a weir, to divert the dry weather flow, were incorporated in manhole No. 4, just east of Sighthill Ave. There are three additional manholes and a ramp raising the elevation of the invert 4.65 ft. above the junction chamber.

For this section of the second contract, tenderers were required to submit prices on a design similar to the special culvert type previously constructed on Glen Road South, and also for a two-ring brick sewer. The successful tenderer submitted the same price for both brick and concrete, and the Works Commissioner of Toronto decided to construct this section also in brick. Of this section, 1,500 lin. ft. were constructed in tunnel, shafts being sunk every 300 ft. and mining being carried on simultaneously in both directions. The average distance mined was 10 ft. in each heading each day.

The material excavated for the first 915 ft. was found to be hard blue clay and soft red sand, as had been indicated by the borings taken by the contractor. The next 588 ft. traversed a stratum of hard blue sandy clay, containing a small amount of water, stones and boulders. For the remainder of the section, a distance of 505 ft., the ground was a soft, yellow sand. This was excavated in open cut, 6 ft. wide by 10 ft. long, alternating with tunnel sections 20 ft. in length, thus obviating the necessity of maintaining hoisting machinery, etc.

Due to the shallow covering and the close proximity of dwellings, very little dynamite was used, and only in small quantities.

At the corner of Glen Road South and Summerhill Ave., a 6-in. water main crossing the top of the sewer was supported by a brick pier laid directly on the crown of the arch of the sewer. This was the only instance during construction where the slightest trouble occurred owing to existing installations.

All of the work was under the general direction of the following Toronto civic officials:—R. C. Harris, works commissioner; George Powell, principal deputy city engineer; W. R. Worthington, engineer of sewers; and W. G. Cameron, engineer of sewer maintenance and construction.

The contractor for the entire construction, including both contracts Nos. 1 and 2, was the A. W. Godson Contracting Co., Ltd., Toronto. The *Canadian Engineer* is indebted to H. F. Barker, the contractor's engineer, for the above information and drawings.

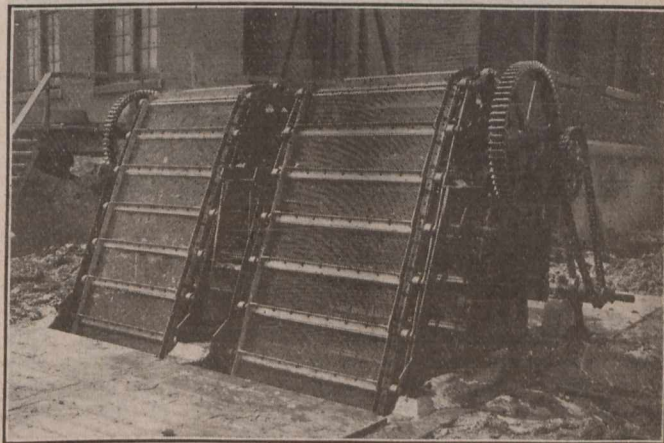
Following is a partial list of Canadian patents recently issued through the agency of Ridout and Maybee, Toronto: Harold W. E. Josling, means for promoting circulation of the fluids in steam generators; Alfred H. Anthony, automatic regulators for boiler feed apparatus; Alfred H. Anthony, float operated water level regulators and the like; Alfred H. Anthony, float operated valves; Aaron N. Warfield, metal car; and Wm. T. Stephens, process of producing iron and steel.

PUMPING PLANT AT SAULT STE. MARIE, ONT.

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IN 1914, the civic authorities of Sault Ste. Marie, Ont., acquired the Tagona waterworks. The pumping station was then in a corner of the Great Lakes Power Co.'s hydro-electric power-house. Under the terms of the purchase agreement, the city was required to erect a new station elsewhere.

In the meantime, investigations were made as to how best to provide a satisfactory supply of water. Alvord & Burdick, of Chicago, reported in favor of a gravity filter near the St. Mary's River. The writer later on made somewhat similar investigations, and advised in favor of obtaining water from the Coldwater Creek by a new route. Owing to the urgency of the demand for a new station, and to the divided local views held by the public with regard to the future source of supply, the Water and Light Commission came to the conclusion that the financial stringency which then prevailed precluded the possibility of carrying out a complete scheme, and, consequently, decided upon an interim undertaking, and that was to erect a new pumping station on Queen St., and to provide in conjunction therewith an electric sub-station, which, as that public utility expands,



TYPICAL VIEW OF THE C. A. JENNINGS BAND SCREEN AS USED AT SAULT STE. MARIE, ONT.

may in future require the entire building, and in that event the waterworks plant will again have to be relocated.

The writer was engaged in 1918 to design the whole scheme, but subsequently Major A. G. Tweedie was appointed acting city engineer and resident engineer to the Water and Light Commission, and all outside work was attended to by him.

The new building measures 81½ ft. from front to back and 52 ft. from side to side. The front part of the main floor consists of offices and workshops. The pump-room is 50 ft. long by 31½ ft. wide, 17 ft. high, well lighted and commodious. The floor over the offices is occupied by the electric department.

The water is drawn from the power canal, and in cases of emergency from the ship canal. It gravitates to the pumping station and passes through two Jennings band screens, which move slowly and automatically discharge the screenings into hoppers. A spray of water keeps the screen clean.

The piping in the pump house is arranged so that any one of the domestic supply pumps can deliver water to any one of the three fire pressure booster pumps. The domestic pressure is 85 lbs. and fire pressure 127 lbs. Two of the domestic pumps were supplied by the Canadian Allis-Chalmers Co. and one by the Bawden Pump Co., Toronto. The fire pumps are very similar in design to the domestic pumps,

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