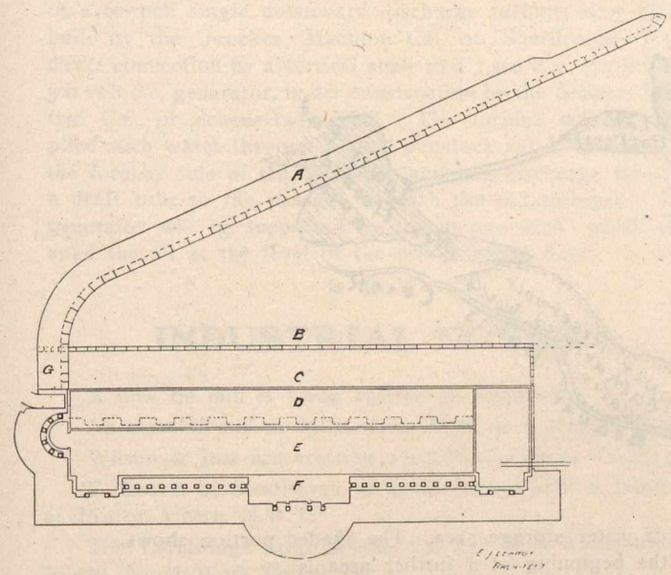
difference in the level of the wall tend to increase the surface current so that the thick ice will be thrown over into the river again. In front of the power-house, and parallel to its face is an outer ice rack formed of steel rods placed 10 inches apart, not standing vertically, but inclined in the direction of the current so that any ice reaching the rack may be lifted and helped down to the outlet. Coarsely screened by these rods the water passes through submerged archways under a portion of the power-house, and any small ice remaining will be caught, before reaching the mouths of the penstocks, by a second rack composed not of rods but of bars placed one inch apart.



Toronto and Niagara Power Co.'s scheme of protection from ice. A, retaining wall; B, outer ice rack; C, inner rack; D, line of penstocks; E, wheel pit; F, offices.

The Ontario Power Co.'s intake has an outer forebay and an inner forebay. A fender for coarse ice with a screen for finer ice are expected to take care of these troubles.

The accompanying diagram shows the scheme which the Electrical Development Co. have adopted for dealing with ice at the Toronto & Niagara Power Co.'s intake. A, shows the wall or dam enclosing the forebay. This is 33 feet 9 inches wide at the base, 24 feet high, and is of concrete with granite coping, and a "bull nose" of granite, to break the ice striking the head. B and C are two rows of arches, the inner one being under the power-house. There is one ice screen over the outer arches, formed of bars placed 2 inches apart, and made in sections of 28 bars 17 feet 9 inches high. These can be lifted for cleaning or other purposes. The velocity of water under the arches is 2 feet 1 inch per second, and as in the case of the Canadian Niagara Power Co.'s works it is thought that frazil ice will not occasion serious trouble in the area covered by the building.

HAMILTON'S ELECTRICAL SUPPLY.

The following is a sketch of the proposed enlargement of the hydraulic power system of the Hamilton Cataract Power, Light and Traction Company, with a short description of the plant as a whole:

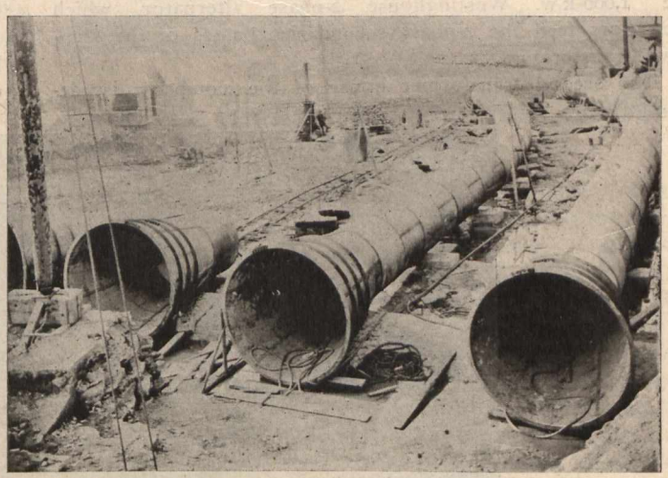
The company's old plant received its water from the feeder of the old Welland Canal into its own canal, being a waterway capable of carrying 250 cubic feet of water per second. This old canal extended from Allanburg to the brow of the Niagara escarpment in the neighborhood of DeCew Falls, well known in history as a military post in the war of 1812. It was from this post that Col. Fitzgibbon, apprized by Laura Secord who walked twenty miles through the woods to warn the British, set out with fifty men and captured 500 Americans who had been sent to seize the post. Immediately back of the forebay at the lower end of the canal, are three storage basins aggregating some thirty acres.

This old hydraulic system having been wholly outgrown, the company is now engaged in altering its conditions as follows: The supply is to be taken from the Lake Erie level of the Welland Canal through a weir constructed in the banks of the canal especially for this purpose. From this weir the water will pass through a new canal capable of handling about 1,000 cubic feet of water per second a distance of three-eighths of a mile. At the lower end of this channel the water is delivered into a natural valley, being the bed of what is known as the Beaver Dams Creek. This stream bed is converted into a lake of about 400 acres in extent by the construction of an earthen dam at its lower end. This newly-formed lake will be connected with the old lake system, and some extensions of it, by means of a short additional canal of about 1,000 ft. in length. The company's waterway will accordingly (all but about a mile for the five miles) consist of a large lake or storage basin, the benefit of which in preventing anchor ice and other winter troubles will be very great. This basin will also have some value as a storage, enabling the company to use its water supply to better advantage and to install a larger plant than would otherwise be possible.

Arriving at the brow of the escarpment, the water is conducted to the power house by seven steel penstocks about 850 feet long each; one of which penstocks is now operating and four under installation. The static head upon the company's turbines is 267 feet. These penstocks are connected up to ten turbines, viz.: two of 1,700 h.p. each of Stilwell-Bierce & Smith-Vaile Company's make, two of 3,300 h.p. each of Italian make by A. Ing. Riva, Monneret & Co., Milan, Italy, and the remaining six of 6,000-h.p. capacity each, manufactured by J. M. Voith, of Heidenheim, Wurtemberg, Germany. Four of these larger turbines are under installation.

The company's generators consist of two Royal Electric 1,000 k.w. three-phase inductor type machines, two General Electric 2,000 k.w. capacity revolving field machines, and six 5,000 k.w. machines, two of which have been purchased from the Westinghouse Electric and Manufacturing Co., the make of the other machines not yet being determined.

The station is arranged to be equipped with automatic electrically operated switches, two in series on each generator. The transforming equipment consists of thirteen 2,900 k.w. oil-insulated water-cooled transformers, wound with 2,400 volt primary to 22,500 or 45,000 volt secondary. The



Hamilton Cataract power plant. New penstocks being placed in position on the Mountain.

wiring of the transformers on the transmission lines is arranged for the higher potential.

The transmission lines are two in number, No. 1 line being a 42-inch equilateral triangle composed of three stranded aluminum conductors of 380,000 circular mills area. No. 2 line consists of two triangles of No. 2/0 wire arranged in 56-inch triangles. Both lines are insulated with R. Thomas & Sons' 9-inch "Swamp" type insulator, each one having been subjected to rigid test at the manufacturer's premises before shipment. Barbed wire is used on each of the lines, and their route is shown on the map on page 158.

The receiving stations in Hamilton are three in number,