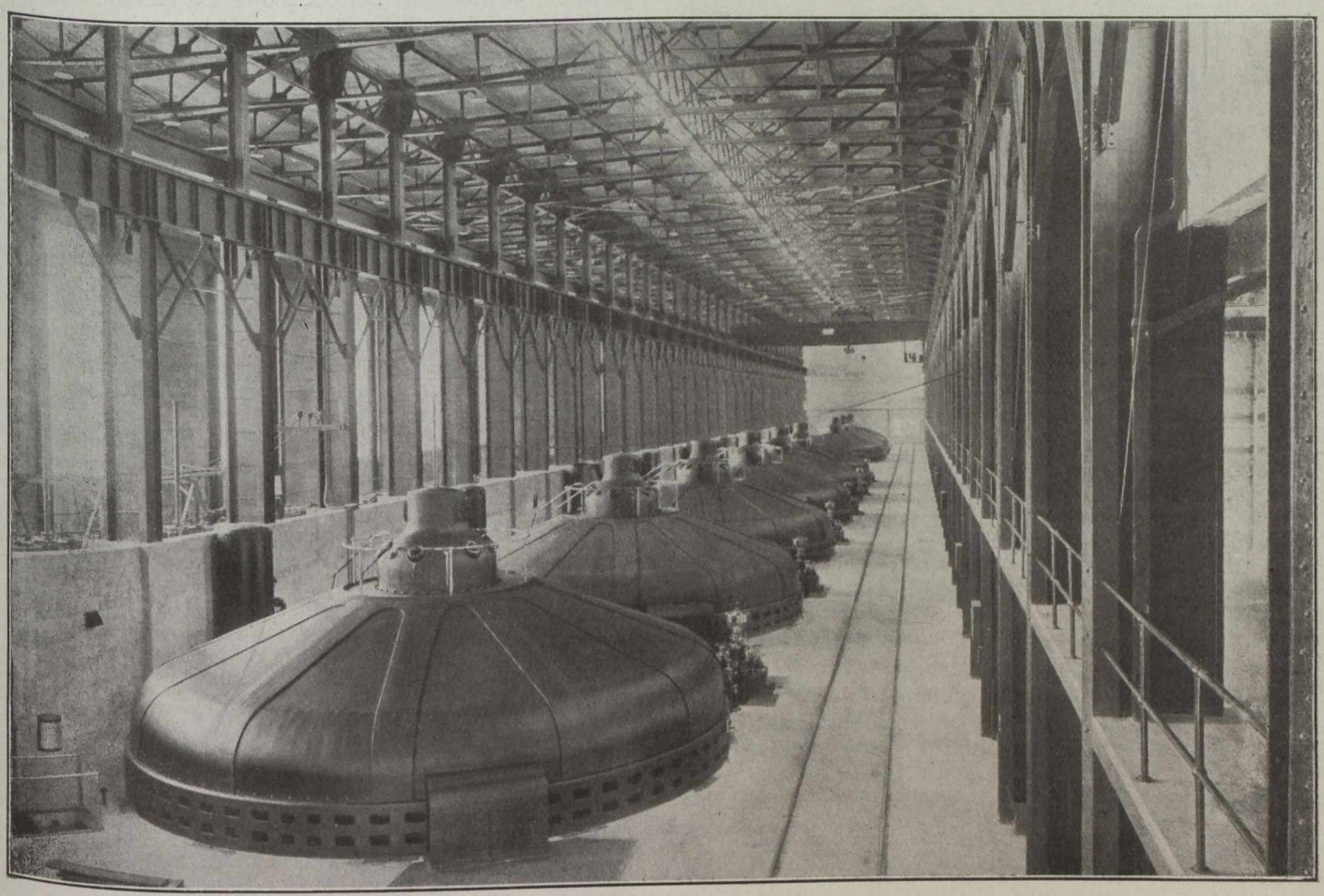
CEDARS RAPIDS POWER DEVELOPMENT.

MESSRS. Henry Holgate and Julian C. Smith read papers last fall, before the Canadian Society of Civil Engineers, on the design and construction of the Cedars Rapids Power and Manufacturing Company's hydro-electric plant at Cedars, near Montreal. On December 2nd, 1915, R. M. Wilson, chief electrical engineer of the Montreal Light, Heat and Power Co., followed with a paper on the electrical design, construction and tests. These three papers jointly give a very complete record of the entire work. Brief abstracts of Messrs. Holgate's and Smith's papers appeared in *The Canadian Engineer* in the issues for November 18 and December 16, 1915, respectively. Following are a few of the most interesting points covered by Mr. Wilson's paper:



Interior View (Looking North) of the Power House at Cedars Rapids, Showing Some Important Structural Features and Illustrating the Arrangement of the Nine Units.

The generating plant consists of nine 10,000 kv.a., 6,600-volt, 3-phase, 60-cycle, vertical units, and three 1,250 kv.a., 2,300-volt, 3-phase, vertical exciter units. Voltage regulators are installed on each unit, maintaining a steady voltage and preventing cross-currents between the units. The main generator busbars are not in the power house, but are installed in the transformer house. The power and transformer houses are 800 ft. apart, connected by feeder cables.

Size of Units.—The design of the generating system was the main point in the consideration of the electrical layout, and had to be worked out in conjunction with the water-wheel design. Mr. Smith explained in his paper why the vertical type of unit was adopted. The next step was to determine the size of unit, having regard for contract obligations that are most onerous as regards continuity of service.

Two sizes were considered, *viz.*, 15,000 kv.a. and 10,000 kv.a. The smaller unit was adopted because: (1) with the larger unit, too great a percentage of the plant capacity would be put out of commission by the failure of any unit; (2) 15,000 kv.a. vertical units had never been constructed and the company did not wish to experiment; (3) the cost of other apparatus, such as cranes, bearings, etc., would have been greatly increased, owing to the excessive weight of the larger units. The weights of the rotor and stator of the smaller unit are respectively 213,000 lbs., and 146,000 lbs. For a 15,000 kv.a. unit, the weights would be 425,000 lbs. and 300,000 lbs.

A unit smaller than 10,000 kv.a. was not adopted owing to the larger power house that would have been required, and on account of the larger operating staff, etc., that a greater number of small units would have necessitated.

When the size of unit had been decided upon, the design was discussed with manufacturers prior to sending out specifications, in order to impress upon them the importance of securing the most economical ratio between the diameter of the unit and its height. The result was that the design adopted saved 7 ft. in height of power house, as well as reducing the cost of the hydraulic installation.

The generator specifications required that the stator be in four sections; that the design be for 75 per cent. power factor, and 25 per cent. overload for two hours; that full rated capacity must be delivered at a normal