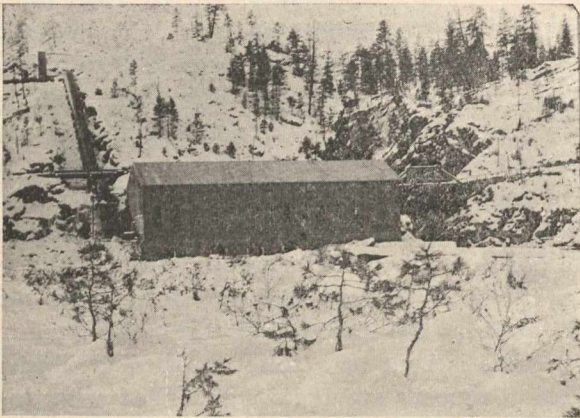


10,000 cubic yards of rock were removed for the site of the power-house, in a natural bay at the foot of the falls. This building is of substantial fire-proof construction, 150-ft. by 50-ft., with stone foundation 22-ft. deep on the lower side, and brick walls 30-ft. above floor level, the height to peak of roof being 45-ft. It has been designed with a view to lengthening it when required.



Cascade W. P. & L. Co.'s Pipe Line.

The third view shows the interior of the power-house, and the generating plant. The three generators are standard Westinghouse, three-phase, two-bearing, direct-coupled, 2,200 volt, 750 K.W., at 80 per



Cascade Company's Power House.

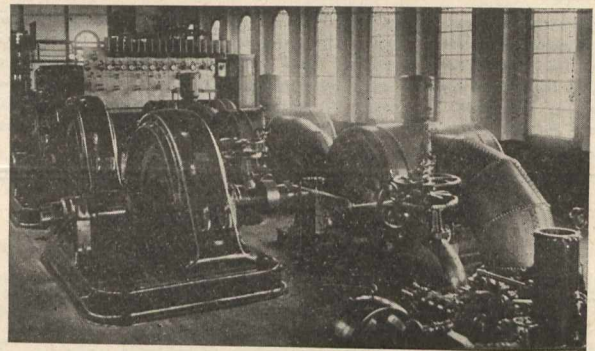
cent. power factor, or 940 K.W. at 100 per cent. power factor, 60 cycles per second, 300 R.P.M. The two exciters, each capable of exciting all three generators at one time, are 45 K.W., 120 volt, shunt wound dynamos, self-contained, two-bearing type, direct coupled to independent turbines, with 500 R.P.M. The turbines are H. Morgan Smith wheels, made at York, Pa., and the governors the Escher-Weis make, from Switzerland.

Cut No. 4 shows the transformers, nine in all, three in each bank, which are Westinghouse, self-cooling, oil-insulated type, having a capacity of 250-K.W. at 80% power factor, or 312½ K.W. at 100% power factor, "Star" connection, and wound for a ratio of 2,000 to 20,000 volts, on both high and low tension windings, with full load efficiency of 97.6 per cent. As the taps are brought out near the neutral point, which is grounded, it is impossible to maintain a dangerous voltage in the auxiliary circuit.

The current from the high tension side of the

transformers is carried to a row of high tension fused circuit-breakers, situated alongside of the building behind the main switchboard, as shown in No. 4. These switches are of the well-known Westinghouse type, placed on independent marble slabs, with marble barriers between. The current leaving these switches enters a high tension bus and is carried to the line switches at the rear of the building. These line switches are grouped switches opening all three wires at the same time. Each switch is furnished with a time limit tripping device, and reversed current tripping coils, so that overloads can be carried for a period of from one to ten seconds, as the local conditions call for, or either line can be cut out automatically in case of trouble.

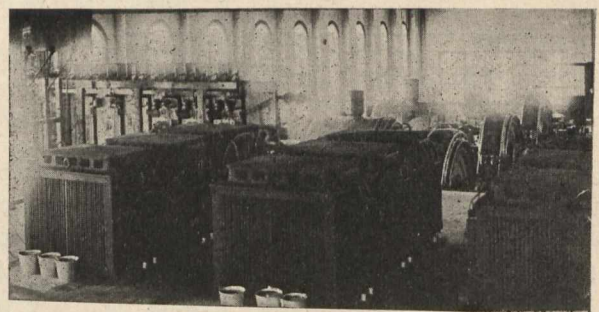
The switchboard for the low pressure side, engraving No. 5, consists of seven panels of blue Vermont marble, one panel for each generator, one for the two exciters, and a feeder panel for each group of transformers. The six lightning arresters, located



Interior of Power House.

just above the switches in the gable of the roof, are the "low equivalent" style of the Westinghouse Electric and Mfg. Co., giving protection against lightning discharges for transmission at 20,000 volts.

A right of way 132-ft. wide is cleared, and transmission lines erected from Cascade via Grand Forks to Phoenix, a distance slightly over twenty-one miles. The high tension circuit consists of two separate three-phase transmission lines, each carrying three No. 3, B. & S. copper wires, with room on each line for another circuit.



Banks of Transformers.

The poles are heavy cedar, and on tangents are spaced not over 100-ft. apart, on curves at less distances, in some cases as low as 50-ft. No angles are turned, but all changes in direction of line made with easy curves. No side or head guys have been used except at extra heavy spans across rivers, etc. The work on this line, as well as all construction of the plant, is a decided credit to the company's local en-