

the wheels are capable of driving the generators at 25 per cent. overload.

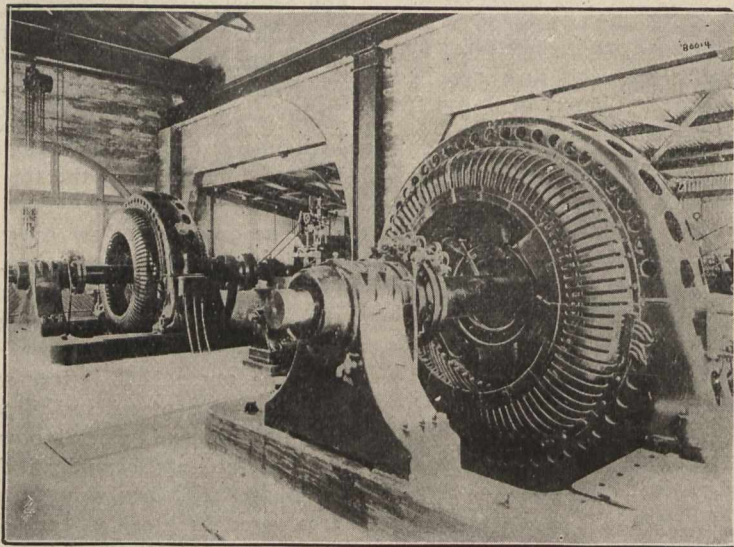
The tail race is  $6\frac{1}{2}$  feet wide, and excavated for 280 feet through bed rock to the Trinity River. The generators, two in number, are of the Bullock type, furnished by Allis-Chalmers Company, of Milwaukee, being three-base 750 k.w., 500 r.p.m., 2,200 volts, 25 cycles, rev. field, six-pole. Two Bullock exciters, 125 volts 45 k.w., 900 r.p.m., are driven by belts from the generators. The power-house, 36x51 feet, is built of concrete made up with sand and gravel, taken from the river bars a few rods from the site of the plant, and with imported Portland cement. The roof is of corrugated iron supported on steel trusses. A "Cyclops," hand-operated crane spans the main part of the building, and is fitted with a one-ton "Triplex" block. This easily handles the heaviest piece of machinery.

The leads between the generators, exciters and switchboard are lead-covered cables laid in conduits with the concrete and cement floor. The transformer house is 13 feet x 51 ft. 6 in., and is also of concrete. It contains seven step-up transformers, viz., two banks of three each, and one in

line anywhere between the plant and the sub-station at Eureka. The line is a single circuit, three-phase, averaging 35 poles to the mile. The potential at present used on line is 30,000 volts.

The sub-station at Eureka includes an auxiliary steam plant consisting of two Babcock & Wilcox water tube boilers fitted with Peabody patent oil burning furnaces duplicate oil pumping system; Goudert auxiliary feed water heater; Wheeler "Admiralty" surface condenser with self-contained steam-driven air and circulating pumps, the cooling water being taken from Humboldt Bay, and a McIntosh and Seymour tandem compound engine of nominal rating of 700-h.p. A jackshaft running at 500 r.p.m., is connected to engine by a rope-drive.

A Bullock rotary converter, 500-k.w., 500 r.p.m., six pole, 25 cycle, 550-volt, is arranged for direct connection to this jackshaft by a jaw clutch and so driven by the engine. This permits of carrying the load by steam when necessary to shut down the transmission line for repairs. The engine is fitted with a switchboard speed control device. The



View in Power House, Showing 750 k.w. Bullock Alternator and Lombard Waterwheel Governor.

reserve. They are of Bullock make, 300 k.v.a., water cooled, oil insulated, 2,200/19,050 volts, 25 cycle.

The high-tension switch house is a frame structure covered with corrugated iron. In it are two banks of "M-T" single throw air-brake switches, and G.E. alternating current multiplex lightning arresters, connected up for the three-phase circuit. The pole line extends almost due west from the plant to the sub-station in Eureka. The length is 65 miles. Of this 55 miles are over a severely rugged mountainous country; the altitude of the plant is only 1,480 feet, and Eureka is at sea-level, but the line passes over several summits ranging from 4,500 to 5,500 feet in altitude. Fifty miles of its length lie in a heavily timbered country, requiring a tremendous amount of clearing, the trees ranging from 2 ft. to 4 ft. in diameter. It was necessary to construct a trail nearly the entire length of the line. The route deviates from a straight line only slightly and only where the topography made it unavoidable. It is a "thorough" transmission, so to speak, there being no taps on the

clutch has a synchronism indicator in the nature of a lamp, so that the engine may be connected to the rotary while it is running at full speed on the power transmitted from the Trinity River plant. For the rotary converter there are three Bullock transformers, 190-k.w. water-cooled, 25-cycle, 30,000/352 volts. For stepping down for the local distributing system are three General Electric Company's 400-k.w. water-cooled transformers.

For furnishing power to the 60-cycle incandescent and arc lighting circuits of the city of Eureka, a three-phase, 60-cycle generator is driven by the rotary acting as a synchronous motor. The sub-station is fitted with switchboards and H. T. switches suitable for handling the equipment. A fuel oil tank 54 ft. in diameter by 25 ft. deep, holding 10,000 barrels, has been built near the sub-station, and is connected to a dock on Humboldt Bay by a pipe-line.

The load at present consists chiefly of lights in the city of Eureka. Some motors are already connected to the circuits, and the motor load is being rapidly developed.

## NEW RAIL MILL OF DOMINION IRON AND STEEL COMPANY, LIMITED, SYDNEY, CAPE BRETON

The latest important addition to the immense plant of the Dominion Iron & Steel Company, at Sydney, Cape Breton, is the new rail mill and the various departments connected therewith.

Through the courtesy of the Chief Engineer to the company, Mr. Edward Holth, M.E., we are fortunate in being able to place before the readers of "The Canadian Engineer" a comprehensive and reliable description of this modern installation.

The Mill was designed and installed by Mr. Holth and his staff of engineers and draughtsmen; fourteen months elapsing between the date the order was given to the engineering department to begin the designing and draughting, and the time the rail mill commenced operations: June, 1905. The construction was greatly hindered, both by the strike at the general works in the summer, and the severe winter,

which delayed very much the freight service and the machinery from reaching Sydney in due time. With a view of accelerating the completion of the work as much as possible, the management decided to give out the manufacture of the larger part of the machinery to specialist rolling mill makers, etc., outside the Dominion.

The steam engine was built by the Southwark Foundry & Machine Co., Philadelphia, Pa., but the 95-ton fly-wheel for same was made by the Laurie Engine Co., Montreal. The first roughing tables and their operating machinery were furnished by Tannett-Walker & Co., Leeds, England. The roll housings, intermediate and finishing tables, saw table, hot-bed machinery, etc., were supplied by the Wellman-Seaver-Morgan Co., Cleveland, Ohio. The pinions and pinion housings were made by the Mesta Machine Co., Pittsburgh, Pa. The roll shop, and 25-ton travelling crane for same, together with the building and some of the machinery