

turbine. The lubrication of the four bearings, two for the turbine and two for the generator, is effected by supplying an abundance of oil in the middle of each bearing by means of a small cycloidal pump, driven from the turbine shaft, and allowing it to flow out at the ends. The oil is passed through a tubular cooler with water circulation and pumped back to the bearings. It is not necessary to supply the bearings with oil under pressure, but only at a head sufficient to enable it to run to and through the bearings, this head never exceeding a few feet. No oil of any kind is used in the interior of the machines nor in the glands, through which their shafts pass. No oil alarms have been provided for the turbines. The hot parts of each turbine up to the exhaust chamber are covered with an ample thickness of non-conducting material and lagged with planished steel, so applied that it may be easily removed. The non-conducting covering is also removable at the cylinder joint to facilitate the opening of the turbine for examination. Between the turbine and its generator a special type of flexible coupling is used to provide for any slight inequality in the alignment of the bearings, to permit axial adjustment of the turbine spindle, and to allow for difference in expansion. This coupling is so made that it can be readily disconnected for the removal of the turbine spindle or of the revolving of the generator. Provision is made for ample lubrication of the adjoining faces of the coupling. The revolving field alternators driven by these turbines are of Allis-Chalmers Company's standard type, designed for high efficiency and safe operation at high peripheral speeds. Some of the principal advantages embodied in their construction are summarized as follows:—

The field core is built up of steel discs, each in one piece, giving high magnetic permeability and great strength. Coils are placed in radial slots, thereby avoiding side pressure on slot insulation and the complex stresses resulting from centrifugal force, which, in these rotors, acts normal to the flat surface of the strip windings. Bronze wedges hold the coils firmly in the slots, making the surface of the rotor a smooth cylinder, reducing windage losses and insuring quick operation. The end connections are securely held by chrome-nickel steel rings. The stator is completely enclosed, eliminating noise of operation. Coils were completely wound and insulated before being placed on the core, thus obviating the risk of defective insulation. Stator windings are placed in open slots, rendering the coils readily removable. End connections are firmly braced, preventing deformation of coils in case of short circuit.

For the purpose of obtaining adequate ventilation and for muffling the noise produced by the circulation of the air the turbo-generators are enclosed in such a manner that the air is taken in at the ends through fans mounted on the rotor shaft, which discharge it over the end connections of the armature coils into the bottom of the machine, whence it passes through the ventilating ducts of the core to an opening at the top. This patented system of ventilation is most efficient.

On the lower floor of the turbine room are two engine-driven Lawrence centrifugal pumps for condensing water, one Blake 1,000 gallon underwriter fire pump, one electrically-driven Deane triplex power pump for sanitary water for the mills, one Fairbanks-Morse duplex steam tank pump for water supply to the heater and purifier, one engine-driven Doane triplex power pump, and one Heisler duplex steam pump for boiler-feeding purposes. The engine-driven triplex boiler feed pump is arranged so that it is automatically controlled by the opening and closing of the boiler feed valves, a constant pressure being maintained on the feed line. Any lowering or raising of this pressure causes the pump to run faster or slower, according to the demand for water.

The level of high water in the pond is about one foot lower than the lower floor of the turbine room. At the end of this room, where the pumps are located, there is a trench, into which the water flows. All of the pumps have independent suction pipes from this trench. This arrangement is economical and works perfectly. The pump space may appear to be somewhat crowded, but it was thought best

to use as little as possible, for when additional turbines are installed there will be ample space and to spare for all new pumps needed.

The switchboard is located on the same floor as the turbines, and consists of two panels controlling the exciters, two panels for the main turbo-generators, one panel for a Tirrill regulator, seven panels for the power circuits, and one panel connected to the lighting circuits. This switchboard has a complete equipment of instruments, and all switches are oil-immersed, except the main generator switches, which are solenoid-operated circuit-breakers. The feeder mains are carried underground to each mill through fibre conduits. Taken all in all, this plant is very complete, being so designed as to secure both maximum economy and low operating costs. The plans for it were made and its construction superintended by S. M. Green, consulting engineer, of Holyoke, Mass.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer for a small fee.

5407—Oct. 14—Authorizing the C.P.R. Co. to place the line or track of its Goose Lake Branch across the line or track of the G.T.P.R. at a point in the south-east quarter of Sec. 23, Township 36, Range 6, west third meridian, west of Saskatoon, Sask.

5408—Oct. 14—Authorizing the C.P.R. Co. to use and operate the bridges at mileage 144.6 and mileage 124.3 on the Medicine Hat section of its line of railway.

5409—October 16—This order authorizes the C.N.R. to construct a bridge across the North Saskatchewan River at Prince Albert, Sask.

5410—Feb. 17—Authorizing the village of Beaverton, Ont., to erect, place, and maintain electric light wires across the main line and siding of the G.T.R. where the same cross Mara Street, Beaverton, Ont.

5411—Oct. 9—Directing the G.T.R. to refund to James G. Cane & Co., of Toronto, one cent per 100 pounds on shipments of lumber from Wiarton to Toronto during month of May last; and further directing the G.T.R. to refund to other shippers, if any, from Wiarton to Toronto, during said month of May last, all amounts collected on shipments in excess of the rate of eight cents per 100 pounds, which the G.T.R. put in force between the said points on June 1st, 1908.

5412—Oct. 9—Authorizing the New Brunswick Telephone Co. to place and maintain its wires across the tracks of the C.P.R. at Wapske, N.B.

5413—Oct. 9—Approving Supplement 2 to Standard Freight Tariff, C.R.C. No. 38, of the C.N.R. Co., applying between stations west of and including Maryfield, Sask.

5414—Oct. 8—Approving Standard Freight Tariff, C.R.C. No. 3, of the Montreal Terminal Railway Co.

5415—Sept. 17—Authorizing the G.T.P.R. Co. to cross certain highways in the municipality of Miniota, Man., and directing the protection to be provided at these crossings.

5416—Oct. 15—Authorizing the C.P.R. Co. to open for traffic that portion of its line of railway from Piapot, mileage 67.75, to Colley, Alta., mileage 75.10, a distance of 7.35 miles.

5417—Sept. 14—Authorizing the G.T.P.R. Co. to cross at grade the track of the Pembina branch of the C.P.R. at Oak Point Junction, near Winnipeg, Man.

5418—Sept. 16—Approving location of new station and rearrangement of the C.P.R. yards in St. Boniface, Man., provided the platform of said station be removed, if it is found to be in the way upon the extension of Provencher Street in said city.

5419—Oct. 9—Authorizing the Canadian Express Co. to carry, free of charge, for ninety days a publication called "The Flag," published in Great Britain.

5420—Oct. 9—Authorizing the C.P.R. Co. to construct, maintain, and operate a branch line or spur to and into the premises of the Great West Coal Co., in the town of Roche