



DOUBLE POLE LINE CROSSING THE RIVER AT CHAMBLY.

on the continent, consisting of a massive concrete dam, in which, as an integral part, is built the power house, with a capacity of 60,000 horse-power.

This dam, which is here illustrated, is about 2000 feet long, 6 feet wide at the crest, and constructed of a concrete composed of the broken rock of the river bed, mortared with sand from the vicinity and American cement. The back is vertical throughout, and the apron is curved so that the overflow water is discharged horizontally, obviating any destructive washing action at the base. A liberal use of one-half inch iron rods, incorporated with the mass of the concrete, gives great strength to the structure, and a surface dressing of neat cement insures the greatest impermeability. This is said to be not only the most carefully constructed but also the largest concrete dam on the continent.

The dam consists of three portions, two of which run perpendicularly across the course of the river, while the third and middle part is parallel with it. In the lower third of the dam, and near the right bank of the river, is built the power house. Here the dam consists of two levels, or steps, over which is built a structure of steel beams and brick walls, 308 feet by 51 feet, for the protection of the machinery. The upper level, which is about 2 feet above the surface of the water in the lake formed by the dam, contains the switchboards and controlling devices and such offices as are necessary. In this part of the dam eight rooms, or flumes, each about 20 feet square

and 10 feet high, are constructed, their arched openings being under the water level, for the reception of the wheels. These, of the horizontal shaft pattern, number four in each flume, each wheel being 40 inches in diameter. These wheels are mounted tandem on one shaft in two pairs, between the wheels of each pair being a large cast-iron box communicating with the draft tubes, which extend through the solid concrete of the lower step of the dam to a point below the level of the tail water. The draft tubes are built of sheet steel, and are 9½ feet in diameter where they leave the boxes, and 10 feet at their outlet. The upper extremities of these being one behind the other, in the line of the shaft, necessitated their construction in a curious skew curve. This installation seems to run to superlatives, since these draft tubes are the largest ever constructed. Their bedding in concrete excludes all possibility of leakage, and the full advantages of the head of 28 feet is realized by their use, although the wheels are but a few feet below the level of the intake water. Under this head, and at the speed of 153 r. p. m., each wheel develops 660 horse-power, or a total of 2640 horse-power to each shaft and flume.

The wheels are governed by means of Giessler electro-mechanical governors. These are relay governors, the revolving balls actuating a small lever which closes electrical contact at speeds higher or lower than that for which the instrument is set. These contacts control electromagnets which operate clutches on the main shaft geared to the

gate of each gang of wheels. It has proven an excellent and reliable governor in other large hydraulic installations.

At present only four of the eight sets of wheels are installed, together with two 28-inch wheels, giving 750 horse-power for driving the exciters of the large dynamos. The whole of the hydraulic machinery was furnished by the Stilwell-Bierce and Smith-Vale Company, of Dayton, Ohio, and reflects much credit upon that concern by the solidity of its construction and the great accuracy with which the parts of the heavy wheels and draft tubes were assembled at Chambly by its constructing engineer, Mr. H. A. Wright.

The shaft of each gang of turbines passes out horizontally through a circular steel bearing plate on the down-stream vertical face of the upper step of the dam, and is directly connected to a 2000-kw generator, giving two-phase current at 60 cycles per second and 12,000 volts.

These machines are of the inductor type, having no moving wire. The inductor is about 10 feet in diameter, and of very massive construction. The single circular field coil is wound on a brass spool of about 10 inches face by an equal depth, and contains any persons who, acquainted with the completely surrounding the inductor. The armature is in two parts. The insulation of these armatures is necessarily most massive and substantial. All the dynamo machinery was constructed by the Royal Electric Company, at Montreal, from design by the Stanley Electric Manufacturing Company, of Pittsfield, Mass.