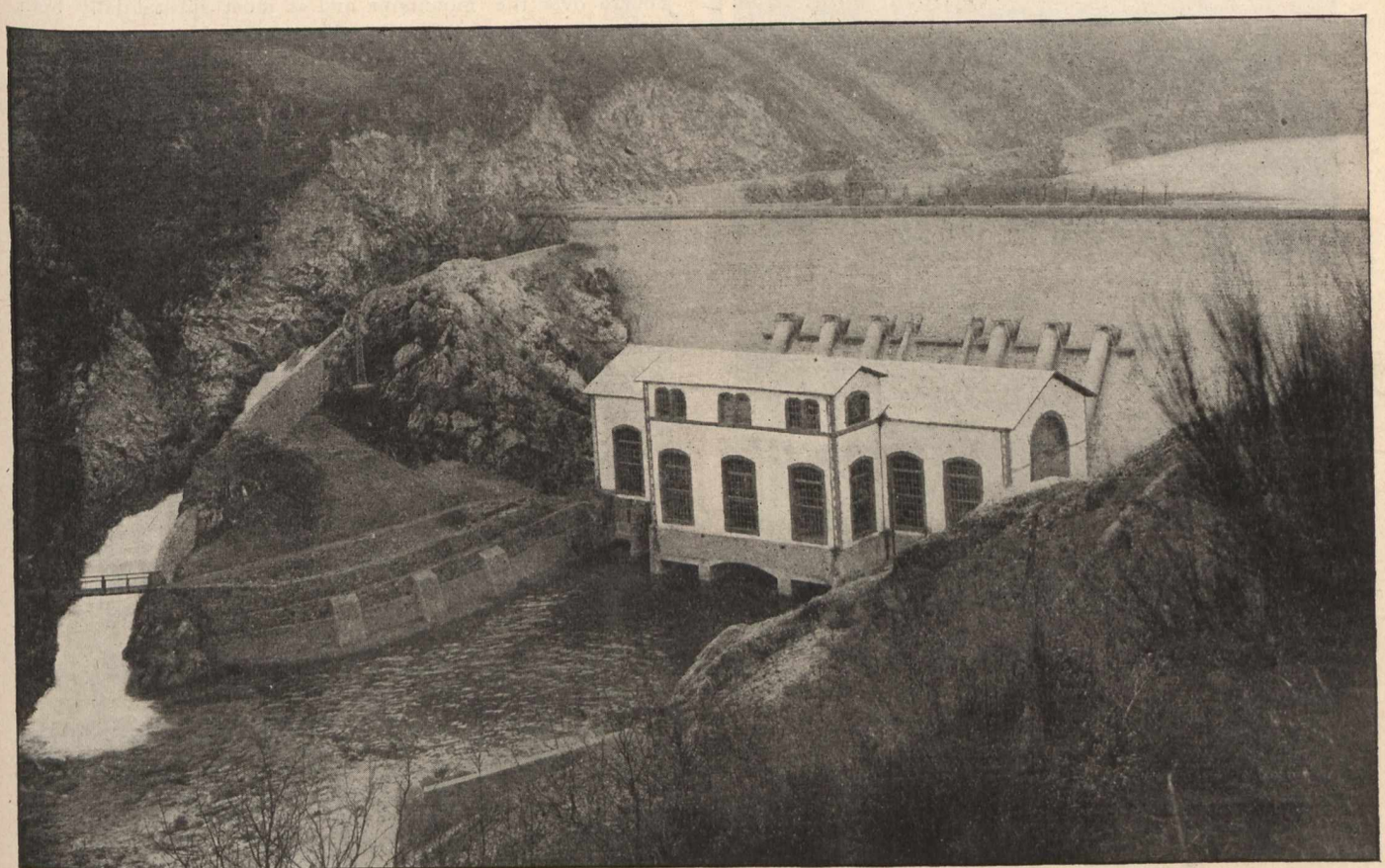
Regulation is secured by a special governor, consisting of a rotating disc and servo-motor actuating valves in conjunction with a high pressure oil pump, by which the gates of the turbine are operated. This turbine gives an efficiency of about 76 per cent. at full load, and the governor is said to regulate within a speed variation of 4 per cent. on a change of half load. The other eight main units, four at each end, were installed in 1902, also by Escher Wyss & Co., and are of the Francis type, having a double runner with central outward discharge, and are said to give an efficiency of about 83 per cent. **It is to be noted that the latter type discharges water in the tail race with less air and commotion than does the Jonval.**

The electrical apparatus is very simple for a station of such magnitude. The generators are wound for three phase, 50 cycles, and 3,500 volts, and revolve at 120 R.P.M. The exciters (3 separate turbine units) provide 170 K. W. each, and revolve at 250 R.P.M. All generators are run in parallel through a simple switchboard directly to the transmission and distribution lines without transformers. The electrical apparatus was built and installed by Brown Boveri & Company, of Baden, Switzerland.



Clermont-Ferrand, General View.

The operation of the station requires comparatively few attendants, being distributed as follows: Eight on turbine deck (one for two units), 4 on alternator deck, 2 at switchboard gallery, and about 8 spare on floor and in workshop. These with a station superintendent and a small technical office staff, constitute the day working force. In the winter an additional crew is required for cold weather troubles. While Lyons is in Southern Europe, freezing weather is frequently experienced. In the winter of 1904-05 the thermometer went at times as low as 5 degrees Fahr. above zero; on which occasions the station experienced trouble from frazil ice. This had been the serious result of occasioning several days' shut down. It is a question whether this ice is formed in the upper river, in the foothills of the Alps, or immediately at the station; the company's engineer inclines to the latter opinion and has tried many artifices to obviate the trouble, but without success. At the time of the writer's visit, January 24th, 1906, the thermometer was down to about 15 degrees Fahr. and in anticipation of trouble, two 25 H.P. steam boilers on scows were supplying live steam at about 8 lbs. pressure to the covered forebays at the screens and sluice gates. To a Canadian in Southern France, in the heart of the silk country, this presented an interesting spectacle.

Transmission lines are entirely underground and consist of three wire cables, insulated with paper and armored with hemp lead and steel tape. The cable is laid directly in a trench on a layer of bricks and surrounded with gravel; which, owing to the low potential is found to provide ample insulation. Distribution lines vary in length up to 8 miles from the generating station, there being, of course, variable drops in voltage due to the different lengths, the adjustment of which has received considerable attention.

The power now in use amounts to about 14,000 H.P. at normal conditions. Of this, about 1,500 H.P. is traction load, 3,000 H.P. lighting load and the remainder mixed motor load. The tariff charged may prove interesting at this juncture for comparison with conditions in Ontario in view of the work of the Power Commission. Good quality steam coal at Lyons is about $4.25 per ton. The prices for motor power are as follows:—Up to 100 H.P. at 11½ cents per kilowatt hour; for over 100 H.P. at $34.00 per H.P. per year on a 12-hour basis, and $45.00 on a 24-hour basis. There is a sliding discount on the above prices as follows:—On a bill of $20.00 per month, 1 per cent.; on $50.00 per month, 2½ per cent.; on $100 per month, 5 per cent.; on $200 per month, 7½ per cent.; and on $300 per month, 10 per cent. For lighting, which the power company itself operates directly, the charges are as follows:—On meter system 13 cents per kilowatt hour for stoves, hotels, cafes, etc.; 16 cents per kilowatt hour for houses. If on a flat basis the lighting rate is as follows:—For a 16 C.P. lamp, burning 750 hours, per year, $4.20; for 10 C.P., $3.75; for supplementary hours, add 6-10 cent for 16 C.P. and 4-10 cent for 10 C.P. for each hour. In the flat rate the bill is determined by a time meter.

Clermont-Ferrand, From the Sioule.

Clermont-Ferrand, a small city of some 50,000 people, about 80 miles west of Lyons, has as yet but a small demand for lighting, traction and motor current. The hydro-electric plant recently built for its supply is, however, of inter-