

water. Escher Wyss have what they call a "revolving filter," F, which can be worked by hand. The cycle of operation from the fly balls to the relay valve, with its fine adjustment to prevent "racing" through the lever system to the regulating valve S, thence to the main cylinder and piston P, and to the throttling lip L, can be readily followed. A pressure

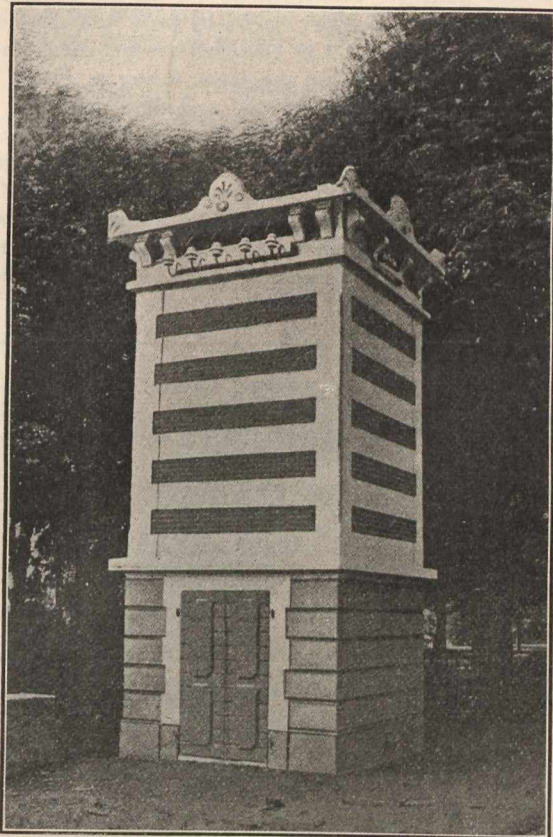


Fig. 9.—Vallorbe: Artistic Isolated Transformer Station.

regulator is also attached to each unit for relieving sudden excess pressure on the supply pipes and penstock.

The generators are built by the Oerlikon shops, and are 3-phase 50 cycles, wound to 13,500 volts at a speed of 375 R.P.M.; they are connected to the wheels with Zedel couplings. The switching is specially interesting, owing to the wide system of distribution, but is simplified by having no transformers. Instrument pedestals of American type are installed, and the chief operator from his gallery can easily control all operations of the station. A unique arrangement of hydraulic jet lightning arresters is installed on a floor above the gallery, shown in Fig. 8. This combines a horn type arrester with a water resistance together with a choke coil and metallic ground wire.

For the distribution of this power and that from the lower station there is planned a network of over 250 miles of line, the farthest point served being about 50 miles distant. A characteristic is the widely scattered network of power service. The total population in the localities is about 100,000, the number of localities or communes designed to be served is 212 with 235 transformer stations. This is a striking example of the extensive detail of distribution which European companies are now carrying out, and both the people and the power companies of Ontario can at the present time benefit materially by following Swiss lead in this respect.

To illustrate this widely scattered market the following table is given, showing the number of localities and respective populations in which the company's franchise permits sale of power for 30 years, subject to state controlled prices:—

10	communes	under 100 inhabitants.	
48	"	from 100 to 200 inhabitants.	
55	"	" 200 to 300 "	
59	"	" 300 to 500 "	
21	"	" 500 to 800 "	
10	"	" 800 to 1,200 "	
5	"	" 1,200 to 2,000 "	
4	"	" 2,000 to 5,000 "	

The power in these places is used for lighting, street railways, cement and brick yards, all manner of agricultural needs, such as churning, etc., watch-making, weaving, and miscellaneous shops and industries.

Small transforming stations of standard design, about 10'-0" x 12'-0" inside and 27'-0" high with 3 floors, are erected in many localities. These are built of brick or concrete and are cheap and neat in appearance. Some in city streets and parks are most artistic. See Fig. 9.

Prices are as follows:—For light; 16 C.P. lamps from 400 to 800 hours per year, \$3.60; over 800 hours, \$4.40. For heating: 8 cents per kilowatt hour. For motors flat rate: on 11 hour basis, less than 1 H.P., \$60 per year; 1 to 2 H.P., \$40; 9 to 11 H.P., \$37; 25 H.P., \$33; 50 H.P., \$30; 100 H.P., \$29. On 24 hour basis add 25% to above figures. For motors on meter rates from 2.5 cents per kw. hour at 1 H.P. down to 1.4 cents at 100 H.P.

The Engelberg Plant.

Among the new Swiss installations that near Engelberg, about 20 miles from Lucerne, stands out most prominently. The construction of this plant was commenced late in 1903, and it was put in operation in the fall of 1905. It is organized by Lucerne promoters and nearly all the stock is owned by the city corporation as a financial investment, but the company is operated privately. The principal market is in the city of Lucerne for lighting and power, and a consider-

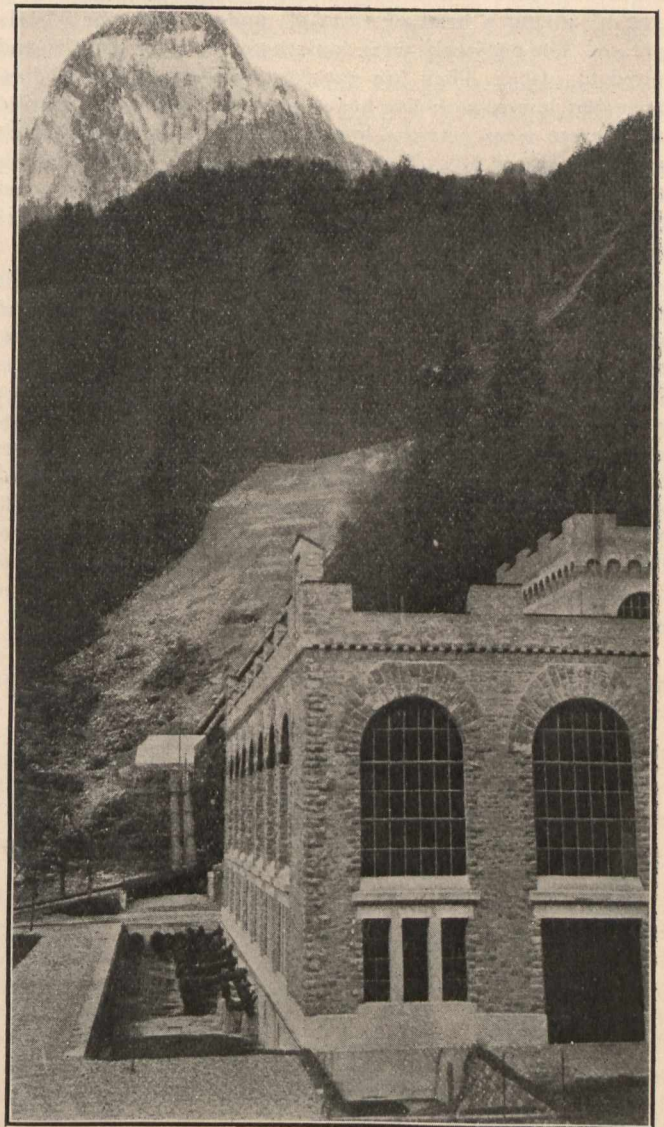


Fig. 10.—Engelberg: General View of Station.

able block is taken for the Engelberg 3-phase electric railway. The interest in this plant is in its modern equipment both hydraulic and electric, and it may be considered an example of the latest European practice.

Engelberg, town and district, are well-known to tourists as a summer and winter resort high in the mountains south of Lake Lucerne. The little Erlenbach rises in the hills nearby and forms a small lake before starting down the valley.