

EUROPEAN HYDRO-ELECTRIC DEVELOPMENT

FRENCH PLANTS IN THE VICINITY OF LYONS.

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Lyons: From the River Rhone.

The city of Lyons with its population of half a million is second in size, but first in industrial importance among the provincial cities of France. This distinction is largely due to its geographic situation, since it is practically in the centre of the country, and is located at the confluence of two navigable rivers, the Rhone and the Soane; hence, secures for it a large provincial trade, and makes it an ideal distributing centre. The surrounding cities and towns contribute their share toward this activity; notably St. Etienne, with its steel works—the largest in France.

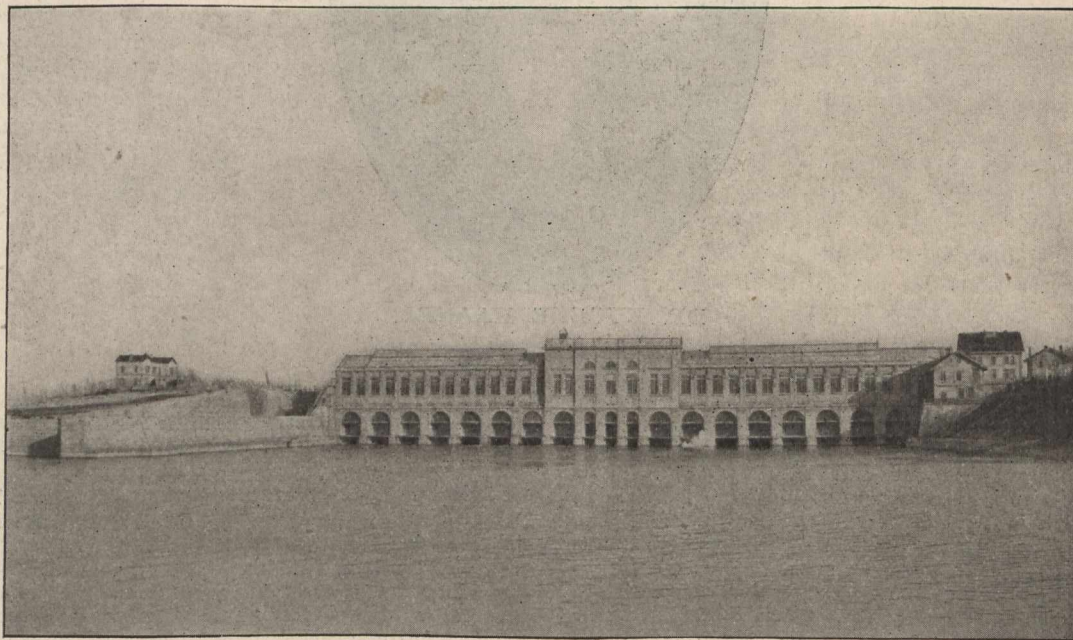
Lyons, as a user of power for manufacturing purposes, offered an attractive field for enterprise. It is not surprising, therefore, that in this city one of the earliest European hydro-electric plants of large dimensions was installed. The diverse character and limited extent of its respective manufactures calls for relatively small quantities of power, requiring a varied distribution and numerous units. The main demands for mixed power come from its silk, fancy goods, leather, wine, brewing and light metal establishments. The total value of manufactures in Lyons amounts to about

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nal de Jonage." This arrangement affords a working hydraulic head of about 38 feet. The amount of water available is limited by the natural conditions and the requirements of the Government to from 3,000 cubic ft. per second at low water, to 4,800 at high water. The diversion of this water from the river, made necessary the construction of a canal of a minimum depth of 8 feet, with locks for the passage of light draft vessels, so that in case of need the Government could use it in conjunction with the main channel.

The upper portion of the canal follows an old river channel, while the main portion, cut through gravel, is heavy excavation to a wet section of about 200 ft. width. The canal is spanned by nine very substantial bridges. The generating station of itself forms the dam across the canal necessary to secure the head of water and at one end a lock for passing vessels is inserted.

The generating station has frequently been noticed in the technical journals during the past few years, it is not my intention in this article, therefore, to enter into elaborate details, but simply to set forth the engineering features of this notable installation. The building itself is about



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The Société des Forces Motrices du Rhone first undertook in 1894 the construction of a hydro-electric plant for the purpose of transmitting power to Lyons, a few miles distant, and thus became one of the pioneer European hydro-electric power producers. The site chosen for development was on the Rhone, a few miles above Lyons, and was such that high tension transmission was unnecessary. The result now is, that as in similar instances in America, a large industrial suburb, Ville-urbanne has sprung up near the generating station, notable for its lack of chimneys and its uniformly neat appearance.

For a distance of about ten miles above the generating station, the Rhone flows through a very irregular bed, consisting of a network of rapids and small swift streams, among gravel islands, in a broad valley, having a total fall of about 35 feet. The main channel is canalized by the Government for shallow draft. The general scheme of the power development comprises a head canal from the Rhone above the rapids to a power house site, thence a tail race canal to an outlet in the Rhone below the rapids, a total distance of about 11 miles, the whole known locally as the "Ca-

475 feet long, and is built largely of concrete, trimmed with stone and tiles. The units are directly connected; of the vertical shaft type, 16 in number; each of about 1,250 net H.P., under normal conditions of the river; there are also 3 exciter units. Water is led to the turbines from separate bays on the upstream side of the station, each having its own screens and sluice gate. The latter is unique, as being in the nature of a cylindrical drum, 10 ft. in diameter, closing the top of a vertical inlet pipe. It is raised and lowered by a chain hoist worked from within the station shown on the right hand side of the interior view of same.

The units are arranged in line at about 27 ft. centres. The right central units, four on each side of the central bay—which contains the exciter units and switchboards—are operated by Jonval turbines made by Escher Wyss & Company, of Zurich, the installation of which was completed about 1897. These are of a special type, having a three stage runner with downward discharge into a draft tube, and water fed to it through three separate and parallel distributors or guides at about 45 degrees; all fitted with cylinder gates. The thrust is provided for by a large disc or piston about 6 ft. diameter, attached to the shaft within, and at the top of the case. The closed chamber on the upper side of the piston is connected to the tail race.