Canadian Hydro-Electric Power Development.¹

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II.

IN a review of last year's activities in water-power development by provinces, Quebec took a pronounced lead with 168,000 h.p., followed by British Columbia with 48,000 h.p.; Manitoba with 43,200 h.p.; Ontario with 5700 h.p.; New Brunswick with 2600 h.p., and Nova Scotia with a small amount. Dealing first with Quebec, it is to be

the river of that name, flowing into the Ottawa River, is associated with the Canadian International Paper Company, which has pulp and paper mills in the district, while a large quantity of power will be diverted to the Niagara system of the Ontario Hydro-Electric Power Commission.

The writer did not have an opportunity of inspecting the power stations in this district, but

FIG. 2.—Chelsea Falls development of the Gatineau Power Company, Gatineau River, Quebec. Capacity, 170,000 H.P. Under construction, 1926. This plant has recently been completed.

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noted that though the plant actually placed in operation during 1926 fell short of the record year of 1925, projects now in course of construction represent a future addition of more than 1,400,000 h.p., which indicates a continuance of substantial progress. The outstanding event of the year was undoubtedly the virtual completion by the Gatineau Power Company of two installations on the Gatineau River at Chelsea and Farmers' Rapids and the initiation of constructional operations at Pagan Falls, the three sites having a total estimated capacity of 530,000 h.p. The Gatineau Power Company, which operates in the valley of

he had the privilege of going through the two power stations of the Shawinigan Water and Power Co. at Shawinigan Falls in the St. Maurice River Valley, a group of the most important hydro-electric installations in the province, and he can testify with appreciation to the very complete and efficient service of generating and distributing plant which he found in operation. Since its incorporation in 1898, the Shawinigan Water and Power Co. has grown to be the fourth largest distributor of electricity in the world: it controls in the form of electricity or hydraulic supply nearly 600,000 h.p. The St. Maurice River is one of the largest rivers in the whole of Canada. It has its

¹ Continued from p. 301.

source at the divide between the valley of the St. Lawrence and the watershed of Hudson Bay at a point about 300 miles north of the former river, and it drains a region of nearly 20,000 square miles. Practically the whole drainage region is forest or woodland, a circumstance which is most favourable for maintaining constancy of river flow. In a part of its course, the waters of the river descend more than 250 ft. within a distance of a dozen miles, and it is here that the principal power stations have been developed.

Shawinigan Falls was the site of the first development, and it is now the centre of the Company's generating and transmission system. Located about twenty miles from the junction with the St. Lawrence, the curvature of the St. Maurice at this point, where the fall is 150 ft., lends itself admirably to economical exploitation. The first installation, completed in 1902, consisted of two 5000 h.p. water wheels and generators, now incorporated in Power House No. 1, the capacity of which was raised in 1910 to 58,500 h.p. by the addition of four units of 11,500 h.p. Power House No. 2, begun in 1911, with two 20,000 h.p. units, received a third unit in 1912; two additional units in 1914; and a sixth unit of 45,000

Canada, Ltd., and 15,000 h.p. to the Belgo-Canadian Paper Company in the form of hydraulic power.

At Grandmère, which is six miles above Shawinigan, the power development of the Laurentide Power Company, Ltd., an allied concern, comprises

Photo.]

FIG. 3.—Shawinigan Power Station. Capacity, 145,000 H.P.
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six 20,000 h.p. units and two 22,000 h.p. units, with provision for a final unit of 22,000 h.p. to be installed in the future. The total capacity at present is 164,000 h.p.

The latest addition to the Company's generating system is an installation of 120,000 h.p. at La Gabelle, seven miles below Shawinigan. This was completed and put into operation in 1924. Provision has been made for the addition of another unit of 30,000 h.p.

In the short stretch of about a dozen miles of river between La Gabelle and Grandmère, there are, therefore, three hydro-electric generating stations having a total capacity of 507,500 h.p. The local storage ponds of the three stations are under unified control and a balance is maintained of the electrical loads so that the water is utilised to its full extent in passing down the river.

Through a subsidiary company (the North Shore Power Company) the Shawinigan Water and Power Company completed and put into operation last year

another installation of 22,000 h.p. at St. Narcisse on the Batiscan River (about 20 miles below the St. Maurice River), replacing an installation of 1600 h.p., reputed to be the first in the British Empire to supply energy over long-distance transmission.

The question of transmission is, of course, an

Photo.]

FIG. 4.—Grandmère Power Station. Capacity, 164,000 H.P.
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h.p. in 1923; thus bringing the total capacity up to 145,000 h.p. at the present time. There is contemplated the installation of two more units of 45,000 h.p. each; so that, when completed, the total electrical capacity of Power Houses Nos. 1 and 2 will be 293,500 h.p. In addition, 50,000 h.p. is supplied to the Aluminium Company of

important problem in dealing with the supply of energy from the generating centres to the various localities of consumption. The Shawinigan Company transmits 3-phase alternating current at 114,000 volts over four lines to Montreal, and the high tension used, together with the large amount of current passed, necessitate very careful insulation. Aluminium is largely taking the place of copper for the cables of transmission lines, and this step is opening out an important industry in the production of aluminium from bauxite. The

300 miles of steel tower and steel pole voltage lines and about 400 miles of high voltage wood pole lines, with more than a thousand miles of wood pole lines of low voltage. The lines on the southern route to Victoriaville cross the St. Lawrence River one mile above the city of Three Rivers, by means of an overhead crossing which is one of the largest in existence, both as regards length of span and height of tower. The distance between the two towers is 4800 ft., which, with the anchorage spans on each bank, gives a total length of 6324 ft. of

Photo.]

FIG. 5.—La Gabelle Power Station. Capacity, 120,000 H.P.
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[S. J. Haywood.]

process is being developed among other places on the Saguenay River, where the bauxite is imported from districts in Central and South America, to be treated with the aid of the local hydraulic power.

The high voltage transmission lines forming the trunk lines of the Shawinigan system radiate from Shawinigan Falls westward to Montreal (85 miles), eastward to Quebec (55 miles), and southward across the St. Lawrence River to Sherbrooke and the Thetford Mines Asbestos district. Three general types of support are in vogue: steel towers, steel poles, and wood poles. Of these, the steel structures are the more permanent. There are

crossing. The towers stand 375 ft. above the foundation level. The minimum clearance above the water is 165 ft., so as to admit of the passage of ocean-liners between Montreal and Quebec.

It would be possible to dwell at considerable length on the development of water power in the Province of Quebec alone. In addition to the Gatineau River, the St. Maurice River, and the Saguenay River installations, to which reference has been made, there are a number of minor installations of cumulative importance, some of which in time will form the nuclei of future groups of power centres. Projects which are in hand, or under active consideration, include a 65,000 h.p.

development on the Prairie River, near Montreal, by The Montreal Island Power Co.; a 50,000 h.p. development at Spicer Fall, on the St. Francois River, by the Southern Canada Power Co.; a 40,000 h.p. plant at Mountain Fall, on the Rouge River, by the Canadian International Paper Co.; a 50,000 h.p. addition to the Ottawa River Power Company's installation at Bryson, and a number of lesser calibre.

The Quebec Streams Commission continues a very useful and beneficial work in fostering water-power development in the Province. The Commission has extensive storage reservoirs established on the St. Maurice and St. François Rivers, Kenogami Lake, Ste. Anne de Beaupré and Mitis Rivers, all of which are at present reported as filled to capacity, the various plants in connexion therewith being thus assured of an ample supply of water during the winter season. The Commission now has under its supervision the construction of the Baskatong reservoir on the Gatineau River, which is at the point of completion. This reservoir is formed in part by Baskatong Lake, and has a capacity of 94 billion cubic feet; it serves to regulate the flow to 8000 cubic feet per second. Other work of the Commission includes surveys and investigations of likely projects, some of which will materialise in due course.

The Province of Ontario includes, of course, the world-renowned Falls of Niagara, or, at any rate, the Canadian portion of them. The Ontario Hydro-Electric Power Commission recently completed two large stations, the Queenston on the Niagara River with 550,000 h.p. development, and the Cameron Falls on the Nipigon River with 75,000 h.p. development. The Queenston Station is now fully loaded, and for the further supply of the Niagara system the Commission has entered into a contract with the Gatineau Power Company for the delivery of from 230,000 to 260,000 h.p. over a 220,000 volt line, commencing next year.

In Northern Ontario, the Abitibi Power and Paper Co. has completed the transmission line from its 48,000 h.p. plant at Island Falls to the mills at Iroquois Falls. The town of Cochrane is also served from this line. A short distance to the west, the Spruce Falls Co. has in hand the

construction of works at Smoky Falls on the Mattagami River, which will result in the obtaining of 70,000 h.p., which will be utilised to supply energy to the Company's pulp and paper mills in the district.

In the extreme west of the Province, a 17,000 h.p. development at the western outlet of the Lake of the Woods has been achieved by the Keewatona Power Co. In the same district, the Bachus Brooks Co. has undertaken the construction of three power sites on the Seine River, which will have an aggregate capacity of 37,620 h.p. It is expected that all three will be completed and in use by the end of the current year.

Important developments are in progress in British Columbia and Manitoba, but as these are much farther afield than the writer's ambit, only very brief allusion will be made to them. In the former Province there are works in hand on the Kootenay and Powell Rivers, while the British Columbia Electric Railway Company's dam at the Alouette lakes, eight miles north of the Fraser River and about 25 miles due east of Vancouver, has proved a valuable addition to the supply at Stave Falls. A project promoted by the same Company at Bridge River is designed for an initial capacity of 54,000 h.p., which may ultimately reach a total of from 550,000 to 700,000 h.p. In Manitoba, the City of Winnipeg and the Manitoba Power Company have made notable additions to their respective installations.

There is not, however, quite the same inducement in the Western Provinces of Canada to exploit water-power as in the Provinces of Quebec and Ontario. Coal is procurable, and although not of high quality, yet the power situation is not so compulsory or so drastic as if no alternative source were available. It is therefore in the Eastern Provinces, with their conspicuous lack of coal-mines, that the greatest and most sustained effort is being made to develop water-power, and the foregoing notice of the steps which are being taken to remedy a striking deficiency in the natural fuel resources of the country, so obviously prejudicial to the development of its industry and commerce, can scarcely fail to interest those whose duty it is to survey the field of Nature and exploit it in the interest and service of mankind.

The British Association at Leeds.

IN the phraseology of our transatlantic cousins, the Handbook for the Leeds meeting may have 'said a mouthful when it describes the area visited this year by the British Association as a 'conurbation,' but behind the word a very important feature of this year's meeting is struggling, if clumsily, for recognition. Proximity of population, and the interlacing of road and rail communication, make the area of the West Riding of Yorkshire one urban unit with a population between one and a quarter and one and a half millions. At the same time, local civic spirit proclaims its divisibility into independent units every whit as

strenuously as the physicist splits up the chemist's atom. The uninitiated visitor must not confound Dewsbury with Batley, or (as the provisional issue of the time-table did!) Halifax with Huddersfield; his crime is as great as that of the visitor to the Western States who assumes that Los Angeles and San Francisco are much the same thing.

The Englishman may pay about the same high price for grape fruits from California and Florida, but this is a mistake condemned on entirely different grounds, and equally emphatically, by both these States; similarly, local championship individualises the products of the local looms, and in its own