THE CANADIAN METAL CO.'S WORKS AT FRANK AND PILOT BAY.

By E. Jacobs.

ONE of the most important enterprises affecting the material prosperity of the Kootenay districts of British Columbia established in 1905 is that of the Canadian Metal Co., Ltd., which has its head office in Nelson. It owes its existence to the persistence and energy of Mr. J. J. Constant Fernau, its general manager, who for about two years has been assiduously working towards effecting the organization and bringing about the operation of this undertaking, which is comprehensive in its objects and gives abundant promise of proving of general benefit, particularly to the zinc and lead producing sections of British Columbia, and, incidentally, to that part of south-west Alberta, immediately beyond the confines of this province, in which it has been found advantageous, owing to the existence there of a supply of cheap fuel, to erect the zinc smelter, which was the initial undertaking of the company.

THE ZINC SMELTER AT FRANK.

The company's zinc smelter at Frank consists of all buildings, machinery, plant and accessories requisite for the manufacture of zinc. The accompanying illustration (see page 457) will serve to give an idea of the works, although one view is not enough to convey an adequate impression of their extent and importance. They were visited, just before the completion of the part now ready for the uses for which the smelter was designed, by Messrs. W. R. Ingalls and P. Argall, members of the Zinc Commission appointed by the government of Canada to report upon the zinc resources and conditions of British Columbia. Shortly afterwards an experimental run was made, chiefly for the benefit of two visiting large stockholders of the company, when a car of zinc concentrates—the first received at the works—from the Grey Copper mine, near Sandon, Slocan, shipped by Mr. J. .A Whittier, manager of the Goodenough Mines, Ltd., was smelted and the first zinc made in Canada was produced.

The sampling department is equipped with automatic samplers and crushing machinery. The ore, after having been passed through the samplers, is conveyed to the storage bins, from which it is weighed out to the roasting furnaces. There are four Merton's patent furnaces each having five decks; combined they give a hearth area of about 5,000 sq. ft. The whole operation is automatic, the ore being fed to the furnaces by automatic feeders and taken thence to the adjacent mixing room by a screw conveyor.

In the mixing room there are bins for roasted ore; coal and coke crushers; mixers, of the pug-mill type; and elevators to dump the ore into cars for conveyance to the distillation furnaces. These furnaces are in an adjoining room, which contains five blocks of furnaces, comprising in all 1,240 retorts.

The roasted ore is mixed in the mixing room with about 40 per cent of its own weight of coal and coke dust, and is then introduced into the retorts by skilled workmen, who throw it into the retorts with small scoops, this part of the treatment process requiring care and practice, to secure best results. The retorts are heated by means of producer gas, and the air for combustion is pre-heated by the waste gases of combustion in apparatus known as generators, which are similar to those used in steel furnaces.

The application of heat to the mixture of roasted zinc ore and coal and coke dust liberates the zinc, which is very volatile; it is distilled out of the retort and is caught in a condenser. From the condenser it is scraped into ladles. Afterwards it is cast into ingots and the zinc, if the product of ore of sufficiently good quality, is then ready for market. If much lead or other metal be present with the zinc in the ingots the metal has to be refined.

Roasting, mixing and distillation are the three essential processes of zinc smelting. In connection with these processes a pottery is necessary, also a gas producer plant. Other requisites are a forge, carpener shop, stores, brick making plant, etc. All of these have been provided at the Canadian Metal Co.'s works and are in operation. The pottery may be mentioned as being one of the best of its kind, and the machines for making the pots used in the zinc works are of a style being rapidly adopted in the United States, although two or three years ago there were in that country only two plants equipped with this class of machine, the main principle of which is the use of hydraulic pressure of 3,000 lb. to the square in., whereas the method commonly adopted, even to-day, is the use of an auger machine which simply drills out the superfluous clay and makes pots thicker and less dense than those made by the hydraulic pressure method. The pottery is also supplied with machines for mixing, screening and stamping the clay before it is moulded.

An elevator delivers the clay required for the bricks to the brick-making department, which is necessary owing to the large number and variety of differently shaped bricks needed in the construction of the furnaces. Adjacent to the pottery are two large brick kilns for burning the bricks at a temperature of 2,500 degrees Fahrenheit.

In a separate building is placed the gas producer plant. Here coal is burned by a mixture of air and steam, giving off what is called producer gas. The coal for these gas producers or generators is obtained from the company's own colliery, situated close at hand, and the entry to which is from the works. Coal is brought direct from the mine to the top floor of the gas producer building, thus avoiding any intermediate handling between mine and zinc works.

The dimensions of the main building, which contain the roasters, mixing chamber, and distillation furnaces, are: Length 750 ft., width 50 ft., height to eaves 26 ft. The buildings in which are housed the forge, carpenter shop and stores, are similar in general design to the main buildings. All are of brick, roofed with galvanized iron. An enlargement of the