

smith shops, all repair work, construction work, electricians and mechanical draughtsmen.

Mine Engineer, who has charge of surveying, sampling and diamond drilling and geological work, and who is responsible for the proper compilation of data regarding ore reserves, etc.

Chief Clerk, who has charge of the accounting and time-keeping departments and of stores.

Steward, who has charge of the bunk houses, mess houses, clubs and company store.

All these departments are directly responsible to the general superintendent, and in this way the maximum of efficiency is obtained.

The Canadian Mining & Exploration Company, at the head of which is Mr. W. W. Mein, has been appointed consulting engineers.

The property is well equipped with machine and repair shops, and has a plant of sufficient capacity to generate power for all purposes. Hydro-electric power from Waweatin Falls will, however, be available in a short time, and when this is in use, costs will be materially reduced. Brick buildings for the accommodation of the men and the staff have been constructed, and a very complete hospital is also available.

PROGRESS ON THE METALLURGY OF COPPER DURING 1911.

Written for the Canadian Mining Journal by George A. Guess.*

Copper metallurgy during the year 1912 has been stimulated by a steadily increasing price for copper. The price of the metal had remained low since the slump in 1907 until December, 1911, when it began to recover and during the present year it has steadily increased from fourteen cents in January to seventeen cents in June, remaining slightly above that figure for the balance of the year. This increased price of copper enhances the value of the output for 1912 over the year 1911 upwards of \$50,000,000.

The present year has seen a growth of reverberatory furnace rather than blast furnace smelting. The increasing tonnages of concentrates, particularly in the southwest, have demanded the construction of more reverberatory furnaces. The time has gone by for the smelting of this fine material in blast furnaces. The new reverberatory plant of the Ray Consolidated at Hayden, Arizona, was in commission in May, and will handle the product from their large concentrators. The smelter at Humboldt, which consists largely of reverberatories, resumed operations in February. The Copper Queen put two oil-fired reverberatories in operation during the year, after spending some time investigating other methods of handling fines. The new plant of the Calumet and Arizona at Douglas will have four large reverberatories. The fact is realized that fine ore is a detriment to blast furnace operations, taking more coke, running more slowly, and producing quantities of flue dust. The practice, therefore, of screening blast furnace ores is becoming general. These fines, together with the flue dust, are smelted in reverberatories where their quantity is sufficient to justify such a furnace or sintered for blast furnace treatment when the tonnage is small. The Canadian Copper Co. at Copper Cliff has during the year added two large reverberatories to their smelting plant. These handle fines and flue dust and converter slag. On account of the basicity of the charge these large reverberatories have a hearth and side walls of basic brick. These are the first reverberatories to be designed and built for the burning of pulverized coal. Previous experiments in firing reverberatories with pulverized coal have been adaptations to existing construction.

Reverberatory furnaces show little change in construction. The limit of size appears to have been reached. The front of the furnace is now, however,

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usually built straight into the flue. The skimming is done at the side near the front.

For roasting sulphide fines for reverberatory smelting the Macdougall type of roaster continues in favour. Larger sizes, however, are being used and the rabble arms have been speeded up to twice their former speed resulting in greatly increased capacity. Roasting furnaces that have been developed in the sulphuric acid industry have entered the field of copper smelting. Herreshoff furnaces are being installed at the C. & A. at Douglas. Wedge furnaces have been put in at Braden, Copper Cliff and other places. Bedding of the charge that has proved advantageous to blast furnace operations is being adopted for fines for reverberatory smelting, and should result in greater uniformity of work and capacity, in their operation. The handling of the Miami concentrates (which consist of silica, copper, and sulphur, with practically no iron) continues to be a unique as well as successful operation. These concentrates are treated at Cananea and are blown into the converters. The construction of a suitable dust chamber for the converter gases has been found necessary.

The Canadian Consolidated Co. at Trail has changed the practice of granulating and roasting the low grade copper matte, high in gold values, and is smelting it direct with silicious ores in the blast furnace. A wide blast furnace has been developed at Great Falls. This is 84 inches wide at the tuyeres and in cross section looks like an early form of iron blast furnace. The upper tier of jackets conveying at the top. By using a slotted tuyere 3 in. x 11 in. with the long axis vertical 120 square inches of tuyere area are obtained per foot of furnace length. This is about three times the tuyere area of an ordinary blast furnace. Blast furnaces 72 inches wide at the tuyeres give improved running at Cerro de Pasco. The new blast furnace plant of the Mason Valley mines was blown in early in January.

Very considerable strides have been made in the development of basic converting during the year. The use of a basic lined converter is now almost universal. The long barrel form of the Peirce-Smith up to 37 feet in length as at Copper Cliff, has been the general form installed until this year when the form developed at Great Falls has found tremendous favour and has been installed generally in the southwest at Cananea, at the Copper Queen, and at the C. & A. at Douglas. This