

one side leading to the chimney to carry off the smoke and fumes. The object in having it lower at the end next the flue is to keep the flames as close down on the ore as possible, so as not to waste any heat. At the end next the fire-box, on the angles of the furnaces, there are two openings, which are fitted with small iron doors, to enable the state of the ore to be seen while undergoing this operation. As soon as the metal is drawn off, another charge is ready to drop in, as there is an iron hopper placed over the top of each furnace capable of containing the requisite quantity of mixed material for a charge, an opening being left on the crown of the furnace to allow this to be done, and, as soon as the charge is in, the hole is again closed up with clay.

The roasting process is the next operation. The pigs or slabs of metal that come out of the reducing-furnace are broken up and placed with flux in a furnace of a similar description as the reducing-furnace, there to be subjected to a great heat from twenty to twenty-four hours. The slag is again carefully skimmed off the surface of the metal, and the regulus, which at this stage contains from 90 to 95 per cent. of copper, is run off into open sand-moulds.

The slabs of regulus, from 5cwt. to 6cwt. each, are now put into a refining-furnace, which is somewhat similar in construction to the others, only being considerably higher and having a special opening on one side to charge it, which is done by placing the slabs on an iron slice having a strong iron handle and sliding them in, one on top of another, until the charge is complete. A charge consists of from 5 to 6 tons of regulus. The side-opening is now closed up, the regulus melted, and again subjected to a great heat for several hours, after which it is taken out by ladles from a small well in front, having the floor of the furnace dipping towards it, and run into ingots of about 21 lbs. each, fit for the market.

It was very difficult to obtain any definite information with regard to the cost of treatment. The cost of smelting depends entirely on the character of the ore. The richer the ore the more costly it is to treat, but, so far as I could learn, the cost of treating the ore from this company's mine is about £2 per ton.

The large quantity of firewood this company consumes has cleared off the bush within a radius of from ten to fifteen miles. They have a light railway and specially-constructed light locomotives for bringing firewood and other mining timber from a distance of over twenty miles.

The Hunter River Copper Works.

This company's works are situated on the Hunter River, near Newcastle, and is one of the most complete smelting plants in the colony. The plant belongs principally to the proprietors of the Wallaroo and Moonta Mines, and a great deal of the ore from these mines is shipped here for treatment. The system adopted here for treating the ore is somewhat similar to that adopted by the Cobar Copper Company, with the exception that the whole of the furnaces, twenty-one in number, are reverberatory, likewise that the ore goes through an additional process of calcining before it is put into the reducing-furnaces; and further, that the fumes from the roasting-furnaces go through about 700ft. of flues before they reach the chimney.

The calcining process is done by putting the crude ore into a furnace similar to that described for roasting pyrites at the United Pyrites Works at Sandhurst, at page 4, and subjecting it to dark-red heat for about six hours, keeping it constantly stirred to free it from sulphur and arsenic; after this it is drawn out and mixed with flux before putting it into the reducing-furnaces. When the furnaces are at work they consume about 6 tons of coal daily. During last year 2,050 tons of copper were smelted, and at the time of my visit there were about 1,000 tons of ingots on the works, ready for shipment.

Mr. Thomas, the manager, accompanied me, with Mr. J. S. Mackenzie, F.G.S., and Examiner of Coalfields in New South Wales, and explained to me the various processes that the ore had to undergo before it was fit for market. He drew my attention to the great length of flues from the works to a large brick chimney, 150ft. in height, which he had recently constructed at an outlay of nearly £7,000, in order to save the oxide from the fumes as they became condensed. The main flue is 9ft. wide by 11ft. in height, and follows a very tortuous course; the more bends and elbows there are the better for condensing the fumes. Mr. Thomas stated that the amount of oxide he saved since the construction of these flues, about twelve months ago, was sufficient to pay all the outlay of erecting them.

I observed here, as well as at Cobar, that for some distance all around the smelting-works the country was devoid of any vegetation. No doubt this is owing to the poisonous fumes condensing in the atmosphere and falling on the ground.

COAL MINING.

The coal measures in this colony occupy an immense area, a great portion of which is situated in such a position that it is comparatively easy to get the product of the mines sent to market. Mr. C. S. Wilkinson, F.L.S., F.G.S., Geological Surveyor, estimates that the coal fields occupy an area of 29,950 square miles, and that the seams now worked cover an area of 3,228 square miles, being about half the area of the coal-fields in the United Kingdom. He also estimates that, after deducting one-half of the contents of the seams for waste, &c., there is about 14,370,000,000 tons available for use; but, be this as it may, the great thickness of the seams, and the facilities there are for working and sending the coal to market, will make this industry one which will employ a large population.

The Wallsend Mine.—This mine has the largest output there is in the colonies, being about 500,000 tons per annum, or more than at present comes out of the whole of the mines in New Zealand. There are about 640 actual miners employed underground, or 1,050, including surface- and truck-men.

The system of working adopted is that known as "bord-and-pillar," the bords being about 7 to 8 yards and pillars from 4 to 5 yards wide. In this mine the main tunnel goes in from the side of the