He remarks further that the coal was soft and the expense of repairs great, and that, as a consequence, the system was abandoned. He also states that he examined 120 Pernolet ovens employed at the Wigan Coal and Iron Company's works, and that they appeared to give somewhat better results than his own. A good many Pernolet ovens are said to have been erected on the Continent.

Enough has been said to show the genesis of the modern coking oven, including its use as a retort and hence as a source of liquid by-products and gas; it would therefore serve no particular purpose, however interesting it might be from an historical point of view, to minutely describe the proces of coking on circular and oblong heaps or piles. The Schaumberg kiln, Smet's, Appolt's, Talbot's, E. Jones's, and many other ovens now passed into oblivion ,some of which have contributed one or more of the details of construction and methods of working embodied in modern practice. The long, narrow, high retort-oven, heated by the combustion of gas in its flues; the method of charging through holes in the top; the door constructed of firebricks held together in an iron frame, and raised and lowered by means of a chain; the ram for discharging the coke; the employment of waste gases under steam boilers; and the condensation and collection of liquid by-products were all in operation before the year 1860; and the last link in the chain—Pernolet's system of returning the non-condensable gases to the ovens, with the object of burning them in the flues beneath their floors, and thereby coking, or assisting to coke, the charge—was patented in 1862.

During the years that have elapsed since 1862 much skill and ingenuity have been exercised in perfecting the details of the modern coking oven, which is now gradually eliminating all its more ancient rivals from the field. The success of these efforts is best illustrated by the fact that in the most recent type of ovens the economy of heat is so great that after the tar and ammonia have been extracted only one-half of the permanent gas is required to coke the coal, and the other half is available for steam-raising or for use in gas engines. The yield of these ovens per ton of coal coked is given by Mr. Hann as follows:—

	Per cent.
Coke	80
Breeze	1.75
Tar	1.63
Sulphate of ammonia (19.5 lbs.)	0.87

WESTERN COPPER COMPANY'S MINES, NEWFOUNDLAND.

By H. V. Smythe, Mgr. Western Copper Co.

The mines of the Western Copper Company are situated at York Harbor, bay of Islands, on the west coast of Newfoundland. The harbor is safe and ample, about six miles in length by three in breadth, and is surrounded by very high land, except at its head, where there is a wide and level stretch of country reaching inland. A large island, Governor's Island, lies in the centre of the harbor, and affords complete shelter to shipping of any size.

The hills on the eastern side of the harbor, where the Western Copper Company's mine is situated, rise abruptly from the waterside, and attain an elevation of 2,125 feet at a little distance inland in what is known as the Blow-me-down Mountains. The western slope has several minor ridges or foothills, intersected by ravines, through which brooks of considerable size flow out into York Harbor.

The mine is located at the head of what is known as Eagle Nest Brook, is about three-quarters of a mile from the shipping, and is at an elevation of about 1,000 feet above tidewater. The geological structure of this district is similar to that of Notre Dame Bay, which has proved a profitable copper-producing district. The rocks consist of the metamorphic metalliferous zone of eastern North America. Wherever this series occurs in Newfoundland it has proved highly metalliferous, all the copper deposits of Notre Dame or White Bays being in the same series. The copper-bearing rock forming the ore channels is a dark green to black serpentine, being an altered diorite, which is the common or country rock. The serpentine band is of unknown width, and contains superimposed, lenticular masses of low-grade chalcopyrite. These ore-masses vary in size, being found crushed or broken near the surface and in solid masses of many thousands of tons as depth is attained. The ore is compact and close-grained, containing about 4.5 per cent. copper and 38 to 41 per cent. sulphur. It is in demand in both Europe and the United States as a fluxing medium, the sulphur being extracted and used in the manufacture of sulphuric acid.

The general trend of the ore-bearing serpentine belt is northeast and southwest with a dip of about 73 degrees southeast, the ore-masses practically conforming to the same trend and dip.

The Western Copper Company's mine is 360 feet in depth. It has three shafts, one of which, the main, is used for hoisting, the other two for pumping and ventilating purposes only. The main shaft is sunk at an angle of 72 degrees southeast, or practically the dip of the ore lenses. At every 60 feet levels have been driven to the southwest along the strike of the ore bodies, and where they occur mining has been carried on by means of overhead stopes. As these stopes average from 10 to 30 feet in width, heavy 12 x 12 inch timbers are used in "square setts" to support the back or roof where the ore has been removed.

At present the company is not actively mining the property, but are locating and developing new ore bodies, shipping what is taken out during development. They have now between 30,000 and 40,000 tons of ore in sight, added to which another series of lenses is being opened up of sufficient depth to more than double that amount.

The plant is well equipped with machinery for both mining and transportation, and there are good shipping facilities. Air drills are used, compressed air being supplied by a Norwalk high-altitude compressor. The ore is hoisted from the mine in an automatic self-dumping skip of one ton capacity by means of a 50 hp. Flory hoist. The ore goes through a crusher, which reduces it to size that will pass through a ring of 6 inches diameter. From the crusher it passes to cars on the main tramway, and these are then lowered to the main tramway by means of powerful winding engines.

The tramway is 5,400 feet in length, dipping 1,000 feet in that distance. The track is 3 foot gauge, and a train consists of two steel self-dumping cars carrying 3 tons each. These cars shoot the ore into a pocket, the capacity of which is 2,000 tons. Underneath the pocket is a double-tracked tunnel, both sides of which are fitted with shute gates. This tunnel connects with the superstructure of the pier, over which cars carrying one ton each are pushed and tipped into the hold of the steamer.