

UNITED STATES PATENT OFFICE.

DAVID HENRY BROWNE, OF COPPER CLIFF, ONTARIO, CANADA, ASSIGNOR TO THE CANADIAN COPPER COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

METHOD OF MANUFACTURING NICKEL AND NICKEL-COPPER ALLOYS.

934,278.

Specification of Letters Patent.

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No Drawing.

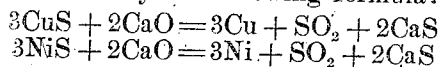
Application filed February 11, 1909. Serial No. 477,449.

To all whom it may concern:

Be it known that I, DAVID HENRY BROWNE, of Copper Cliff, Ontario, Canada, have invented a Method of Manufacturing Nickel and Nickel-Copper Alloys, of which the following is a specification.

In the manufacture of copper it has been common heretofore to produce copper in a metallic state by bessemerizing, which consists of blowing air through molten copper matte, which is a sulfid of copper. It is well known that nickel and alloys of copper and nickel cannot be produced in this manner, because the oxids and sulfids of nickel do not interact as in the case of oxids and sulfids of copper, so that in the manufacture of nickel and copper nickel alloys it has been the practice to produce matte in the form of sulfids, then to roast the sulfids to bring them to the state of oxids, then to reduce the oxids with carbon to the condition of spongy metal and to melt such sponge into the form of ingots.

The purpose of my invention is to dispense with such roasting process and to produce nickel and copper nickel alloys directly from the sulfid matte. I proceed as follows: I take the matte, which consists of sulfids of nickel or nickel and copper produced in the usual manner in a cupola furnace, a Bessemer converter or a reverberatory smelting furnace so that it will be free to the desired extent from iron, and I place such matte in an electric furnace, preferably an arc furnace, where I subject it to the action of lime. The matte may be introduced into the furnace in a liquid condition as it is taken from the furnace in which it is made; or I may take the solid matte, crush it, and after mixing it with lime or lime stone introduce it in solid condition into the electric furnace. When the matte which is introduced into the electric furnace is heated and is brought into a molten condition at a high temperature a reaction occurs between the lime and the sulfur contained in the matte so that the lime combines with the sulfur and becomes sulfid of calcium, leaving the metal free from sulfur. The reaction which takes place is illustrated by the following formula:



I may add the lime in the furnace all together at the beginning of the operation, or it may be introduced continuously or intermittently. The lime sulfid, being lighter than the metal, will float on the surface as a slag, which may be removed from time to time as desired.

The slag may be thinned by the introduction of common salt, fluorspar, or any other easily fusible neutral flux which will facilitate the removal of the slag, and I may also introduce with the charge powered carbon which will effect saving in the waste of the carbon electrodes employed in forming the arc, but otherwise does not necessarily take part in the chemical reactions in the furnace.

The principle of my invention is the useful application of the discovery that at a high temperature and under reducing conditions the lime will combine with the sulfur of the molten matte, forming sulfid of lime and leaving the metal free from sulfur. I have found it suitable in the practice of my invention in treating matte containing 22 per cent. of copper, 58 per cent. of nickel, .5 per cent. of iron, and 28 per cent. of sulfur, to add to the charge in the electric furnace an equal weight of lime, and if desired, powdered carbon to the amount of 5 per cent. of the matte.

It is desirable that a surplus of lime should be employed over and above that which is theoretically needed to combine with the sulfur in the matte.

I claim as my invention:

An improvement in the manufacture of nickel or nickel alloys which consists in subjecting sulfur compounds of such metal or metals to fusion with electric heat in the presence of lime, causing thereby the combination of sulfur with lime as sulfid of calcium, the evolution of sulfur dioxid and the production of nickel or nickel alloy.

In testimony whereof, I have hereunto set my hand.

DAVID HENRY BROWNE.

Witnesses:

JOHN GRIBBLE,
E. C. LAMBERT.