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COMPLETE SPECIFICATION.

Improvements in the Process of Bessemerizing Copper Matte.

I, JAMES BROWN HERRESHOFF, Junior, of Richmond Hill, Borough of Queens, City and State of New York, United States of America, Chemical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

In processes for bessemerizing metals, as hitherto carried out, it has been usual to employ a charge of fresh silicious material for each charge of matte and to operate the blow for some time until the proper temperature at which the collection of the bases will take place is reached.

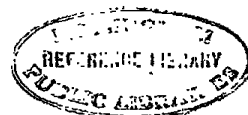
10 It has, however, been proposed to leave in or return to the converter after the copper (or other metal) has been removed from the converter, the molten silicious material which has been used for treating the charge and to employ said molten silicious material for fluxing and slagging the next charge of matte. As, however, the material returned to or left in the converter possesses a capacity
15 for collecting bases inferior to that of the silicious material first introduced, it is necessary to make periodical acidity tests in order to ascertain whether the capacity of the silicious material for taking up bases has become exhausted, which tests give very little indication of the true condition of the fluxing or slagging agent owing to lack of homogeneity in the composition of said agent.
20 The present invention relates to the bessemerizing of copper matte and consists in a process in which silicious material, in excess of that required to slag or flux the molten charge, is introduced into the converter, this excess of material (which retains the same capacity for collecting bases as it possessed when it was first introduced into the converter) becoming heated and, when the
25 metal has been removed from it and whilst still in the heated state, being used as a fluxing medium for another charge of matte.

The process may be carried out either in a single converter as in the following Example I or in a battery of two or more converters as in Example II.

EXAMPLE I.

30 Silicious material and matte are introduced and air is blown through the mass. The slag is removed, more silicious material is added, and a second blow is produced, and this process is continued until white metal is produced. Instead of introducing a fractional amount of silicious material, the requisite amount may be introduced in one charge. The slag is removed from the white
35 metal and the latter is now blown to blister copper. Immediately before the copper is poured, silicious material is placed in the converter, which material becomes highly heated but is not chemically acted upon so that it retains the same capacity for collecting bases as it possessed when introduced into the converter. The copper is then poured or otherwise removed from below this
40 material, after which a new charge of matte is introduced on to the silicious material in the heated state, and the whole process is repeated.

[Price 6d.]



Herrshoff's Improvements in the Process of Bessemerizing Copper Matte.

EXAMPLE II.

Silicious material is introduced into the first converter, molten matte is then poured therein, and air is blown through the mass until a clean and fusible slag is formed, and part of the iron in the matte is removed. The slag is now poured off and a charge of silicious material, which is in excess of that required to remove the iron content of the bath, is introduced into the converter. Air is again blown through the mass until the iron has been removed therefrom in the form of slag and white metal is produced. The excess of silicious material above the white metal is viscous or non-fluid and highly heated and retains the same capacity for collecting bases as it possessed when introduced into the converter. The white metal is now removed from the converter and introduced into the second converter, as for instance by pouring it from under the slag in the first converter into the second converter in which it is blown to blister copper in the usual way. The first converter is lined with a basic or neutral lining which may consist of magnesite bricks, chrome bricks or the like. The second converter may be provided with a basic, neutral, or acid lining, the first being preferred. The silicious material left in the first converter gradually settles as the white metal is being removed and finally rests upon the bottom of the converter. A new charge of matte is now introduced and the process is continued as before.

It will be seen that in both the examples I introduce silicious material into the converter upon the bath or charge therein, so that the heat of the bath, which would otherwise be wasted, is utilized, and that the heated silicious material is brought into contact with the molten matte of a second charge, tending to raise the temperature of the matte.

An advantage of my process is that the slags poured from the converter, are in general clean, containing but a small percentage of copper. It is well-known to those versed in the art that slags poured from a bath either of white metal or of copper contain a large percentage of copper, those poured from a bath of copper containing much more copper than those poured from a bath of white metal, and that they must be subsequently treated at great expense to obtain the copper content thereof. In the operation of my process in any of its forms, I at no time pour slag from a bath of copper, while in the operation of the specific example of my process in which two or more converters are used, I pour slags only from matte and at no time from either white metal or copper. The slag present over the white metal is rendered stiff and viscous by the addition of suitable quantities of silicious material, with the result that the white metal can be poured from below without the use of complicated apparatus. This thick viscous slag, containing appreciable amounts of copper, is retained in the converter and worked up with the next charge of matte into a clean slag containing negligible amounts of copper, which clean slag is finally poured from the matte. Thus it will be seen that my process either obviates the necessity or reduces the expense of the subsequent treatment above mentioned.

In order that there may be no doubt as to what I intend to be understood by the words "silicious material in excess" wherever used in this specification, I would state that the actual "excess" will depend upon the conditions of working, *e.g.* the temperature of the bath, the grade of matte under treatment, the time at which the fluid slag is poured off. The following example should make my meaning clear:—

When treating, say, 1000 lbs. of 50% matte containing approximately 320 lbs. of ferrous oxide, I estimate that 160 lbs. of silica should be added to each 1000 lbs. of 50% matte for the purpose of obtaining a fluid slag, and I consider, in this example, any weight of silica in excess of that stated as "silicious material in excess" and estimate that the addition of, say, 240 lbs. of silica to the charge above referred to (that is 80 lbs. in excess of the weight of silica previously mentioned) would produce the thick viscous mass I refer to.

Herreshoff's Improvements in the Process of Bessemerizing Copper Matte.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

5 1. The improvement in the art of bessemerizing copper matte, which consists in introducing into a converter, upon the molten charge therein, silicious material in excess of that required to slag or flux said charge, the excess material becoming heated and retaining the same capacity for collecting bases which it possessed when it was first introduced into the converter, then removing the charge from said material and utilizing said material, whilst still in the
10 heated state, as a fluxing medium for a subsequent charge of matte, substantially as described.

2. The improvement in the art of bessemerizing copper matte according to Claim 1, which consists in introducing into a converter upon the molten charge therein silicious material in sufficient amount to form a thick viscous mass upon
15 said charge, removing the charge from the converter while allowing said mass to remain therein and then introducing matte into the converter upon said mass.

Dated this 26th day of May, 1914.

A. M. & WM. CLARK
Chartered Patent Agents,
53, Chancery Lane, London, W.C.