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UNITED STATES PATENT OFFICE.

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SEPARATION OF METALS.

No Drawing. Application filed September 26, 1921. Serial No. 503,358.

To all whom it may concern:

Be it known that I, SIGURD GIERTSEN, a citizen of Norway, residing at Kristiansands, Norway, have invented certain new and useful Improvements in Separation of Metals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved method of separating copper from copper-nickel solutions such as copper-nickel sulphate solutions by cementation.

The invention is based upon the discovery that copper can be effectively separated from copper-nickel sulphate solutions by cementation upon raw Bessemerized copper-nickel matte. By fine crushing of the raw matte before cementation by mechanical stirring and by the use of a more or less concentrated form of the raw matte, the cementing capacity of the matte can be materially increased, so that the greater part of the nickel can be removed from the matte by the cementation.

It has been the common practice heretofore to make use of reduced metal (produced by oxidation or roasting of Bessemerized copper-nickel matte and subsequent reduction) for cementing copper from copper-nickel sulphate solutions. I have found, however, that the production of reduced metal, by roasting and subsequent reduction, is unnecessary, and that the raw Bessemerized matte itself can be used for the cementation.

I have further found that the cementing capacity of the raw Bessemerized matte can be materially increased by so modifying the Bessemerizing operation that the resulting matte is materially reduced in its sulfur content. Ordinarily, prolonged blowing in the Bessemer converter results in freezing the charge, but I have found that by adding to the charge a small amount of scrap iron or other heat producing material, such as ferro-silicon, sufficient additional heat will be supplied by the oxidation to permit the sulfur to be gradually lowered to a degree considerably below that otherwise commercially feasible. A small quantity of low grade matte or pyrrhotite ore is well adapted for use as heat producing material, since such materials seem to give off their sulfur very quickly, leaving the iron to oxidize and thereby supply the supplemental heat. By thus prolonging the blowing operation, it is possible to produce a raw Bessemerized matte containing a materially reduced sulfur content, for example, less than ten per cent, or even as low as eight per cent or less of sulfur. The concentrated matte thus produced, with its lowered sulfur content, is particularly advantageous for use in the cementing process.

The carrying out of the cementing operation is promoted by heating of the solution. The solution may thus be heated to boiling to promote the cementation, particularly where the cementing capacity of the matte is to be utilized as quickly as possible, or where the matte contains its normal sulfur content. The cementing operation will also be promoted by fine grinding of the raw matte or by stirring as well as by concentration of the matte to a greater or less extent by reducing its sulfur content in the manner above described.

The cementing operation can be carried out in a progressive manner, or on the counter-current principle, by bringing the fresh solution into contact with the partially exhausted matte, and utilizing the fresh matte for treating the solution from which most of the copper has already been removed.

The cementing process of the present invention can be utilized in conjunction with the electro-deposition of nickel from nickel sulphate solutions, or in conjunction with the production of nickel sulphate solutions for other purposes.

I claim:

The method of separating copper from copper-nickel solutions, which comprises treating the same with Bessemerized copper-nickel matte containing less than about ten per cent of sulfur.

In testimony whereof I affix my signature.

SIGURD GIERTSEN.