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METHOD OF SEPARATING NICKEL FROM NICKEL-COPPER ALLOYS.

1,266,775. Specification of Letters Patent. Patented May 21, 1918.

No Drawing. Application filed July 13, 1916. Serial No. 108,992.

To all whom it may concern:

Be it known that I, JOSEPH DHAVERNAS, a citizen of the Republic of France, residing in the town of New Brunswick, county of Middlesex, and State of New Jersey, have invented certain new and useful Improvements in Methods of Separating Nickel from Nickel-Copper Alloys, of which the following is a disclosure.

My invention relates to a method for separating nickel from nickel-copper matte. This matte, as is well known, is obtained in large quantities in smelting processes, and is an impure metallic product consisting essentially of nickel-copper, and usually of a substantial percentage of sulfur.

It has heretofore been proposed to separate the nickel out of the matte by first roasting the matte, thereby converting the copper into oxid, and then leaching out the copper-oxid as copper-sulfate or chlorid, leaving the nickel substantially free of copper. This process has not been found satisfactory because it has been found impossible to leach out all of the copper and, in practice, there always remains two or three per cent. of copper undissolved, however long the acid treatment. Moreover, it was found that if the roasting was carried far enough to make the copper more easily soluble, a large percentage of nickel would be oxidized along with the copper, with the result that it would dissolve with the copper in the subsequent acid treatment, preventing the successful operation of the method.

My improved process differs radically from that above described, as will be readily seen from the following description.

In practising my improved process, I first roast the matte partially, in order to reduce the sulfur content of the matte. If the sulfur content be no greater than twelve per centum, I can proceed without any roasting; but I prefer to have the content of sulfur reduced to about eight per cent. When sufficiently desulfurized, I then reduce the matte to convert whatever oxids it may contain or which have been formed in the roasting process to a deoxidized state, this step being accomplished by suitable reducing gases, or coke, or in any suitable way. The result after the deoxidizing step is a conversion of the original high-sulfur matte into a low-sulfur double matte of copper and nickel.

The nickel salt in the solution may be separated in any well known way, such as by the addition of lime or by evaporating the liquid. The resulting crystals or nickel salt may then be broken up by heat treatment to form the well known nickel oxid, from which metallic nickel may easily be obtained by reduction.

If in practising my improved process, it is found, as is sometimes the case, that the acid employed to dissolve the nickel also to a small extent attacks the copper and carries a trace of it into the solution, this trace of copper in the solution may be removed by adding metallic nickel, preferably in granulated or powdered form, which operates to displace the copper in the solution and causes it to be precipitated.

In dissolving the nickel out of the oxidized and substantially reduced matte, I may employ a neutral or slightly acid copper solution. In using such a solution, the nickel of the metallic matte displaces and precipitates the copper of the solution, leaving a nickel solution, and thereby effecting the desired separation.

I am aware that many modifications may be made to the process above described without departing from the scope of my invention, and I therefore intend to include all equivalent processes within the scope of my claims.

What I claim is:

1. The improvement in methods of extracting nickel from copper-nickel matte, containing sulfur, which consists in roasting the matte to remove part of the sulfur, then reducing the resulting oxids to metallic form, then treating the metallic nickel-copper with an acid adapted to attack and dissolve the nickel, substantially as described.

2. The improvement in the method of extracting nickel from copper-nickel matte which consists in partly oxidizing the matte, partly reducing the resulting oxid, and dissolving out the nickel.

3. The improvement in methods of extracting nickel from copper-nickel matte containing sulfur which consists in roasting

the matte to reduce the sulfur content, then reducing the resulting product, then treating the product with an acid thereby dissolving the nickel, and then adding metallic nickel to the solution for the purpose of precipitating any copper dissolved therein, substantially as described.

4. The improvement in processes of the kind described which consists in treating non-oxidized nickel-copper matte with an acid adapted to dissolve the nickel, then treating the solution with metallic nickel thereby precipitating any small percentages of copper in the solution, then drawing off the nickel salts and treating them to produce metallic nickel, substantially as described.

5. The improvement in methods of extracting nickel from copper-nickel matte which consists in partly oxidizing the matte by roasting, partly reducing the resulting matte, treating the resulting product with an acid adapted to dissolve the nickel, then treating the solution with metallic nickel, thereby precipitating any small percentages of copper in the solution, then drawing off the nickel salts, and producing metallic nickel therefrom.

JOSEPH DHAVERNAS.

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