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JOSEPH DHAVERNAS, OF NEW BRUNSWICK, NEW JERSEY, ASSIGNOR TO UNITED STATES NICKEL COMPANY, OF NEW BRUNSWICK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF SEPARATING NICKEL FROM NICKEL-COPPER ALLOYS.

1,273,465. Specification of Letters Patent. Patented July 23, 1918.

No Drawing. Original application filed July 13, 1916, Serial No. 108,992. Divided and this application filed September 8, 1917. Serial No. 190,308.

To all whom it may concern:

Be it known that I, JOSEPH DHAVERNAS, a citizen of the Republic of France, and a resident of New Brunswick, county of Middlesex, and State of New Jersey, have invented an Improvement in Methods of Separating Nickel from Nickel-Copper Alloys, of which the following is a specification.

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.

This application is a division of my application Serial No. 108,992, filed July 13, 1916, for method of separating nickel from nickel-copper alloys. The claims of the present application relate particularly to the method in which a neutral or slightly acid copper solution is used. Claims to this method were divided out of the parent application.

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 metalic nickel may easily be obtained by reduction.

If, in practising my improved process, it is found, as is sometimes the case, that the solution 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.

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.

I claim:

1. The improvement in the method of extracting nickel from copper-nickel matte which consists in reducing the matte and treating the resulting mass with a neutral or slightly acid solution of copper whereby the copper in solution will be precipitated and the nickel left in solution.

2. The improvement in the method of extracting nickel from copper-nickel matte, which consists in partly oxidizing the matte, reducing the resulting product to a metallic state, and treating the product with a neutral or slightly acid solution of copper.

3. 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 a neutral or slightly acid copper solution

adapted to attack and dissolve the nickel, substantially as described.

4. The improvement in the method of extracting nickel from copper-nickel matte which consists in partly oxidizing the matte, reducing the resulting oxid, and using a neutral or slightly acid copper solution to dissolve the nickel while preventing the copper from going into solution.

5. 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 a neutral or slightly acid solution thereby dissolving the nickel, and then adding metallic nickel to the solution for the purpose of precipitating any copper dissolved therein, substantially as described.

6. The improvement in processes of the kind described which consists in treating the product obtained by oxidizing and reducing nickel-copper matte, with a substantially neutral copper solution 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 to produce metallic nickel, substantially as described.

7. The improvement in methods of extracting nickel from copper-nickel matte which consists in partly oxidizing the matte by roasting, reducing the resulting matte, treating the resulting mass with a slightly acid copper solution 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.

In testimony whereof, I have signed my name to this specification this 7th day of September, 1917.

JOSEPH DHAVERNAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."