UNITED STATES PATENT OFFICE.

AUGUSTE J. ROSSI, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO THE TITANIUM ALLOY MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

PROCESS FOR PRODUCING THE ALLOY OF TITANIUM WITH COPPER.

1,022,599. Specification of Letters Patent. Patented Apr. 9, 1912.

No Drawing. Application filed February 4, 1911. Serial No. 606,455.

To all whom it may concern:

Be it known that I, AUGUSTE J. ROSSI, a citizen of the United States, and a resident of Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Processes for Producing the Alloy of Titanium with Copper, of which the following is a specification.

My present invention relates to a novel method for producing the said alloy, and its object is to provide such a method whereby the said alloy may be produced without recourse to some of the agents and operations hitherto deemed desirable, if not essential, and the attainment of a resulting product free from former characteristics of such alloys and possessing other characteristics not found in the latter.

Letters Patent No. 700,244 were granted to me May 20, 1902, reissued No. 12,754, March 17, 1908, for the alloy of titanium and copper and my then method of producing same by aluminium reduction of titanium oxid. The product of my said patented process is, when thereby manufactured on an industrial scale, often found to contain aluminium and other resultants to such extent as to render it comparatively undesirable for some specific uses, though increasing its utility for others. Elimination of such residuals may require exceptional care and skill in operation, besides employment of agents, the presence or effects of which may sometimes undesirably affect particular products into which the alloy is incorporated. On the other hand, for example, a content of some small amount of carbon in alloys of titanium and copper may prove not only harmless for certain applications but even useful for others. My researches have now disclosed that notwithstanding the peculiar characteristics and behavior of copper in presence of carbon and titanium oxid under high temperatures, it is nevertheless possible to produce its alloy with titanium by means of carbon reduction of oxygen compounds of titanium under conditions hereinafter described, and that the resulting product, notwithstanding its inferiority to some extent, in certain particulars, to that produced by my said previously patented method, will, as ordinarily produced on industrial scales, be free from some characteristics imparted by said method and possess others imparting thereto special value for specific uses.

The process of my present invention may be practiced as follows:—In a container provided with means for heating the charge to required temperature, as for example in the crucible of an electric furnace of any of the now well known forms, such for instance as illustrated and described in Letters Patent No. 802,941, granted to me October 24, 1905, I produce a bath of molten copper, either by pouring into the crucible the copper previously molten, in any convenient manner, or by introducing into the crucible solid copper and melting same therein by turning on the current. Into said molten bath I introduce a mixture, preferably intimate, of carbon and oxid of titanium, and continue the current until the temperature of the entire charge has been raised sufficiently to insure reduction of the titanium oxid by the carbon. The resulting metallic titanium liberated will dissolve or mingle homogeneously with the copper to constitute the desired alloy, which may then be tapped out and resulting slags therefrom eliminated in any convenient manner, as will be understood by those skilled in the metallurgical art. The required bath of molten copper may also be produced by charging into the crucible a mixture, preferably intimate, of oxid of copper or other compound of copper capable of reduction by carbon, and oxid of titanium and carbon. The current being turned on as before will result first in formation of the required bath of molten copper and subsequently in reduction of the titanium oxid, liberation of metallic titanium and production of the alloy as before. In producing said alloy of titanium and copper, by the process of my present invention, in operations conducted on an industrial scale, it is preferable; if not indispensable, owing to the characteristic properties of copper under the conditions mentioned, to interpose between the atmosphere and the charge a liquid coating comprising molten neutral substances, such as slags, by superimposing and maintaining such coating over the charge, as, for example, described in my

Letters Patent No. 877,518, granted January 28, 1908. It will be understood, of course, that the respective proportions of cupric and titanic material employed, as well as of carbon, will be regulated according to the proportions of copper, titanium and carbon, if any, desired in the resulting product. The calculations and resulting proportionings required to accomplish this will be readily understood by metallurgists without further explanation here.

As a matter of ordinary industrial practice the resulting product of the aforesaid methods of my present invention may contain a small quantity of carbon say 1% to 5% or thereabout, which may prove of advantage for some purposes, or, at all events, not detrimental, as for example when said product, or copper thereby purified, as per Letters Patent No. 905,232, granted to me Dec. 1, 1908, is used in electrical conductors, the presence of some carbon in such instances being less objectionable than that of some aluminium, to be, as aforesaid, expected in the product of my previously patented process unless particular care and skill are exercised in its operation.

What I claim as new and desire to secure by Letters Patent is the following, viz:—

1. The method of producing the binary alloy of titanium with copper, which comprises charging together oxid of copper, oxid of titanium and carbon, and raising the temperature sufficiently to produce a bath of molten copper, and reduction also of the titanium oxid, substantially as described.

2. The method of producing the binary alloy of titanium with copper, which comprises reducing titanium oxid by carbon in a bath of molten copper, substantially as described.

3. As a new article an alloy, or compound, consisting predominantly of titanium and copper alloyed together and containing also some carbon.

4. As a new article an alloy, or compound, consisting predominantly of titanium and copper alloyed together and containing also carbon in excess of 1%.

AUGUSTE J. ROSSI.

Witnesses:
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