UNITED STATES PATENT OFFICE.

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

COPPER AND PROCESS FOR PURIFYING, CASTING, AND ALLOYING THE SAME.

No. 905,232. Specification of Letters Patent. Patented Dec. 1, 1908.

Application filed December 7, 1907. Serial No. 405,460.

To all whom it may concern:

Be it known that I, AUGUSTE J. ROSSI, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Copper and Processes for Purifying, Casting, and Alloying the Same, of which the following is a specification.

It is well known that copper, when melting, absorbs gases and is oxidized, to an extent, during fusion, the resulting oxids dissolving in the metal with the result that copper cannot be cast in sand directly from crucibles, or in sand molds made in flasks, or such molds as are used for casting pig iron, copper so cast containing "blow holes" and cavities to such an extent as to render it, for instance, unfit for drawing into wires without special manipulation and treatment, and the pouring of the molten copper in such cases being accompanied by violent ebullitions and disengagement of gases through the gates of the flasks.

I have discovered that if to copper when charged into the crucible, or while melting, there be added a small quantity of titanic material, for instance preferably from 1% to 2% in weight of combined cupric and titanic materials, for example an alloy of copper and titanium, containing say from 5% to 12% of titanium or thereabouts, the molten mass can, with advantageous results. be cast in sand in flasks such as mentioned above, the pouring being quiet, without overflow through the gates, and without piping, and the resulting bars solid, presenting, in practice, a close grained, dense, structure free from blow holes. For example my said invention may be practiced as follows: The copper to be treated is melted as usual in the crucible or other container. There is then added thereto a substance containing cupric and titanic material, as for instance an alloy of copper and titanium, such as described in U. S. Letters Patent No. 700,244, granted to me May 20, 1902 which addition, in many cases, need not exceed from 1 to 2 per cent. of the entire weight of the copper treated thereto, and the content of titanic material, or of titanium, 5 to 12 per cent. of the said addition, the function of the titanium, when added in such small proportions, being limited to the prevention of the formation of the aforesaid gases, oxids, or other undesirable compounds with the copper, and the elimination of those already contained therein, and the titanic material being, in such cases, so proportioned as to enable my said process to result in a final product without the aforesaid undesired gases, oxids and other compounds, or resultants thereof, and with also substantially traces only of titanium, say a fraction of 1% at the most.

It will be understood that I do not limit myself to the specific proportions above suggested, regarding these only as generally the most satisfactory for ordinary purposes, as some good results from my said process may also be attained by higher proportions of titanium or titanic material, which, though I consider them unnecessary in most cases, and even objectionable in some, may render the resulting copper product desirable for special specific purposes.

For the better understanding of my said process and its results, as compared to the prior art, the two following operations may be noted.

1. In a usual brass crucible furnace I charged and melted 50 pounds of copper ingot, which, when at the proper temperature, was cast, in equal proportions, in flasks containing sand molds, according to prior usual foundry practice. The resulting four bars of cast copper weighed seven pounds each, and being broken, contained large cavities, and blow holes.

2. I then, according to my said novel process, charged another lot of 50 pounds of the same copper into a similar crucible, with the addition of 1 to 2 per cent. in weight of a copper titanium alloy containing 8 per cent. of titanium or thereabouts. The conditions and procedure in this case were in all respects similar to those in the above described previous instance. The metal was submitted to the same heat until the addition was incorporated. It was then cast, in equal proportions, into four flasks prepared in all respects for casting as in the previous instance. The resulting four bars of copper were found to be perfectly solid, weighed from 12½ to 12¾ pounds each, and, when broken, showed a close grained, dense structure, without blow holes or cavities.

Comparative physical tests were made of the two sets of bars resulting from the above described operations. The bars treated by my process were found to have an ultimate strength, elongation, and elastic limit four

to five times greater than those of the said bars not treated by my process. Scarcely a trace of titanium was found, by analysis, in the bars treated, thus demonstrating that the action of the titanic ingredient was substantially confined to the elimination, or prevention, of obnoxious gases or oxids such as oxygen and nitrogen and the reduction of the oxids of copper formed during the melting of the metal. The effects of my said process are also advantageous in cases in which the molten copper is intended to form the basis of alloys of that metal with zinc, or tin, or both; including also additions of lead or manganese, as practiced for brass, bronzes, and such special copper alloys, the resulting alloys derived from copper so treated by my process being also substantially free from blow-holes, and generally superior, the beneficial effects of my process extending not only to the resulting copper when used as such in wire or other forms, but also to alloys of which copper so treated forms the basis.

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

1. The method of treating copper which consists in incorporating therewith, while molten, a quantity of titanium sufficient to free the resulting product from undesired compounds and gases.

2. The method of treating copper which consists in incorporating therewith, while molten, a titanic material in quantity sufficient to free the resulting product from undesired compounds and gases.

3. As a new article of manufacture a metallic body composed preponderatingly of copper and containing not to exceed traces of titanium.

4. The method of treating molten copper which consists in incorporating therewith an alloy containing copper and titanium.

5. The method of treating molten copper which consists in incorporating therewith a substance containing cupric and titanic materials.

6. The method of treating molten copper containing impurities which consists in incorporating with such copper an alloy containing copper and titanium proportioned to leave in the resulting product not to exceed one per cent. of titanium.

7. The method of treating molten copper containing impurities which consists in incorporating with such copper a substance containing cupric and titanic materials proportioned to leave in the resulting product not to exceed one per cent. of titanium.

8. The method of treating molten copper which consists in incorporating therewith an alloy containing copper and titanium proportioned to leave in the resulting product not to exceed one per cent. of titanium.

9. The method of treating molten copper which consists in incorporating therewith a substance containing cupric and titanic materials proportioned to leave in the resulting product not to exceed one per cent. of titanium.

10. As a new article of manufacure a metallic body composed preponderatingly of copper and containing not to exceed one per centum of titanium.

11. As a new article copper free from blow holes and containing not to exceed one per centum of titanium.

12. The method of treating molten copper which consists in incorporating therewith an alloy containing copper and titanium proportioned not to exceed two per cent. of the mass, and said titanium content not to exceed twelve per cent. of said alloy.

13. The method of casting copper which comprises first melting it, then incorporating therewith an alloy containing copper and titanium, and then pouring the molten mass into the mold.

14. The method of casting copper which comprises first melting it, then incorporating therewith a substance containing cupric and titanic materials, and then pouring the molten mass into the mold.

15. As a new article of manufacture copper containing not to exceed traces of titanium.

16. As a new article of manufacture copper containing less than one per centum of titanium.

17. As a new article of manufacture copper free from blow holes and containing not to exceed traces of titanium.

18. As a new article of manufacture copper free from blow holes and containing titanium in quantities less than to constitute such copper an alloy of titanium.

19. The method of treating molten copper which consists in incorporating therewith titanium proportioned not to exceed one per centum of said copper.

20. In the process of producing copper the step which consists in incorporating with the copper, while molten, titanium.

AUGUSTE J. ROSSI.

Witnesses:
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