

# 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.

ALLOY OF ZINC AND TITANIUM AND PROCESS FOR THEIR PRODUCTION.

979,393.

Specification of Letters Patent.

Patented Dec. 20, 1910.

No Drawing. Original application filed March 22, 1907, Serial No. 363,959. Divided and this application filed May 4, 1909. Serial No. 493,856.

*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 Alloys of Zinc and Titanium and Processes for Their Production, of which the following is a specification.

My present invention relates, in part, to improvements in, and processes for producing, alloys, including those of copper with other metals, such as tin, zinc, or lead, one or more, and designated, as the case may be, brasses or bronzes, and my present application for patent is a division of my pending application, Serial No. 363,959, filed March 22nd, 1907.

The copper of commerce contains impurities, and it has been found that admixtures, or alloys therewith of certain metals, or elements, such as titanium, produce on such copper, for casting or other purposes, certain beneficial results, for instance reduction, diminution, or even elimination of undesired compounds or gases present in its molten state, and which cause defects such as "pin-holes" tending to render such castings unsound and useless. While commercial copper itself, as say in the form of castings, has been thus purified and improved, the introduction thereinto, in its remolten state, of zinc or other metal to produce brasses or bronzes has hitherto produced in the resulting bath a recurrence of conditions unfavorable to the copper and consequent unsoundness, if not uselessness, of the resulting brasses or bronzes. Thus for instance, into the alloy, in molten state, compounds have been imported and resulting gases developed and occluded, which owing to their maleficent effect especially upon the copper content, have injuriously affected the alloy produced, even in cases in which the copper itself had been, as above stated, previously purified.

My tests have demonstrated that by introducing into the bath of molten copper employed in production of the brass and bronze alloys referred to, zinc itself, previously improved by alloying with titanium, a satisfactory condition of the resulting alloy is promoted, and even in higher degree than

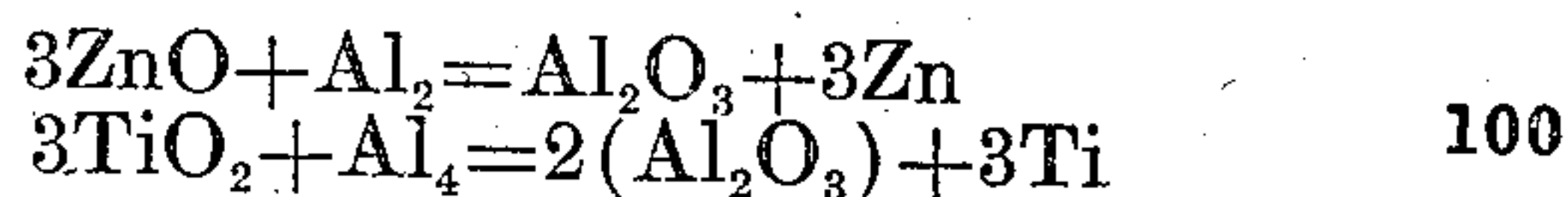
in cases in which such titanium has been separately brought into the presence of the copper previously to its reduction to molten state for the purpose of producing the brasses or bronzes referred to.

In addition to its utility for the specific purpose aforesaid, *i. e.* in making alloys of copper with zinc and other metals, my novel alloy of zinc and titanium is also useful when comelted in small quantities with zinc to purify and improve latter, and also in other employments in the arts.

As titanium exists rarely, if ever, isolated in metallic state, but only as alloyed with other metal, principally iron, or sometimes copper, and none of these alloys serve my purpose, it is preferable to derive the required titanium from its oxid.

My present invention comprises not only the said novel article, to wit, the alloy of zinc and titanium, but also my hereinafter described preferred process for producing same which is substantially as follows:—

My said alloy of titanium with zinc I produce by charging into a graphite crucible, or other container properly adapted, zinc, titanic acid, and preferably an oxid of zinc, also such an amount of aluminium (preferably in shots or the like so as to melt more rapidly) as is chemically sufficient to decompose the oxid of titanium and also the oxid of zinc and reduce their respective titanium and zinc contents to their metallic states. This mixture is then heated, as by a coke fire, in a wind furnace, or otherwise, to a temperature sufficiently high to insure the melting of the metallic elements of the charge, and the taking place of the reactions above noted. The molten product, on being withdrawn and cooled will be found to be an alloy of zinc and titanium, the percentage of the latter being proportional to the amount of titanic acid and aluminium charged, the reactions being as per the following formula, viz:



While, in this instance, the presence of an oxid of zinc is not absolutely essential, it nevertheless, promotes considerably the reactions desired in the charge, and accelerates its fusion into a homogeneous metallic alloy,



the heat of formation of the zinc oxid being so small as to leave available a large excess of heat due exothermally to the combination of its oxygen with part of the aluminium of the bath. In this manner I have obtained an alloy of zinc with titanium containing six to ten per centum of titanium and more. In operating this process any of the now well known forms of so called electric furnaces may be employed, in which case the addition of the zinc oxid while still advisable, is not as important as with other furnaces, since extra heat, if required, may be derived from the current.

The proportions of the ingredients used in the charge will be varied according to the percentage of the respective metals desired in the alloy according to the formulas above given and as experience and test in each case will readily demonstrate to those skilled in the metallurgical art, it being understood that for some purposes alloys lower in titanium than those mentioned may be desirable, and vice versa. I have also found it advantageous, though not essential, to add, in some cases, to the charge, as per Letters Patent No. 877,518 granted to me January 28, 1908, some fusible slag, such as broken glass or a mixture of latter with an ordinary iron blast furnace slag, comprising silica, alumina, lime and magnesia, or a silicate of alumina and lime, in such proper proportions as can readily be determined in each case as to insure such slags floating on the top of the charge, thus constituting, as it were, a blanket for the latter, and thus protecting the other aforesaid ingredients of the charge from oxidation at the surface by contact with the atmosphere. Such blanket

is particularly useful because of the otherwise rapid and excessive oxidation of the molten zinc by contact with the atmosphere under the high temperatures required, thus avoiding an important loss of that metal notwithstanding its specific gravity is greater than that of the aluminium and the titanium oxid. When the slag blanket is thus employed, the zinc present in the charge will assist in reducing, in part, the titanitic acid and correspondingly diminishing the proportion of aluminium required.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is the following, viz:—

1. As a new article an alloy of zinc and titanium.

2. The process of producing an alloy of zinc with titanium which comprises bringing titanitic acid into the presence of zinc and aluminium while molten together, subjecting the mass to a temperature sufficient to insure reduction of said titanitic acid by said aluminium, and withdrawing and cooling the resulting metallic product.

3. The process of producing an alloy of zinc with titanium which comprises bringing titanitic acid and oxid of zinc into the presence of zinc and aluminium while molten together, subjecting the mass to a temperature sufficient to insure reduction of said titanitic acid and said oxid of zinc by said aluminium, and withdrawing and cooling the resulting metallic product.

AUGUSTE J. ROSSI.

Witnesses:

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GEORGE G. MEASURES,  
PHILIP C. PECK.