

UNITED STATES PATENT OFFICE.

CHRISTIAN DANTSIZEN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

COATING METALS.

1,381,085.

Specification of Letters Patent.

Patented June 7, 1921.

No Drawing.

Application filed November 1, 1919. Serial No. 335,090.

To all whom it may concern:

Be it known that I, CHRISTIAN DANTSIZEN, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Coating Metals, of which the following is a specification.

The present invention relates to the surface alloyage of one metal with another metal, as, for example, the surface alloyage of iron or copper with another metal, for example, aluminum.

The present invention comprises a modified process of carrying out the treatment of metals described in U. S. Patents 1,155,974 to Van Aller, and 1,091,057 to Gilson, one of the main objects of which is to render the treated surface inoxidizable. The procedure described in these patents involves the heating of the metal on which surface alloyage is desired in the presence of a metal powder.

In accordance with my present invention the product described in these patents is produced by a process involving the use of a molten treating metal in the presence of an alloying metal. It is the object of my invention to reduce the equipment needed and reduce the time required for producing the desired article.

The following process for treating metals such as iron, copper or the like, with aluminum, is illustrative of my invention. The metal article to be treated, for example, iron, which for the sake of convenience will be called the foundation metal is first thoroughly cleaned, preferably by pickling for about five minutes in hydrochloric acid solution of a specific gravity of 1.1 and then is placed for about a minute in a concentrated solution of zinc chlorid.

While still wet with zinc chlorid the cleaned foundation metal is brought into contact with an easily fusible metal capable of alloying with both the foundation metal and the treating metal. Metals suitable for this purpose are zinc and tin. The foundation metal may be allowed to remain in contact with molten tin at a temperature of 300° C. for about fifteen seconds.

The foundation metal after being withdrawn from the tin bath is brought into contact with the treating metal, for example, aluminum. For example, the foundation metal after being subjected to the

tin bath may be introduced into a bath consisting of one part of tin and 3 to 8 parts of aluminum by weight. This bath preferably should have a temperature of about 800° C. After having been left in contact with the alloy of aluminum for about 30 seconds, the foundation metal is heated to a temperature sufficiently high to cause penetration and alloyage of the aluminum into the surface layer of the foundation metal. Preferably the foundation metal is vigorously shaken conveniently in an iron box for about 15 seconds to remove adherent metal before being thus heated. The final firing temperature will depend upon the character of the metals to be alloyed and other conditons, but when working with a foundation metal of iron to be treated with aluminum I have found firing at a temperature of about 800° C. for about fifteen minutes to be satisfactory.

While I have described the preferred method of carrying out my invention, I wish it to be understood that various modifications may be made therein without departing from the spirit of my invention.

In some cases the preliminary treatment in a bath of tin, zinc or other metal alloying with the foundation metal and the treating metal may be omitted, the foundation metal being subjected only to a molten bath of alloy of the treating metal and an easily fusible metal, for example, a bath of aluminum and tin. Somewhat better results however are obtained by the use of an intermediate bath of tin, zinc or the like.

Instead of a chemical pickling to cleanse the surface of the metal, sandblasting may be used with good effect prior to applying the alloying metals.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The process of treating metals to render them inoxidizable at high temperatures which consists in thoroughly cleaning the surfaces of the article to be treated, coating the surface with metal having a relatively low fusing point, then dipping in molten aluminum and firing at a relatively high temperature.

2. The process of treating metals to render them inoxidizable at high temperatures which consists in pickling the article in acid, coating the cleaned surface with metal having a relatively low fusing point in the

presence of a flux, then dipping in molten aluminum and firing at a temperature high enough to cause alloyage of aluminum with said metal article.

5 3. The process of treating metals to render them inoxidizable at high temperatures which consists in coating a clean surface of the article with tin, then dipping in molten aluminum and firing at about 800° C.

10 4. The process of treating metals to render them inoxidizable at high temperatures which consists in treating the article with a pickling solution, coating the surface with tin, then dipping in molten mixture of aluminum and tin and firing at about 800° C.

15 5. The process of alloying a foundation metal upon its surface with a second metal which consists in bringing said foundation metal in a clean state into contact with a
20 second metal to be alloyed therewith in the presence of a third easily fusible metal capable of alloying with both of said metals and then heating the foundation metal while in contact with said metals to a temperature
25 sufficiently high to cause said second metal to penetrate the surface of said foundation metal and alloy therewith.

6. The process of treating metals to render them inoxidizable at high temperature

which consists in bringing a clean surface 90 of a foundation metal article to be treated into contact with a molten metal readily alloyable both with said metal and with aluminum, then bringing aluminum in contact with said surface and finally firing at a temperature 35 sufficiently high to promote alloyage between said foundation metal and aluminum.

7. The process of alloying a foundation metal of iron or the like with aluminum which consists in coating clean surface of 40 said foundation metal with tin, then coating the tinned surface with aluminum and finally firing said coated metal at a temperature high enough to cause alloyage of aluminum with said foundation metal. 45

8. The process of treating metals to render them inoxidizable at high temperature, which consists in bringing the metal to be treated in a clean condition into contact with molten aluminum in the presence of a 50 material causing the aluminum to wet the surface of said metal and then firing the coated article at a temperature sufficiently high to cause alloyage of the aluminum with said metal. 55

In witness whereof, I have hereunto set my hand this 31st day of October, 1919.

CHRISTIAN DANTSIZEN.