UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING COMPOSITE METALLIC ARTICLES.

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To all whom it may concern:

Be it known that I, JOHN KIRBY, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Manufacturing Composite Metallic Articles, of which the following is a specification.

This invention relates to a method of manufacturing composite metallic articles, particularly copper coated iron and steel sheets or bars, or in other words a composite sheet or bar having an iron or steel center and a copper coating, and has for its object to provide, in a manner as hereinafter set forth, a method of copper coating whereby the tensile strength of the copper will be increased and the copper will be thoroughly welded with the iron or steel center.

It is a well known fact that when copper is brought to too high heat, say between 2300° to 2400° Fahr. that the life of the copper is taken therefrom and that the copper becomes dry and full of blow holes, under such conditions becoming very unsatisfactory for any use. To overcome this objection of high heating is one of the objects of the method herein described, as the bath which contains copper, in which the metal is immersed for coating, is maintained between a boiling heat and 2200° Fahr., never rising above 2200° Fahr.

It is also a well known fact that when merchant iron is brought to a degree above a high welding heat that the iron becomes burnt and scales to cinders, which makes the iron unfit for use. This same statement also applies to steel. To overcome the foregoing objections, the iron and steel, when ready for immersing in the bath in accordance with the method as herein set forth, is heated to a temperature about or below 1500° Fahr., which prevents burning and scaling.

The method as hereinafter set forth, provides for the increasing of the tensile strength of the copper, obtaining of a satisfactory weld between the copper as well as the preventing of the burning or scaling of the iron or steel center prior to immersion in the coating bath.

In carrying the method into effect a suitable quantity of commercial copper is placed in a suitable receptacle and brought to a molten condition, by bringing the copper to boiling point, which is about 2100° Fahr. I then combine with the molten copper a vanadium-aluminum alloy providing thereby a bath formed of copper, aluminum and vanadium, and as the aluminum has an affinity for the copper, the vanadium readily combines therewith thereby increasing the tensile strength thereof. When the vanadium-aluminum alloy is placed into the molten copper, the alloy is at a temperature of 3500° Fahr., the molten copper being about 2100° Fahr.

The percentage relative to the proportions of the ingredients of the bath, by way of example, vanadium eight to twenty-five hundredths, aluminum six to twelve hundredths, the balance being copper.

It is well known that vanadium has a great affinity for iron and steel, under such conditions it causes, when the iron or steel center is coated with the amalgam alloy, a high weld between the center and the copper. When the center is immersed in the vanadium aluminum copper bath, it is at a heat from 1200° to 1500° Fahr., and remains in the bath from three to five minutes.

It is well known that copper cannot be packed and rolled without sticking, but by coating in a manner as stated, the copper has the tensile strength thereof increased and the composite article can be rolled without sticking at the required heat and that the articles when packed will be prevented from sticking due to the vanadium hardening the copper.

Briefly described the method consists in bringing a quantity of commercial copper in a suitable receptacle to a molten condition by heating the copper to a temperature about 2100° Fahr. Then combining vanadium and aluminum to provide a vanadium aluminum alloy. The temperature of the alloy being about 3500° Fahr. Then combining the vanadium and aluminum alloy at the temperature stated with the molten copper, under such conditions providing a bath consisting of copper, aluminum and vanadium and maintaining the said bath at a temperature of about 2100° Fahr., then taking the article to be coated at a temperature of 1500° Fahr., and immersing the article into the bath, the article to remain in the bath from three to five minutes, then removing the coated article and if desired immersing the same again for a period of one

minute. The coated article can then be treated in any desired manner. After the coated article has been removed from the bath it is at a temperature of 2200° Fahr. and it is rolled to thoroughly complete the weld.

What I claim is:

1. A method of coating iron and steel consisting in providing a molten bath of copper, aluminum and vanadium, and then immersing into said bath the article to be coated.

2. A method of coating iron and steel which consists in immersing the article to be coated in a molten bath including copper and vanadium.

3. A method of coating iron and steel consisting in providing a molten bath of copper, aluminum and vanadium, maintaining said bath at a temperature of about 2100° Fahr., then immersing a metal article brought to a temperature of about 1500° Fahr., in said bath, then removing the coated article.

4. A method of coating iron and steel consisting in providing a molten bath of copper, aluminum and vanadium, maintaining said bath at a temperature of 2100° Fahr., then immersing into the bath the article to be coated, and then removing the coated article.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN KIRBY.

Witnesses:
MAX H. SROLOVITZ,
N. L. BOGAN.