UNITED STATES PATENT OFFICE.

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METHOD OF DEPOSITING COPPER AND OTHER METALS.

948,662.

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No Drawing.

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To all whom it may concern:

Be it known that I, ALFRED SANG, of Sewickley, Allegheny county, Pennsylvania, have invented a new and useful Method of Depositing Copper and other Metals, of which the following is a full, clear, and exact description.

This invention has reference to a novel method of depositing copper, or copper and another metal, such as zinc, upon iron and steel to form a protective coating therefor, and provides a simple and effective way of forming upon iron and steel articles a surface coating composed either of metallic copper alone, or of successive layers of copper and another metal, such as zinc, or of an alloy of copper and another metal such as zinc.

In carrying out my invention, the articles to be coated are first thoroughly cleaned by any well known method, such as pickling or sand-blasting, or by the combined steps of pickling and sand-blasting. They are then placed in a closed vessel and are packed or covered with metallic copper in the form of a very fine dust or powder, or with a mixture of copper dust and another metal, such as zinc dust, depending upon the character of the coating which is to be formed. The receptacle is then subjected to heat substantially as in the sherardizing process, except that a somewhat higher temperature (preferably about 1000 degrees F.), should be employed when copper alone is used, or when a considerable percentage of copper is employed.

When the articles are removed from the receptacle, after it has been allowed to cool, if copper alone has been used as the covering or packing material, they are found to have on their surfaces a smooth, uniform, and closely adherent coating of copper, of a thickness depending upon the length of time occupied in the treatment. When a mixture of copper and zinc dust is employed, the articles will be found to have a double-layer coating, the inner layer being copper and the outer layer of zinc, with the two layers more or less alloyed where they join each other. The surface layer of the coating may be thick enough so that the articles will present substantially the same appearance as sherardized articles, but if this coating be cut or scratched through, there will appear an underlying layer of copper, with an intermediate brassy portion where the two layers are alloyed. By properly regulating the proportions of zinc and copper dust, the coating may be made to consist substantially wholly of an alloy of the two metals. I have found that five per cent. (by weight) of copper dust, or even less, mixed with zinc dust, will give a plainly perceptible coppery appearance to the coating.

Carbon may or may not be used in the receptacle during the operation. When used it need not be in powdered form but may be either powdered or in lumps, the latter being preferred.

The copper used should be in the form of a very fine powder or dust. I preferably obtain this dust by precipitating the copper from a solution of its sulfate by means of zinc dust. I use a cold copper sulfate solution, adding the zinc dust slowly, and with agitation, which gives a precipitate in a very fine form.

I preferably subject the receptacle containing the articles to be coated and the material in which they are packed to agitation during the time the receptacle is being heated. Instead of mixing zinc dust with the copper, I may use some other metal instead of zinc dust. I have also found that by using a graphite or clay, or clay-lined receptacle, much better and quicker results are obtained, with less loss of coating metals.

The coating produced by my invention is superior to that produced by any other method with which I am familiar; since copper is harder and more resistant than zinc, and affords a better protection against oxidation, especially when exposed to sea-water. When the coating consists of a compound layer of copper and zinc, it has peculiarly resistant properties, due in part to the double coating as such, and in part to the interposition of the copper between the iron and steel and the zinc, whereby there is a less abrupt difference in the electro-chemical properties of the iron and steel and of the outer zinc coating.

What I claim is:—

1. The method of depositing copper on iron and steel surfaces, which comprises applying metallic copper in powdered form to the surface to be coated and in subjecting the same to heat; substantially as described.

2. The method of depositing copper and another metal on iron and steel surfaces, which comprises applying to the surface to be coated a mixture of the copper and other

metal in powdered form, and in subjecting the same to heat; substantially as described.

3. The method of depositing copper and zinc on iron and steel, which comprises surrounding the articles to be coated with a mixture of powdered metallic copper and zinc dust, and in subjecting the same to heat; substantially as described.

4. The method of applying a coating of copper and zinc in successive layers, on the surfaces of iron or steel articles, which comprises bringing the articles into contact with a mixture of powdered zinc and copper, and subjecting them to heat; substantially as described.

5. The method of applying a coating of copper-zinc alloy to the surfaces of iron and steel articles, which comprises bringing the articles into contact with a mixture of powdered zinc and copper, with the zinc in excess of the copper, and subjecting the same to heat; substantially as described.

6. The method of depositing copper and another metal on iron and steel surfaces, which comprises applying to the surface to be coated a mixture of copper and other metal in powdered form, together with carbon, and in subjecting the same to heat; substantially as described.

7. The method of depositing copper and zinc on iron and steel, which comprises surrounding the articles to be coated with a mixture of powdered metallic copper and zinc dust, together with carbon, and in subjecting the same to heat; substantially as described.

8. The method of depositing copper and zinc on iron and steel, which comprises surrounding the articles to be coated with a mixture of powdered metallic copper and zinc dust, and in subjecting the same to heat and agitation; substantially as described.

In testimony whereof, I have hereunto set my hand.

ALFRED SANG.

Witnesses:
W. C. WINTERHALTER,
F. C. HODKINSON.