

UNITED STATES PATENT OFFICE.

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PROCESS OF FORMING A PROTECTIVE METAL COATING UPON METALLIC ARTICLES.

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To all whom it may concern:

Be it known that we, JAMES H. MADDY, residing at 610 West One Hundred and Sixteenth street, New York, county of New York, and State of New York, and BRUNO H. SCHUBERT, residing at 224 Jane street, Weehawken, county of Hudson, and State of New Jersey, both citizens of the United States, have invented certain new and useful Improvements in Processes of Forming a Protective Metal Coating Upon Metallic Articles, fully described and represented in the following specification.

The object of the present invention is to furnish an improved protective coating to metallic articles, especially those formed of iron and steel, which are most liable to rust and to corrosion by various fumes.

Metallic articles have been heretofore furnished with a metallic coating by a dipping in melted metal, or by applying a metallic coating composition to the surface of the article and then heating the metallic article to the melting temperature of the coating metal.

The first process is not applicable to large objects like the freight and passenger-cars used upon railroads, or the steel frames of buildings, especially after they have been erected; and the second process cannot be practically employed with such large articles as those specified, on account of the undesirability and impossibility of heating the entire article to the temperature of melted lead, tin or zinc.

The present invention furnishes a means of applying to metallic articles a protective coating of fusible metal such as lead, zinc, tin or antimony, without highly heating such articles, by combining with the protective metal a chemical agent which creates a great affinity between the protective metal and the iron or steel article, and thus promotes the union of the two at a moderate temperature. The addition of such an agent to the protective metal enables it to be fused upon the surface of the metallic article and united permanently thereto, by a hot blast of suitable temperature to melt the protective metal but not in any case furnishing heat enough to raise the temperature of the entire article anywhere near to the said melting point.

In practising the present invention, the

protective metal is used in a powdered form and combined with a salt of mercury which, when the composition is applied to the metallic article, operates to form an amalgam with the surface of the metallic article, which amalgam produces so great an affinity of the article for the protective coating, that the two become united as soon as the coating is melted, and without the necessity of greatly raising the temperature of the metallic article.

For convenience, the term "fusible metal" is used herein to indicate lead, zinc, tin, antimony or any similar fusible metal, or alloy of such metals, and in practice the said fusible metal is powdered and combined with a dry salt of mercury, as mercury bichlorid, and the mixture then reduced to a plastic or flowing consistency by the addition of a liquid like zinc-chlorid solution which produces no injurious reaction in the composition, but which facilitates its application and adhesion to the surface of the metallic article to be coated. When thus applied to the metallic article, the coating may be melted thereon by a blow-torch of capacity sufficient to melt the fusible metal, but not to melt or injuriously heat the metallic article to be coated.

The metallic article to be coated necessarily requires a chemically clean surface, and it may be cleaned from oxid and other impurities by any suitable means; immersion in a pickle and subsequent washing being suitable for portable articles, and a sand-blast and hand-scrubbing being employed for large articles or objects. When the surface of the article is thus cleaned, the composition is painted thereon, and the application of a heated blast to the surface, then melts the composition, and develops the affinity between the article and the coating metal, so as to unite the two permanently.

Practical use and exhaustive test have shown that the connection of the coating with the article is permanent and not capable of being disturbed by the atmosphere or corrosive gases, provided the metal coating be of lead or tin, so as not to be susceptible to such corrosive agencies.

It is found that the coating is more free from pin-holes and inequalities of texture than the coating formed by dipping the article in the molten bath.

By this process, a coating of lead, or a composition of lead with any other of the fusible metals, may be permanently attached to iron and steel articles, and as lead is materially cheaper than zinc, the process secures a protective coating at very moderate cost.

Where the coating is applied to sheet-metal which is to be bent or stamped into curved forms, the coating of lead, or of an alloy having a great preponderancy of lead, is more suitable as possessing greater flexibility; while the addition of a small proportion of tin or antimony gives to the coating a greater hardness and enables it better to resist abrasion.

From the above description it will be seen that the invention involves the mixing of a salt of mercury with the powdered coating metal, so that the coating may be attracted more positively and firmly to the iron or steel article, and it also preferably includes the addition of an inert liquid, like zinc-chlorid, to give the composition a flowing character, permitting its application by a stiff brush. The zinc-chlorid also operates as a flux in protecting the surface of the iron or steel article from oxidation when heated.

The mixture of mercury salt and zinc-chlorid operates as a flux to lower the melting point of the powdered metal and to protect the iron or steel article from oxidation during the melting of the metal thereon, and in practice the salt of mercury is dissolved in the zinc-chlorid and the powdered metal added thereto in the desired proportion.

To form a thin paste which when melted upon the article will give it a thin coating of protective metal, a proportion of flux may be used from one to three times the weight of the powdered metal with which it is mixed.

To form a thick paste which when melted upon the article will give it a thick coating of protective metal, a proportion of flux may be used having one-third to one-half the weight of the powdered metal with which it is mixed.

Having thus set forth the nature of the invention what is claimed herein is:

1. The process of forming a protective metal coating upon a metallic article, which consists in mixing powdered metal with a salt of mercury, applying the compound to

the surface of the metallic article, and finally fusing the coating metal in the compound thereon.

2. The process of forming a protective metal coating upon a metallic article, which consists first in mixing powdered metal with a salt of mercury and a chemical inert liquid, and thereby reducing the mixture to a suitable consistency, second, applying the composition to the metallic article, and third, projecting a hot blast against such composition to fuse the coating metal upon the article.

3. The process of forming a protective metal coating upon a metallic article, which consists first, in mixing powdered metal with a salt of mercury, second, applying the mixture to the surface of the metallic article, and third, projecting a hot blast against such composition to fuse the coating metal upon the article.

4. The process of forming a protective metal coating upon a metallic article, which consists first, in mixing powdered metal with mercury bi-chlorid, second, applying the mixture to the surface of the metallic article, and finally, fusing the compound and depositing the coating metal thereon.

5. The process of forming a protective metal coating upon a metallic article, which consists first, in mixing powdered metal with mercury bi-chlorid and sufficient liquid zinc-chlorid solution to make a flowing composition, second, applying the said composition to the surface of the metallic article, and third, fusing the metal in the composition thereon.

6. The process of forming a protective metal coating upon metallic frames of buildings *in situ*, which consists first, in successively cleaning such metallic frame-portions by a sand-blast, second, successively applying a composition of powdered protective metal and mercury bi-chlorid to such cleaned surfaces, and finally, fusing the composition to deposit the coating metal thereon.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

JAMES H. MADDY.
BRUNO H. SCHUBERT.

Witnesses:
J. G. BELDEN,
A. J. KAY.