UNITED STATES PATENT OFFICE.

CLAYTON MARK, JR., AND CLARENCE MARK, OF EVANSTON, ILLINOIS, ASSIGNORS TO ANSON MARK AND CLAYTON MARK, COPARTNERS AS THE MARK MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS.

METAL-COATED IRON OR STEEL ARTICLE.

1,168,663. Specification of Letters Patent. Patented Jan. 18, 1916.

No Drawing. Application filed April 22, 1915. Serial No. 23,105.

To all whom it may concern:

Be it known that we, CLAYTON MARK, Jr., and CLARENCE MARK, citizens of the United States, and residents of Evanston, in the county of Cook and State of Illinois, have jointly invented a new and Improved Metal-Coated Iron or Steel Article, of which the following is a specification.

Our invention consists in providing a protective coating for articles of iron or steel, and is comprised of lead, antimony and zinc in such proportions that when they are alloyed they are electropositive to iron.

It has been found that where a coating is applied, such as lead, tin or copper, which is electronegative to iron, it is almost impossible to secure a perfect coating; that is, one free from small holes, etc. In such a coating, wherever an imperfection occurs, galvanic action is set up between the coating and the exposed iron, so that the iron is corroded, and after a time the corrosion will eat under the coating and will cause a separation between the coating and the iron, or else will completely destroy the iron. Zinc has been used very largely as a protective coating, but by reason of the fact that it is very electropositive to iron, the zinc coating is destroyed after a comparatively short time by the galvanic action which takes place between it and the iron, and it is also readily soluble in acids.

The object of our invention is to provide an alloy of coating of such a character that it will not be electronegative to iron, since in such a case a battery action is initiated between the coating and the iron at the expense of the iron and which, at the same time, will not be too electropositive to iron, for in such a case the alloy is not durable by reason of the fact that a reverse battery action ensues and destroys the coating, and when the coating has been destroyed the metal itself will become corroded.

We have found it very desirable to use an alloy composed of lead, antimony and zinc, which can be applied to the metal to be protected at a temperature between 750° and 950° F.

Typical examples of such an alloy are approximately as follows:

Lead	98	92	86
Zinc	1	3.5	6
Antimony	1	4.5	8

which we have found to give favorable results. These alloys contain, in each instance, approximately the stated amount of zinc at the saturation point when temperatures of approximately 900° F. are used. When the temperature is increased, more zinc may be added, or when the percentage of antimony is increased, the higher is the percentage of zinc which is necessary to saturate the bath.

An alloy made in the proportions described maintains a comparatively bright, hard finish, under ordinary conditions of exposure, and is more resistant to acid attack than the ordinary galvanized coating, or coatings comprised of lead and zinc. The alloy forms a smooth and uniform coating, which can be readily applied to pipes, sheeting and similar articles. We have found this coating to have practically all of the advantages of a galvanized or sherardized coating, with the added advantage that it is at least twice as durable to weather and acid attack as a galvanized or sherardized coating. It is also much more adherent than are the usual galvanized coatings, and will not flake or peel off under expansion or contraction of the article, or even if the article is bent or hammered.

The terms and expressions which we have employed are used as terms of description and not of limitation, and we have no intention, in the use of such terms and expressions, of excluding any equivalents for the features shown and described, but recognize that various modifications are possible within the scope of the invention claimed.

What we claim is:

1. An iron or steel article, having a coating electropositive to iron, composed of lead,

antimony and zinc, the antimony being present in percentages below 8 per cent., the zinc being present in percentages below 6 per cent., and the remainder being lead, the percentage of antimony being at least as great as the percentage of zinc.

2. An iron or steel article, having a coating electropositive to iron, composed of lead, antimony and zinc, the antimony being present between 1 and 8 per cent., the zinc being present in percentages between 1 and 6 per cent., and the remainder being lead, the percentage of antimony being at least as great as the percentage of zinc.

3. An iron or steel article, having a coating electropositive to iron, containing approximately the following percentages of lead, antimony and zinc: lead 92 per cent., antimony 4.5 per cent. and zinc 3.5 per cent.

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