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NONCORROSIVE ALLOY AND METHOD OF MAKING AND USING THE SAME

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This invention relates to the coating of metal with non-corrosive and acid-proof protective metal, and to the protective metals themselves.

In certain localities where oil fields and attendant air conditions exist, as in Southern California, Oklahoma and elsewhere, exposed metals of certain kinds, such as copper and the ferrous metals, corrode much more rapidly than elsewhere, and the corrosion shortens their life and necessitates frequent and expensive replacement.

It has been found in practice that protective coatings of zinc, or of lead, which are more or less effective elsewhere, fail to properly protect articles of metal subject to corrosion in such localities. It has been found also that the ordinary coatings of zinc, or of lead, wherever used, fail to properly protect articles of metal subjected to the attack of strong acids. An iron pipe, for example, if galvanized, or lead coated in the ordinary manner, and tested in a 20% solution of sulphuric acid for 48 hours, will be rendered unfit for further use by the action of the acid during that time.

It has been discovered that these difficulties heretofore encountered in protecting metal against corrosion and acid attack, can be overcome by utilizing different characteristics of different protective metals in such a manner that the weakness of each is fortified by the strength of the other, for protective purposes. It has been further discovered that one of these protective metals or alloys is far superior to any solder for all soldering purposes.

Zinc, as originally used in galvanizing, is itself subject to slow surface corrosion and to rapid destruction by the action of certain acids. Lead, as originally applied as a coating, though non-corrosive, sometimes has minute "pin holes" through which the corroding agent reaches and attacks the coated metal.

It has been further discovered that by first applying an undercoat of protective metal or alloy, such for example as lead containing approximately 4.5% of zinc and approximately .5% of aluminum, and thereafter applying a supercoat of protective metal or alloy, such for example as lead containing approximately 2% of phosphor-tin with or without approximately .1% of phosphide of lead, the zinc alloy of the undercoat is protected by the lead of the supercoat against surface corrosion and closes all pin holes in the lead of the supercoat, thus preventing the corroding agent from reaching and attacking the coated article during its natural life. Metals, when protected in this manner, not only successfully resist corrosion in any atmosphere, but successfully resist attack by acids, showing no change whatever after 48 hours of immersion in a 20% solution of sulphuric acid, which is the most severe test known to science.

One reason for preferring these particular protective metals or alloys is that the melting point of the undercoat alloy is sufficiently higher than that of the supercoat alloy to permit the application of the latter by the well known hot dipping process without disturbing the previously applied undercoat otherwise than by softening it, to permit it to penetrate or plug any pin holes in the lead; and these processes and materials are cheap. Another reason is that the undercoat alloys with the metal of the article being coated and this results in deepening the closure of pin holes in the lead, as well as in the formation of a firm bond with the protected metal.

Preferably, the protective undercoat is first applied by the hot dipping process and thereafter the supercoat is applied by a similar process, although the distinguishing characteristics of the two alloys may be otherwise utilized. The surface protected may be the

entire surface of the article, or any lesser part thereof needing protection.

Thus, there is produced a coating which achieves a protective result not obtainable by the use of either protective alloy alone, but only by a conjoint action of the factors of both. The article to be coated may be of any metal subject to corrosion, or to destruction by acids, and the protective metals or alloys may be of any kind suitable for the purpose.

In preparing the metal or alloy for the undercoat, lead is first melted, and then the zinc and aluminum are melted in the molten lead at a temperature of 875° F. At this temperature the alloy is ready for article dipping therein.

In preparing the metal or alloy for the supercoat, lead is first melted and then the phosphor-tin is melted in the molten lead at a temperature of 750° F. At this temperature the alloy is ready for article dipping therein.

Where still greater fluidity, tenacity and strength is desired, the lead phosphide is incorporated in the lead along with the phosphor-tin. It is the supercoat metal or alloy which has been discovered to be more fluid, more tenacious and stronger than any known solder for soldering purposes; and its use for this purpose is contemplated. The undercoating metal or alloy is somewhat less efficient for this purpose, but may be used.

What is claimed is:

1. The method of applying a non-corrosive and acid-proof protective coating to metal, which consists in first applying to the metal to be coated an undercoat of lead containing approximately 4.5% of zinc and approximately .5% of aluminum at a temperature of approximately 875° F., and then applying to the undercoated metal a supercoat of lead containing approximately 2% of phosphor-tin at a temperature of approximately 750° F.

2. The method of applying a non-corrosive and acid-proof protective coating to metal, which consists in first applying to the metal to be coated an undercoat of lead containing approximately 4.5% of zinc and approximately .5% of aluminum at a temperature of approximately 875° F., and then applying to the undercoated metal a supercoat of lead containing approximately 2% of phosphor-tin and approximately .1% of lead phosphide at a temperature of approximately 750° F.

3. A metallic product, comprising a metallic body provided with an undercoat of lead containing approximately 4.5% of zinc, and approximately .5% of aluminum, and with a supercoat of lead containing approximately 2% of phosphor-tin and approximately .1% of lead phosphide.

4. An alloy consisting of lead containing approximately 4.5% of zinc and approximately .5% of aluminum.

5. An alloy consisting of lead containing approximately 2% of phosphor-tin and approximately .1% of lead phosphide.

6. The method of making an alloy suitable for soldering, which comprises adding phosphor-tin and lead phosphide to molten lead in sufficient proportions to form a lead alloy containing approximately 2% of phosphor-tin and approximately .1% of lead phosphide.

In testimony whereof, I have signed my name to this specification.

WILFORD J. HAWKINS.