Patented Aug. 2, 1932 1,869,784

UNITED STATES PATENT OFFICE

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PROCESS OF METAL COATING

No Drawing. Application filed January 25, 1928, Serial No. 249,495. Renewed December 10, 1931.

This invention has reference to a process for lead coating iron or steel articles, with special reference to sheets and wire.

The invention has for its principal object to provide a lead coating which is electro-positive to iron or steel and which is free of the pin holes ordinarily found in lead coatings.

The invention has for a further object to provide a coating for iron or steel articles which will resist atmospheric corroding conditions and the like in a manner superior to that of galvanized materials ordinarily used.

A further object of the invention is to provide iron or steel articles coated with lead in such a manner as to withstand fabricating and forming operations without material injury to the coating.

A still further object of the invention is to provide a smooth even lead coating which is obtained by passing the coated material through a heated oil bath immediately subsequent to the coating step.

In carrying out my improved process I first take the iron or steel article and give it a very light coating of zinc in the usual manner. I then pass the article through a bath of molten lead containing zinc up to the saturation point at the temperature employed. At the entrance end of the lead-zinc bath I have a flux composed of sal-ammoniac. At the exit end of the bath I place a flux on top of this and oil, the latter acting as a smoothing medium for the coating.

After the article has been zinc coated I pass it through water, both for purposes of cooling the article and to keep the entrance flux of zinc chloride active or "alive" as it is known to those skilled in the art. In the meantime I have prepared my lead-zinc bath by heating zinc in contact with lead for a long period of time. In this connection I prefer to use material taken from the so called "tight-coat" pots where a small amount of zinc is floated on a large amount of lead for the purpose of zinc coating. I have found that this lead is saturated with zinc in a manner most suitable for my process.

As the zinc coated material passes through this lead-zinc bath it takes on a coating of lead-zinc which is very firmly adherent to the zinc of the original coating, and I have found that the lead-zinc coating so amalgamated is as tight a coating as the original zinc and will not crack or peel off, if the zinc coating has been of such a nature that it will not crack or peel off. This is easily controlled by either making the coating of zinc very thin or by the use of some special process which would make a heavy coating of zinc malleable.

The material thus coated is passed from the bath in preferably, a vertical direction through a flux containing zinc chloride. This zinc chloride is preferably a much used material which has been taken from the ordinary sheet galvanizing bath and to which is added a small amount of fresh zinc chloride. Immediately upon leaving the fluxing bath and before the coating has set the coated material is passed through a molten bath of palm oil, cylinder oil or materials of a similar nature. This latter material smooths the coating up and closes the so called pin holes which are formed in ordinary lead coating.

A lead coating per se is electro-negative to an iron or steel base and also to zinc, the result being that in case of corrosion of a lead coated product the lead would have no protective action whatever to the iron or steel base. Consequently it is necessary for a lead coating to be of any protective value to iron or steel that it have electro-positive characteristics. This is obtained by the addition of a small amount of zinc to the lead. The zinc in no way impairs the usual inertness of lead as a corroding resistant medium and when corrosion once does set in the lead coating being electro-positive will protect the iron or steel base. I have found further that by controlling the temperature at which the lead-zinc coating is applied, that the original zinc base is not destroyed and in a number of tests which I have made I have found no breaks in the coatings on iron or steel articles, where the iron was exposed. This latter condition is made possible further by the use of palm oil or cylinder oil at the exit end of the bath for the purpose of causing the coat-

ing to flow smoothly around or over the coated article.

For consistent results, in fact to carry out my process the temperature of the lead-zinc must not be over 700° Fahrenheit. If the temperature goes above this then the coating is not as adherent and the oil bath does not have so good an opportunity to smooth the coating and as a result the coating will be rough and broken. Furthermore, by getting the temperature too high I destroy the effect to some extent of my preliminary zinc coating. For this reason the control of the temperature is most important and lack of knowledge of this important point has contributed largely to the failure of lead coating processes.

I am aware that it is not new to coat with lead-zinc, but prior processes have failed to take into account the necessity for a mobile smoothing arrangement and consequently a suitable smooth coating, free from pin holes has not been obtained and a lead coating which is pourous is commercially of no value. It is true of course that paraffin and other waxy materials have been tried in connection with certain lead coatings but the use of such materials is impracticable for continuous processes on account of the high temperature employed and the consequent danger of fire and the further knowledge that such materials either burn up under severe heat, such as are employed for my process, or else the material is rendered useless on account of decomposition, whereas with my process, using palm oil or cylinder oil no such disadvantages occur.

What I claim is:—

1. The process of continuously coating iron or steel articles which consists in coating the article with zinc and then coating such zinc coated article with lead containing a sufficient amount of zinc to make said lead coating electro-positive to iron and steel and finally smoothing said lead-zinc coating by passing the coated article through heated oil which is substantially resistant to decomposition at the temperature of the molten bath.

2. The process of continuously coating iron or steel articles which consists in coating the article with zinc and then coating such zinc coated article with lead containing a sufficient amount of zinc to make said lead coating electro-positive to iron and steel and finally smoothing said lead-zinc coating by passing the coated article through heated palm oil.

3. The process of continuously coating iron or steel articles which consists in coating the article with zinc and then coating such zinc coated article with lead containing a sufficient amount of zinc to make said lead coating electro-positive to iron and steel, the temperature of said lead being approximately 700° Fahrenheit, and finally smoothing said lead-zinc coating by passing the coated article through heated oil which is substantially resistant to decomposition at the temperature of the molten bath.

4. The process of continuously coating iron or steel articles which consists in coating the article with zinc and then coating such zinc coated article with lead containing a sufficient amount of zinc to make said lead coating electro-positive to iron and steel, the temperature of said lead being approximately 700° Fahrenheit, and finally smoothing said lead-zinc coating by passing the coated article through heated palm oil.

5. The process of continuously coating iron or steel articles which consists in coating the article with zinc, passing said zinc coated article through a zinc chloride flux, passing such fluxed coated article through a molten lead-zinc bath, passing such lead-zinc coated article through a zinc chloride flux, said flux being a by-product of sheet galvanizing, and finally smoothing said lead-zinc coating by passing the coated article through heated oil which is substantially resistant to decomposition at the temperature of the molten bath.

6. The process of continuously coating iron or steel articles which consists in coating the article with zinc, passing said zinc coated article through a zinc chloride flux, passing such fluxed coated article through a molten lead-zinc bath, passing such lead-zinc coated article through a zinc chloride flux, said flux being a by-product of sheet galvanizing, and finally smoothing said lead-zinc coating by passing the coated article through heated palm oil.

7. The process of continuously coating iron or steel articles which consists in coating the article with zinc, passing said zinc coated article through a zinc chloride flux, passing such fluxed coated article through a molten lead-zinc bath containing a sufficient amount of zinc to make said lead coating electro-positive to iron or steel, passing such lead-zinc coated article through a zinc chloride flux, said flux being a by-product of sheet galvanizing, and finally smoothing said lead-zinc coating by passing the coated article through heated palm oil.

8. The process of continuously coating iron or steel articles which resides in initially coating the article with zinc, then passing same through a bath of molten lead-zinc alloy having a flux of zinc chloride, and finally in passing the article through a bath of heated oil which is substantially resistant to decomposition at the temperature of the molten bath so as to cause the coating to flow smoothly over and around the article and to close the "pin holes" inherent to lead coating.

In witness whereof, I have hereunto affixed my hand this 23d day of January, 1928.

HARRY W. THEISS.