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METHOD OF THERMICALLY COATING OBJECTS OF IRON OR STEEL WITH ALUMINUM OR ALUMINUM ALLOY

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5 Claims. (Cl. 91—70.2)

This invention relates to a method of thermically coating objects of iron or steel with aluminum or aluminum alloy by immersing the objects into a bath of molten aluminum or aluminum alloy, flux being used which facilitates the formation of the coating. In order to obtain by this method a uniform coating adhering at all points and forming a real alloy with the underlying metal it is of great importance that the surfaces of the objects are free from all impurities and are not covered by any dissociated iron or coal particles.

For this purpose the objects are immersed, according to the invention, into a melted flux bath containing $CaCl_2$, $ZnCl_2$, an alkali chlorid and an alkali aluminum fluorid before they are transmitted to the metal bath after having first been mechanically cleaned to remove fatty substances, oxides and slag, or having been subjected to mordanting in diluted acid and, if necessary, having also been subjected to another treatment for volatilizing superficial impurities. The proportions of the substances forming the melted flux bath may lie within the following limits:

2–50 parts by weight of anhydrous $CaCl_2$
1–30 parts by weight of anhydrous KCl
½–20 parts by weight of anhydrous NaCl
$\frac{1}{10}$–5 parts by weight of anhydrous Na_3AlF_6
½–30 parts by weight of anhydrous $ZnCl_2$.

While the objects are immersed in the melted flux bath they may be kept in rotation or stirred in another manner or they may be subjected to the action of brushes or other mechanical means for facilitating the removing of the dust particles.

The melted flux bath may have such a temperature that the objects contained therein will be heated so much that they can be transmitted to the molten bath of aluminum or aluminum alloy without their temperature sinking beneath the melting-point of the said bath.

The treatment for volatilizing impurities which may precede the immersing into the melted flux bath consists preferably in that the objects are dipped into a melt of $NH_4Cl/ZnCl_2$ or they are immersed into an aqueous solution of the said double salt, and then they are dried by heating. By the heating the chloride is transformed, with oxidic impurities on the surfaces of the objects, into impurities which volatilize, and the objects will be coated by an anhydrous layer of salt which preserves against oxidation. Iron and coal particles which are dissociated on the surfaces of the objects by this treatment are removed by the subsequent immersing into the melted flux bath. Instead of $NH_4Cl/ZnCl_2$ another salt may be used which forms volatile compounds with the said oxides and produces the coating of the objects with a coherent layer of salt preserving against oxidation.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of plating ferrous objects with aluminum or alloy containing aluminum as the principal constituent, which comprises cleaning the object to remove fatty substances, oxides and slag, immersing the object in a molten flux bath which contains calcium chloride, an alkali chloride, zinc chloride and an alkali aluminum fluoride, heating the flux bath, and transferring the object to the metal bath the temperature of which is about the melting point of the metal, the heating of the flux bath being carried to such a degree that the transferring of the object from the flux bath to the metal bath can be carried out without having the temperature of the object fall below the melting point of the metal bath.

2. The method set forth in claim 1, which includes the step of stirring the object while it is immersed in the flux bath.

3. The method set forth in claim 1, wherein the object, before being immersed in the flux bath, is immersed in a solution of a salt which forms volatile compounds with the oxygen impurities occurring on the surface of the object and which produces by heating a coherent layer of salt on the surface of the object.

4. The method set forth in claim 1, wherein the flux bath contains the following substances:

2–50 parts by weight of anhydrous $CaCl_2$
1–30 parts by weight of anhydrous KCl
½–20 parts by weight of anhydrous NaCl
$\frac{1}{10}$–5 parts by weight of anhydrous Na_3AlF_6
½–30 parts by weight of anhydrous $ZnCl_2$.

5. A flux for use in plating ferrous objects with aluminum or aluminum alloy, which consists of the following substances:

2–50 parts by weight of anhydrous $CaCl_2$
1–30 parts by weight of anhydrous KCl
½–20 parts by weight of anhydrous NaCl
$\frac{1}{10}$–5 parts by weight of anhydrous Na_3AlF_6
½–30 parts by weight of anhydrous $ZnCl_2$.

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