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METHOD OF MAKING A METAL COATED ARTICLE WITH A PROTECTIVE FILM

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3 Claims

ABSTRACT OF THE DISCLOSURE

The method of forming a protective film on hot-dip metal coated articles, and more particularly articles coated with zinc, but those coated with a metal of the group consisting of tin, lead, aluminum and alloys thereof too, by hot-dip coating an article in a pot comprising a molten metal, directing a spray of paint directly against the solidified metallic coating while the latter is still hot from the hot-dip treatment, said paint comprising flowing agents not showing any boiling phenomenon at the temperature the articles have at the time of applying the paint.

BACKGROUND OF THE INVENTION

This invention relates to a method of forming a protective film on hot-dip metal coated articles, and more particularly articles coated with zinc, but those coated with a metal of the group consisting of tin, lead, aluminum and alloys thereof too.

During last years hot-dip metal coated articles and more particularly articles coated with zinc, but those coated with tin, lead, aluminum and alloys thereof too, appeared to be insufficiently protected against corrosion and accordingly such articles have to be provided with an additional protective film.

It has hitherto been proposed to subject hot dip zinc coated articles to a pretreatment, such as hot or cold phosphatizing and subsequently to coat said articles with at least one layer of paint. In this connection the general term paint is intended to comprise paints, varnishes, lacquers, enamels and similar film forming materials.

Said method, executed in several modes, is suffering from the drawback that the pretreatment of the zinc surface that has been effloresced after a rather short period already is time consuming. Additionally fully drying the zinc surface while preventing its oxidation is difficult if not impossible.

Further fresh painted articles require a considerable room for drying, whereas hot drying such as baking or muffling the paint requires a heating device such as a muffle furnace and an additional amount of energy.

BRIEF SUMMARY OF THE INVENTION

All of the above mentioned drawbacks, arising with conventional methods and with the articles obtained thereby, are eliminated in accordance with the present invention by hot-dip coating an article in a pot comprising a molten metal, directing a spray of paint directly against the solidified metallic coating while the latter is still hot from the hot-dip treatment, and using a paint comprising flowing agents not showing any boiling phenomenon at the temperature the articles have at the time of applying the paint. The flowing agents now will allow the applied paint to evenly spread as a smooth film and will not suddenly and quickly evaporate on contacting the hot articles, which would give rise to holes in the coating.

It will be apparent that the paint components of the paint have to be able to resist the temperature the articles have at the time of applying the paint. Applying the paint while the articles are at a temperature of at least 100° C. is advisable in order to prevent oxidation and deterioration

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of the metal coating to the utmost as well as to protect it from becoming humid while ensuring a suitable drying or baking of the protective coating.

Preferably a paint is applied comprising a thermosetting resin-based binding agent the curing properties of which being adapted to the temperature the articles have at the time of applying the paint. Examples of suitable thermosetting resins being epoxy resins and alkyd resins.

In a preferred mode of the invented method the paint comprises a binding agent which will become cross-linked within some minutes at the temperature the articles have at the time of applying the paint in order to enable the thus treated articles to become stacked within a practical lapse of time after the protective film has been applied thereto while preventing the risk of seriously damaging said film.

DETAILED DESCRIPTION OF THE INVENTION

The manner by which the invention may be performed is shown by the following illustrative example.

Steel beams having an H section with a length of 4.5 m., a height of 20 cm. and a material thickness ranging from 7 to 13 mm. were hot galvanized as usual by being pickled and subsequently passed through the usual coating pot containing molten zinc covered with a flux layer and being maintained at a temperature of from 420 to 470° C.

The zinc coated beams after emerging from the coating bath cooled down and accordingly the zinc coating solidified. After having arrived at a temperature of about 200° C. said beams were sprayed with a paint of the following composition:

	Parts by weight
Pigments and fillers	45
"Epikote 1001" (Shell)	24
"Araldite Härter HY 830" (Ciba)	6
High boiling hydrocarbons:	
"Solvesso 150" (Esso)	20
Ethyl glycolic ether	5

The paint flowed to an even protective film that quickly dried and became hard. After having further cooled down the beams could become stacked for storage and shipping without running the risk of substantially damaging the protective paint coating.

The thus coated beams were tested for adhesion of the paint coating which appeared to be excellent.

It will be clear that numerous modifications may be made without departing from the spirit of the invention. For example the paint may be sprayed in an electrostatic field. Similar modifications will undoubtedly occur to the skilled worker upon reading these specifications and consequently it is not intended that the invention be limited to the foregoing detailed description that has been given for clearness and understanding only.

While hot dip galvanizing will probably be the most commonly used coating method in this connection, the coating metal does not constitute a limitation on the instant invention which is equally applicable to other hot dip coating methods, such as with tin, lead, aluminum, and similar metals and alloys thereof.

Similarly the method may be used in combination with continuously hot-dip galvanizing or aluminizing of strip steel.

What I claim is:

1. The method of making a protected metal article having a metallic coating with a protective film formed directly on the metallic coating without the aid of pretreatment of such metallic coating, which comprises the steps of:

- (a) maintaining a bath of molten coating metal;
- (b) dipping the metal article into and withdrawing it from the bath of step (a) to form a metallic coating on the article;

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- (c) applying a film forming liquid to the coated surface of the article before the article has cooled to a temperature less than 100° C., said film forming liquid consisting of synthetic resin binding agent and organic solvent flowing agent in which the flowing agent has a boiling point temperature substantially greater than 100° C.;
- (d) controlling the point of application of step (c) such that the article is of a selected temperature at the point of application in which said selected temperature is sufficiently lower than said boiling point temperature as to cause said film forming liquid to spread evenly as a smooth film without sudden evaporation on contact; and
- (e) thereafter allowing the article to cool while the film forming liquid dries to form a hard protective film.
2. The method according to claim 1 wherein said coating metal is zinc and the article is of steel.

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3. The method according to claim 2 wherein said thermosetting resin is an epoxy resin and said selected temperature is about 200° C.

References Cited

UNITED STATES PATENTS

3,155,530	11/1964	Schnedler	-----	117—105.3	X
2,861,897	11/1958	Hendrixson	-----	117—105.3	X
3,251,708	5/1966	Schmetterer et al.	--	117—71	M

FOREIGN PATENTS

480,085	2/1938	Great Britain	-----	117—71	M
480,578	2/1938	Great Britain	-----	117—71	M

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