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GALVANIZING METHODS

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The present invention relates to improvements in galvanizing methods, the primary object of the invention being to subject ferrous metal stock to preliminary treatment prior to immersion in a galvanizing bath, for the express purpose of rendering the galvanized coating more ductile than that obtainable by conventional prior practice.

A further object of the invention is to apply a coating to ferrous metal stock such as rod or wire prior to immersion of the stock in a molten zinc galvanizing bath, so as to effectively minimize the diffusion between the zinc and the ferrous metal stock at the normal temperature of a molten zinc galvanizing bath.

Another object is to provide a method of galvanizing which will enable the zinc galvanized coating to withstand greater degrees of cold working, bending, or shaping, than heretofore possible without fracturing the zinc coating.

An additional object is to provide a method of galvanizing ferrous metal products which will minimize the diffusion of iron and zinc, to thus reduce the abrasive characteristics of the coated product so as to prolong the life of wire drawing dies when the invention is applied to rod and wire stock, and to prolong the life of forming dies when the invention is applied to sheet or strip ferrous metal products.

Generally speaking, the invention covers copper-coating ferrous metal rods, wire, or sheet stock, prior to immersion in a conventional molten zinc galvanizing bath, for the express purpose of increasing the ductility and minimizing the abrasive action of the zinc coating so as to better condition the stock in the case of wire or rod to cold working such as drawing the same through a die to reduce its gauge, or to better condition sheet metal stock for cold forming operations, by the use of bending and forming dies.

In treating ferrous metal stock according to the present invention, I first apply to the ferrous metal base a thin layer of copper for the express purpose of retarding the formation of the iron-zinc alloy which heretofore has inherently formed when steel and similar ferrous metal articles were coated with zinc by the hot dip process. After the ferrous metal stock has been copper-coated, I then immerse it in the molten zinc galvanizing bath. In the case of rod and wire stock, the copper-coated stock is fed continuously first through the usual flux employed in conventional galvanizing treatments, then through the bath of molten zinc, after which the stock may

or may not be subjected to a pressure wipe in a conventional manner.

Chemical analysis has shown that the galvanizing coatings made by prior art methods, in which ferrous metal stock is merely passed through molten zinc, have resulted in the production of a galvanized coating containing from approximately $7\frac{1}{2}$ to 9 per cent of iron. Contrasted with this, when the zinc galvanized coating is applied by the method of the present invention, which involves the preliminary application of a coating of copper thereto, analysis shows that the coating contains only from 0.9 to 1.0 per cent of iron. This reduction in the iron alloy content of the coating is regarded as of importance, particularly in the production of ferrous metal products which are intended to be later subjected to cold forming operations such as drawing through a die to reduce the gauge or subjecting to the action of forming dies for shaping or otherwise cold working the metal. The advantage of the invention is attained largely because the improved zinc coating is much more ductile when having the lowered iron alloy content. Practice has demonstrated that the zinc galvanized coating obtained by the practice of the present invention exerts a much lower abrasive action on wire-drawing dies or on forming dies, than that exerted by conventional galvanized stock. Die life tests indicate that approximately four or five times more wire can be drawn per given die as compared to the old pressure-wiped galvanized wire not copper-coated before being introduced into the molten zinc bath.

It is to be understood that the method is not limited to any specific copper coating procedure, since the copper layer may be applied to the wire either by chemical action or by electroplating. The stock can be copper-coated and hot-dip galvanized in one continuous operation, or alternatively, the stock can be first copper-coated in one operation and later galvanized in a separate operation.

I claim:

1. The method which comprises coating ferrous metal stock with a layer of copper, passing such copper-coated stock through a molten zinc galvanizing bath, said copper coating being effective to minimize the diffusion between the zinc and the ferrous metal stock at the normal temperature of said molten zinc galvanizing bath, and subjecting said stock to a mechanical cold working operation effective to elongate it and alter its cross sectional area.

2. The method which comprises coating ferrous metal stock with a layer of copper, passing such copper-coated stock through a molten zinc galvanizing bath, and cold drawing the thus-processed stock through a die to reduce the gauge thereof.

3. The method which comprises coating ferrous metal stock with a layer of copper, passing such copper-coated stock through a molten zinc galvanizing bath, said copper coating being effective to minimize the diffusion between the zinc and the ferrous metal stock at the normal temperature of said molten zinc galvanizing bath,

and subjecting the thus-processed stock to a cold die forming operation.

4. The method which comprises coating ferrous metal stock with a layer of copper, passing such copper coated stock through a molten zinc galvanizing bath, said coating being effective to minimize the diffusion between the zinc and the ferrous metal stock at the normal temperature of said molten galvanizing bath, and cold drawing the thus processed stock through a die to reduce the gauge thereof.

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