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METAL COATED FERROUS ARTICLE AND PROCESS OF MAKING IT

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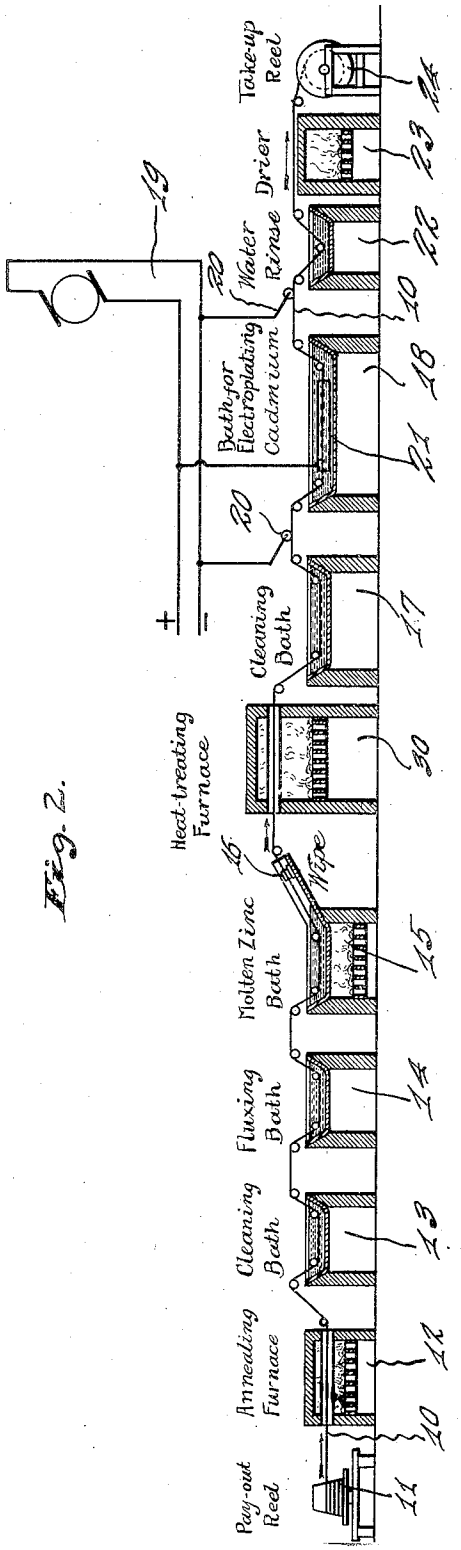


Fig. 2.

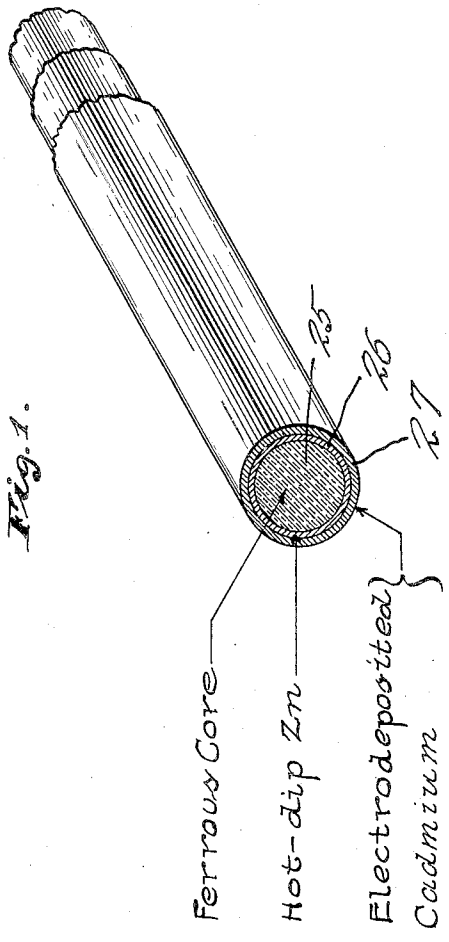


Fig. 1.

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METAL COATED FERROUS ARTICLE AND PROCESS OF MAKING IT

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8 Claims. (Cl. 91—68.2)

It is the object of my invention to produce on ferrous articles, and especially on ferrous wire, an improved metallic coating of which the part next to the ferrous metal is a zinc coating applied by the hot-galvanizing process, and of which the outer part is substantially pure cadmium.

More specifically, it is my object to make possible a heavy coating, in which the outer surface is of a very pure cadmium while the inner part is of zinc firmly associated with the ferrous base by inter-alloying.

This present application is a division of my co-pending application Serial No. 556,631, filed August 12, 1931, which resulted in Patent No. 1,984,335, granted December 11, 1934.

In carrying out my invention, I apply the coating in two parts. The first part is a zinc-coating, applied by the hot-galvanizing process, wherein there is a certain inter-alloying between the zinc and the ferrous base. The second part is a coating of cadmium deposited over the first or inner zinc coating otherwise than by hot-galvanizing, desirably by electro-deposition, whereby this second part of the coating, of cadmium, may be made comparatively pure and free from alloy, and also comparatively heavy, and yet will be firmly joined to the article by its adhesion to the surface produced by the hot-galvanizing. As a result I am able to get a heavy coating, of which the inner part of zinc is alloyed firmly with the ferrous base, while the outer part is of comparatively pure cadmium. This composite coating is of great advantage, because of the high resistance which the cadmium exterior offers to corrosion, especially to those types of corrosion of which a salt atmosphere is typical, while the under coat of zinc not only adheres well to the ferrous base and is relatively inexpensive but in addition furnishes an excellent base for the electroplated cadmium of the outer coat.

In carrying out my invention, whether on ferrous wire or other ferrous articles, the coating processes may be either continuous or by batches; but I prefer the continuous process, especially for wire.

The accompanying drawing illustrates my invention. In such drawing, Fig. 1 is an enlarged perspective view of a wire coated in accordance with my invention, with the coatings much magnified in thickness, and without any attempt to indicate any inter-alloying; and Fig. 2 is a diagram showing a continuous process for coating ferrous wire in accordance with my invention.

I will describe my invention in connection with the continuous process indicated in Fig. 2, although it is not limited to a continuous process.

The wire to be coated may be a ferrous wire of any character, prepared for coating in any desired manner. I have not shown the wire-drawing apparatus, since it is well understood; and so indicate the wire 10 as coming from a pay-out reel 11. From that pay-out reel the wire 10 may pass through an annealing furnace 12, and then through cleaning and/or fluxing baths 13 and 14, for preparative purposes. These preparatory treatments are conventional, and may be varied as desired. After the preparatory treatments, the wire 10 is passed through a bath 15 of molten zinc; in which passage molten zinc adheres to and alloys with the surface of the wire to provide the usual hot-galvanizing. If desired, although it is not necessary, the zinc-coated wire after it emerges from the bath 15 of molten zinc may pass through a wipe 16. Also, although it is not essential to my invention, the zinc-coated wire may now receive a heat treatment if desired, as by being passed through a heat-treating furnace 30.

Up to this point, the wire produced is hot-galvanized wire, and may be of any type. The hot-galvanized coating thereon forms the first part of the coating of my present invention.

The hot-galvanized wire is now treated to apply the second part of my coating thereto. This treatment may be made immediately after the wire has been hot-galvanized, in the same continuous process; or it may be applied at some later time, although I deem that less desirable.

In the arrangement shown in Fig. 2, the second half of the coating is applied in the same continuous process. The hot-galvanized wire 10, after leaving the bath 15 of molten zinc, and the wipe 16 and/or heat-treating furnace 30 if they are used, is desirably passed through a cleaning bath 17, of any suitable character, to prepare the wire for the subsequent coating. The wire 10 then passes to the second coating apparatus, for which I prefer an electro-plating bath 18. In this bath the moving wire is the cathode, being connected to the negative side of a suitable electric supply-circuit 19, as by trolleys 20. The plating bath also has a suitable anode 21 connected to the positive side of the supply-circuit. I have indicated this electro-plating bath, as well as the other baths shown, merely diagrammatically; as they may take any suitable form. From the electro-plating bath, the now double-coated wire may pass, through an intervening washing bath 22 and over or through a drier 23 if desired, to a take-

up reel 24; by which take-up reel the power is applied for moving the wire.

The electro-plating bath 18 contains an electrolyte suitable for plating cadmium on to the already hot-galvanized wire; and the anode 21 is of suitable material for such cadmium plating. In consequence, the second part of the coating is a coating of comparatively pure cadmium. As already stated, the hot-galvanized ferrous wire furnishes a good base for this electro-deposition of cadmium. This second part of the coating may be as heavy as desired, so that the total may be a heavy coating when and if desired; and the outer surface of this coating is of substantially pure cadmium.

The nature of the electrolyte in the electro-plating bath 18 may vary in accordance with the known processes for cadmium plating; and so may the current density used for plating. My invention is not limited to any specific character of electro-deposition, or to any specific electrolyte or current density so long as they are suitable for electro-plating cadmium; but is intended to include not only electro-deposition of cadmium following hot-galvanizing with zinc, but also to include other types of cadmium coating than hot-dipping, applied at a temperature below the melting point of cadmium to a wire or other ferrous article which has been hot-galvanized.

The general nature of the resultant article, such as wire, is indicated in Fig. 1. The ferrous core 25 is the initial ferrous wire, to which a galvanized coating 26 of zinc is applied by any available hot-dipping process of galvanizing; and over the zinc coating 26 is an outer cadmium coating 27 applied at a temperature below the melting point of cadmium by a process other than hot-dipping, and desirably by electro-deposition. The under coating 26 of zinc alloys with the ferrous base 25 in the hot-galvanizing process, in a manner which is impossible to show in the drawing, but which is well known.

I claim as my invention:—

1. A coated ferrous article, comprising a ferrous base having a hot-galvanized coating of zinc thereon, and over that an electro-deposited coating substantially wholly of cadmium.

2. A coated ferrous wire, comprising a ferrous base-wire having a hot-galvanized coating of zinc thereon, and over that an electro-deposited coating substantially wholly of cadmium.

3. The process of coating a ferrous article, which consists in applying to it a zinc coating by the hot-galvanizing process, and applying to the hot-galvanized ferrous article by electro-deposition a coating substantially wholly of cadmium.

4. The process of coating a ferrous wire, which consists in passing it successively through a bath of molten zinc and through an electro-plating bath containing a suitable electrolyte for depositing a coating substantially wholly of cadmium.

5. A ferrous-coated article as set forth in claim 1, in which the hot-galvanized coating of zinc is a wiped coating.

6. A ferrous-coated wire as set forth in claim 2, in which the hot-galvanized coating of zinc is a wiped coating.

7. The process of coating a ferrous article as set forth in claim 3, in which the first coating is wiped before the second is applied.

8. The process of coating a ferrous wire as set forth in claim 4, in which the first coating is wiped before the second is applied.

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