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METAL COATED FERROUS ARTICLE AND PROCESS OF MAKING IT

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Fig. 2.

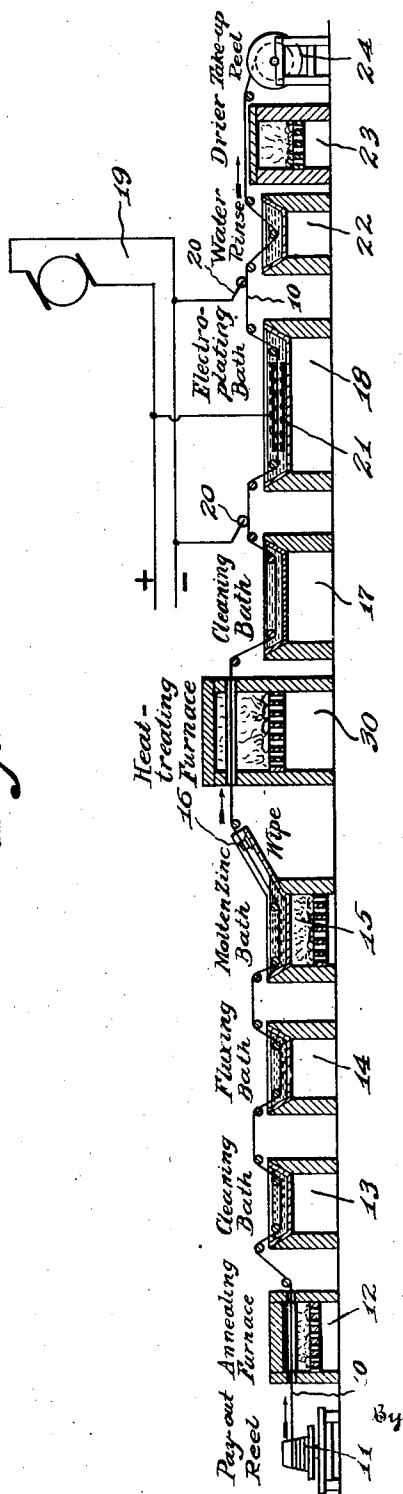
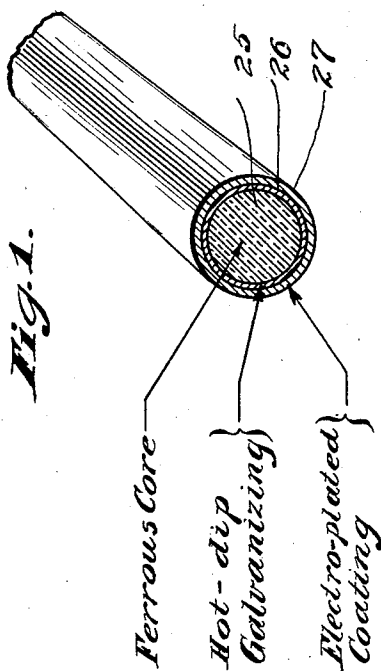


Fig. 1.



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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 an improved zinc coating on ferrous articles; and especially on ferrous wire.

More specifically, it is my object to make possible a heavy coating of zinc; and to provide a coating whose outer part is of very pure metal, while the inner part is firmly associated with the ferrous base by inter-alloying.

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 also a zinc coating, but is deposited over the first zinc coating otherwise than by hot-galvanizing, desirably by electro-deposition; whereby this second part of the coating 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 zinc, of which the inner part is alloyed with the ferrous base while the outer part is of comparatively pure zinc.

In carrying out my invention, whether on ferrous wire or on 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 zinc on to the already hot-galvanized wire; and the anode 21 is of suitable material for zinc plating. In consequence, the second part of the coating, as well as the first or hot-galvanizing part, is a zinc coating. That is highly desirable to get a heavy zinc coating, and one that has its outer part of substantially pure zinc.

The nature of the electrolyte in the electro-plating bath 18 may vary in accordance with known processes for zinc 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; but is intended to include not only electro-deposition of zinc following hot-galvanizing, but also to include other types of zinc coating than hot-galvanizing applied to a wire or other ferrous article which has been hot-galvanized.

10 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-dip process of galvanizing; 15 and over the coating 26 is an outer zinc coating 27 which is applied by a coating process other than hot-galvanizing, and desirably by electro-deposition. The coating 26 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.

It has heretofore been proposed to coat a ferrous article by two successively applied zinc coatings, the first by electro-deposition and the second by hot-galvanizing. See for instance 25 Patent No. 1,552,040, granted to Frank F. Fowle and myself on September 1, 1925. With the successive coatings applied in that order, however, the same result is not obtained which I obtain by my present process; in which the 30 first coating is by hot-galvanizing, and in which a certain alloying action takes place between the zinc and the iron during the hot-galvanizing.

I claim as my invention:

35 1. A zinc-coated ferrous article, comprising a ferrous base having a hot-galvanized coating of zinc thereon, and over that a second coating of zinc applied by a different process and comparatively pure and free from alloy and compara- 40 tively heavy.

2. A zinc-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 zinc.

3. A zinc-coated ferrous wire, comprising a ferrous base-wire having a hot-galvanized coating of zinc thereon, and over that a second coating of zinc applied by a different process and comparatively pure and free from alloy and comparatively heavy.

4. A zinc-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 zinc.

5. The process of zinc-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 a process other than hot-galvanizing a zinc coating which is substantially pure and free 20 from alloy and comparatively heavy.

6. The process of zinc-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 25 electro-deposition a coating substantially wholly of zinc.

7. The process of zinc-coating a wire, which consists in passing it successively through a bath of molten zinc and through an electro-plating 30 bath containing a suitable electrolyte for depositing a coating substantially wholly of zinc.

8. The process of zinc-coating a wire which consists of subjecting it to two dissimilar zinc-coating processes, of which the first is zinc-coating by hot-galvanizing and the second deposits a zinc coating which is comparatively 35 pure and free from alloy and comparatively heavy.

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