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GALVANIZING APPARATUS

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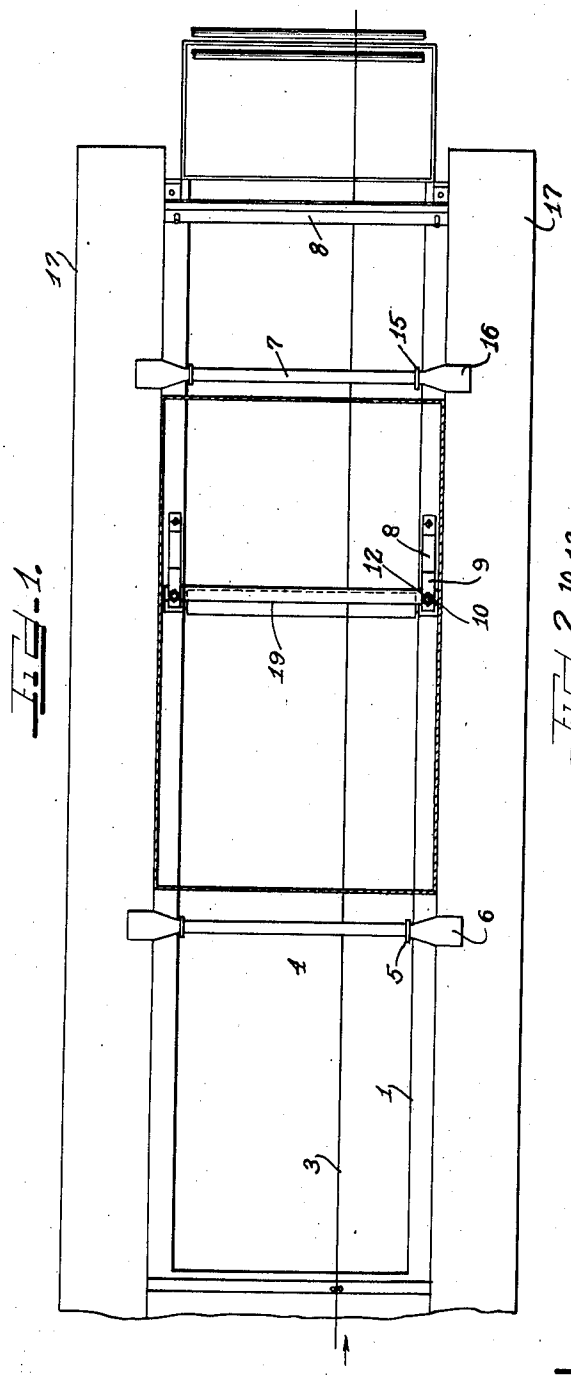

Fig. 1.

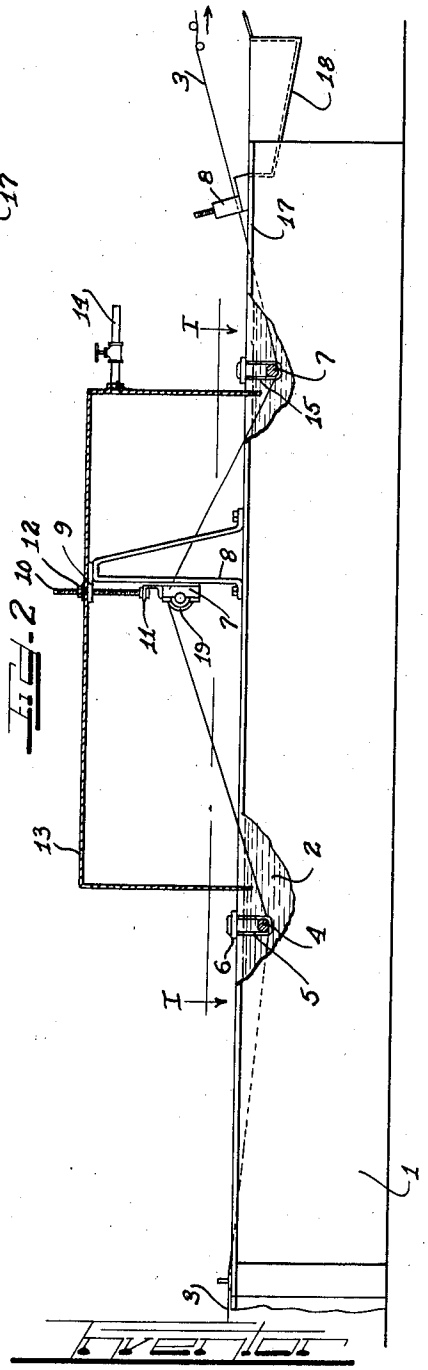

Fig. 2

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GALVANIZING APPARATUS

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3 Claims. (Cl. 91—12.5)

The present invention relates to galvanizing apparatus, and more particularly to apparatus for applying superposed coatings of zinc to ferrous material, such as wire, sheets or other flexible material.

The invention also contemplates and has for an object the provision of an apparatus for galvanizing wherein an initial coat of zinc is applied to the material, such as wire, sheets and the like, the material with initial coating is then cooled, and another coating of zinc is applied to the initial coating. The apparatus is designed to apply the successive coatings while continuously moving the material through the apparatus.

Another object of the present invention is to provide galvanizing apparatus adapted to apply successive coatings of zinc to material and cooling the material in the presence of a non-oxidizing atmosphere, between successive coatings, so that the finished product may be bent or flexed without causing the coating to crack, peel off or loosen, thereby fully protecting the material from deterioration in use.

A further object of the present invention is to provide galvanizing apparatus adapted to apply thin and flexible coatings of zinc to flexible ferrous material, such as wire, sheets and the like, so that the finished product may be bent or flexed without impairing the coating.

A still further object of the invention is to improve galvanizing apparatus, whereby wire, sheets and the like of ferrous material may be coated to prevent deterioration in use.

A yet further object of the invention is to provide galvanizing apparatus for successively applying two thin layers or coatings of zinc to flexible or bendable material, such as wire, sheets and the like.

Coatings of zinc on iron or steel, produced by exposing the surface of the iron or steel to the action of molten zinc, adhere firmly to the iron or steel by reason of a thin layer of zinc-iron alloy, or a mutual solution of the two metals, occurring at the surface of contact. This alloy, however, has the disadvantage of being very brittle, so that when a wire or other flexible material is galvanized, there is a tendency for the alloy to break when the wire is bent, thus causing the coating to crack and loosen or peel off the material.

The present invention overcomes this difficulty by providing an apparatus wherein the application of zinc to the iron or steel is made under conditions which favor the formation of a thin and, therefore, flexible coating of zinc-iron alloy, with a superposed coating of zinc.

The above, other and further objects of the invention will be apparent from the following description, accompanying drawing and appended claims.

The accompanying drawing, schematically, represents an apparatus embodying principles of the present invention and the views thereof are as follows:

Figure 1 is a view, partially in plan and partially in section, of the tank illustrated in Figure 2, the section being through the cooling chamber, with certain parts in elevation.

Figure 2 is a side elevational view of an apparatus of the present invention, with certain parts in plan, certain parts in section and other parts broken away, all to show details of construction.

The coating of iron-zinc alloy forms during the passage of the material, such as wire, through the molten zinc, and its thickness is dependent, to some extent, on the time during which the wire remains in the zinc bath. The longer time the wire is immersed in the bath, the greater the zinc deposit thereon and the thicker will be the coat of alloy formed. When a short passage of time is employed, a comparatively thin, weak coating will be formed.

The apparatus of the present invention includes a tank 1 for containing a bath 2 of molten zinc or spelter through which the material to be coated is passed.

The bath is advantageously maintained at a temperature of substantially 875° F. during the coating operation. Material to be coated, such as a wire 3 is drawn through the apparatus by any suitable means, not shown. The wire is inserted through the machine and as it is drawn through, it passes first underneath a submerged roller or equivalent means 4 supported in the tank 1 by means of yokes 5 suspended from brackets 6 suitably secured to the side walls of the tank. After passing underneath the submerged roller 4, the material is removed from the bath and passes over a roller 19, thence downwardly and is again immersed in the bath, passing underneath another submerged roller 7, thence outwardly of the bath through a wiper 8 to a point of disposal.

The roller 19 is journalled in sliding blocks 7 which are supported on upright brackets 8 suitably secured to the side walls of the tank. At the upper end of each of the brackets 8 is a plate or similar means 9 having a vertically disposed

threaded screw 10. The heads of the screws are secured to the blocks 7 by means of connections 11. The vertical adjustment of the screws 10 is effected by means of nuts 12 surrounding the screws and engageable with the plates 9. By the means just described, the angle at which the wire or other material being coated leaves the bath after the first immersion and enters the bath for the second immersion may be regulated. In this way the times of immersion and of exposure to the non-oxidizing atmosphere may be increased or decreased without changing the speed of travel of the material through the bath.

A housing 13 is suitably attached to the tank 1 and includes the adjusting roller 19. The end walls of the housing 13 project downwardly a slight distance into the bath 2. The interior of the housing 13 forms a cooling chamber and the atmosphere in this chamber is maintained as a reducing or non-oxidizing atmosphere by admission, through a supply pipe 14 from a suitable source, of suitable non-oxidizing agents, such, for instance, as carbon dioxide, nitrogen, hydrogen, producer gas, illuminating gas, mixtures of these gases or other suitable gases. It is preferable, however, that the gases be non-inflammable.

It will be observed that the material, such as the wire, is given successive immersions in the coating bath and between these immersions is cooled in a reducing or non-oxidizing atmosphere. The result of such action is to form on the wire by the first immersion an initial coating of zinc-iron alloy. This initial coating is cooled within the housing or chamber 13, and the second immersion applies a superposed coating of zinc to the initial coating of zinc-iron alloy.

The product resulting from the use of the present apparatus produces a coated wire or similar material with superposed coating. The initial or first coating is a relatively thin one of an alloy of zinc and iron, while the major portion of the superposed or second coating is of practically pure zinc. The resulting product is one which may be bent or twisted without impairing the galvanized coating in any respect whatsoever, thereby preventing access of moisture through the pores of the metal of the wire.

While the accompanying drawing illustrates but a single wire 3 as passing through the apparatus; it is to be understood that a plurality of wires may be continuously passed through the apparatus, so that quantity production may be readily accomplished.

As the apparatus appears in the illustration, the material being coated remains immersed a slightly longer time during the first immersion than during the second. However, the time of immersion may be changed as desired in accordance with the material being coated, and also in accordance with the nature of the coating applied.

The speed of movement of the wire through the apparatus may vary over a wide range. In general, larger sizes of wire require more time, and consequently slower speeds, as more time is needed to bring such larger wires to the temperature of the bath for receiving the initial coating. By way of example, when it is desired to galvanize wires having diameters between .0348 and .192 inches, the most effective speed will vary from 210 to 46 feet per minute.

It is to be understood that the speeds specified are not critical but are illustrative only, as the speed of the wire depends to some extent on the length of the tank. The specified temperature of the zinc bath hereinbefore mentioned is not critical and may be varied somewhat, as desired.

It is to be understood that while this invention has been described as applied to the production of galvanized wire, sheet material may also be run through the apparatus and treated in the same manner. While rigid articles may also be treated in this apparatus, it is advantageous principally in the treatment of flexible articles, as the apparatus is utilized for the coating of material which is flexed or bent in use, such as wire, and to coat such material with a galvanized coating preventing any tendency for the coating to crack or double when the article is bent or flexed.

The second submerged roller 7 is supported in the tank in the same manner as the first submerged roller 4, that is to say by means of hangers 15 supported on brackets 16 suitably secured to the side walls 17 of the tank 1.

The wiper 8 may be of any well-known form and construction. Adjacent the leaving end of the apparatus is a drip pan 18, in which any matter wiped off of the wire 3 by the wiper 8 may be collected.

The wires from this galvanizing apparatus may be led to any suitable point for disposition, such, for instance, as winding on reels for the market.

This application is a continuation, as to all common subject matter, of my co-pending application Serial No. 724,305, filed May 7, 1934.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

The invention is claimed as follows:

1. In a galvanizing apparatus, means for applying superposed coatings of zinc on flexible material including means providing a bath of molten zinc, means for immersing the material in said bath for the formation of an initial coating, means for removing the initially coated material from the bath and cooling it in a non-oxidizing atmosphere, and means for immersing the initially cooled material in the same bath to acquire a coating of zinc about said initial coat.

2. A galvanizing apparatus including, in combination, a tank, a bath of molten zinc in said tank, means for passing a wire along said tank and immersing portions of said wire at different points in the length of the tank, means intermediate said points of immersion for cooling the wire in a non-oxidizing atmosphere, and means for varying the angularity of the wire with respect to the surface of the bath as it leaves the bath after the first immersion and as it enters the bath for the second immersion.

3. A galvanizing apparatus comprising a tank for containing a bath of molten zinc, means for guiding flexible material along said tank and for immersing spaced lengths of said material in said bath, a housing for enclosing the unimmersed portion of said material between the points of immersion, walls of said housing extending into said bath to form a seal therewith, and means for introducing a non-oxidizing atmosphere into the space enclosed by said housing.

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