

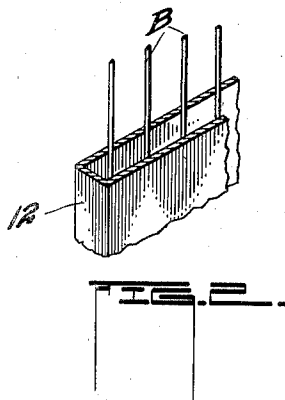
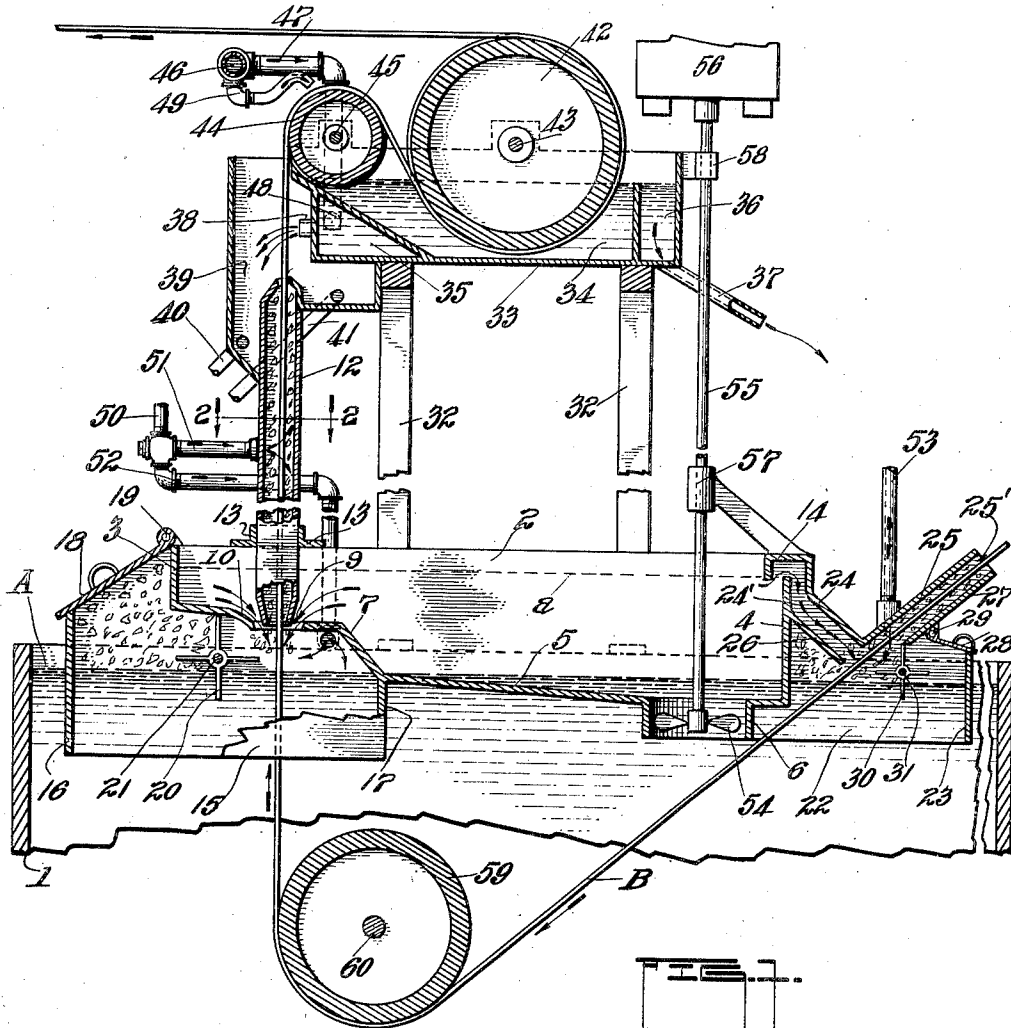
July 18, 1939.

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2,166,249

APPARATUS FOR COATING METALLIC MATERIALS

Filed Dec. 3, 1934



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## UNITED STATES PATENT OFFICE

2,166,249

## APPARATUS FOR COATING METALLIC MATERIALS

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Application December 3, 1934, Serial No. 755,757

4 Claims. (Cl. 91—12.5)

This invention has reference to an apparatus for applying metallic coatings to iron or steel articles.

More specifically the invention has reference to an apparatus for coating iron or steel articles with zinc spelter to produce a heavy coating which is low in iron, substantially free from oxides, scruff or deleterious matter, bright, smooth and of uniform thickness throughout, which coating will withstand severe deforming without dusting, flaking, cracking or peeling. Furthermore, a coating low in iron, such as I produce, is ductile and high in electrical conductivity, and is therefore useful in the production of telephone wire.

To produce a zinc coated iron or steel article with a coating low in iron, it is desirable that the article be removed from the zinc bath before the article base reaches the temperature of the bath, or at least before the coating becomes high in iron. This time element is determined by the temperature of the bath, the length of time the material is in the bath and the rapidity with which the coated article is cooled.

To produce a zinc coating on an iron or steel article free from oxides or other deleterious matter, the article should be withdrawn from the bath through an oxide free surface and to remove the possibility that any particle of oxides shall adhere to the surface of the article, where it enters the bath, provision should be made for introducing the article into the bath through an oxide free surface. In the accomplishment of an oxide free surface on the bath in the area of the emergence of the coated article from the bath, I employ the use of a non-oxidizing gas which is applied to the bath where the article emerges therefrom, so as to provide a seal and preferably cause the article to be moved through an oxygen free atmosphere and to be immediately quenched when leaving said atmosphere, and to remove from the body of the bath, and from below its surface, oxide free zinc and cause it to be moved across the article being coated and down and around the article, so as to insure the article emerging from the bath through an oxide free surface.

By the use of my apparatus, I am able to produce a zinc coated article where the coating is heavy and low in iron; where both the surface of the article, and the body and the surface of the coating are substantially oxide free and having a silvery bright appearance.

I have found from long experience in the galvanizing of iron or steel articles, that a zinc

coating which is relatively high in iron, as for example 7% or higher, is more or less brittle and will not withstand the ordinary deforming galvanized articles are subjected to, with the result that the coating will flake, peel, crack or dust, resulting in early deterioration of the article, impairing its usefulness. By my apparatus I reduce the iron content usually present in zinc coatings by subjecting the article to a short immersion in the molten bath, passing the article through the bath at a relatively high speed and rapidly quenching the coated article. This is preferably accomplished through the use of a smaller pot than ordinarily used and increasing the speed of the article through the pot, over the speeds ordinarily used. This is especially true in continuous galvanizing, as for example, with wire and strip.

I have further found that with the ordinary and usual practice of hot galvanizing and with many, if not all of the special types of galvanizing which have been promoted in recent years, where claims are made and advanced that the metallic coatings are uniform and smooth and allegedly heavy, that the zinc coatings are far from being heavy and anything but smooth and uniform. This is due to the fact that the methods of coating do not eliminate oxides adhering to the surface of the article and do not eliminate the presence of oxides in the coatings and especially the adherence of oxides on the surface of the coatings, and all employ the use of a wipe of some sort or bring the coated material into contact with some object, in some instances, a "skimmer" bar, before the coating has had a chance to set, or in some other manner, move or deform the coating while in a molten state which results in varying thickness of the coating. The presence of these oxides, wherever they may occur or appear, will ordinarily result in lack of smoothness of the coatings, produce non-uniform coatings and when the article is deformed, for whatever purpose, when these deformations occur where oxides are present, the coating will crack, break, dust or peel, due to the varying thickness of the coating caused by the presence of oxides, and entirely destroy the function of the coating. I overcome these objectionable features by eliminating the use of wipes, skimmer bars, guides and any element which in any way tends to disturb or move the coating before the coating has set; and eliminate the oxides by removing the article from the bath through an oxide free surface, while at the same time cause to flow over the surface of the article, at its point of exit from

the bath, a substantially oxide free metal. This free oxide metal is preferably moved from the body of the metal bath. Immediately on the article leaving the bath, it passes into an oxygen free atmosphere, which provides a seal at the exit end of the bath, and on the coated article leaving such oxygen free atmosphere and before the coating has set, I quench the coating with water. Quenching the coating, in this manner, will effect a stoppage of an alloying action and prevent "bambooing" and "rippling" surfaces as well as give a bright finish to the article and set the coating so that it will not be damaged when passed over pulleys and sheave wheels. In the manner in which I cause the oxide free metal to flow over and along the surface of the article, a turbulent condition is created on the surface of the bath, at the exit of the material therefrom, and creates or produce an oxide free surface.

The presence of oxides on the surface of a bath, where the article is withdrawn therefrom, will act as a non-uniform wipe which will remove much of the coating from the article, producing a coating non-uniform in thickness around and throughout its length. However, removing an article from a bath through an oxide free surface created by the flowing of the oxide free metal thereacross and therearound prevents this condition. Furthermore, to avoid the possibility of adherence of particles of oxides on the surface of the uncoated article, as it enters the bath, the article may enter the bath through an oxide free surface and be preliminarily coated with an oxide free coating. However, the adherence of oxide particles to the surface of the articles occurs infrequently, but my method lends itself to the elimination of these particles and may be used as practice may dictate and is therefore disclosed.

Furthermore, in the production of unwiped wire, where a heavy coating is desired and where the coated wire is removed vertically from the bath, it is not unusual to find that the coating in its unset state will slip back on the wire and produce a "bambooing" effect. This will result in a non-uniform thickness of coating which is anything but even. This "bambooing" effect when it is present on sheets, is usually referred to as a "roughened rippled surface". I avoid this condition through the speed at which the material is moved and quenching the coated article with water, at a predetermined point, after the coated article leaves the bath.

My apparatus lends itself to the heavy coating of "rimmed" or "open" steel, and materials having a decarburized surface.

This application is a continuation in part of the application filed by me May 22, 1933, bearing Serial No. 672,219, for a Method and apparatus for coating metals.

That the invention may be more fully understood, reference is had to the accompanying drawing forming part of this application, illustrating a preferred embodiment of the invention, in which:

Fig. 1 shows in elevation, partly in section, an apparatus for practicing my invention;

Fig. 2 is a detail taken on the line 2—2, Fig. 1. Like characters of reference denote corresponding parts throughout the figures.

In the drawing, the zinc pot is designated 1, although only a fragment of the pot is shown. In galvanizing practice, where it is the aim to coat a wire with a heavy coating of zinc, for example three-fourths of an ounce per square foot of surface or more, the wire remains in the zinc

bath for long periods, so as to build up an iron zinc alloy to produce a heavy zinc coating. To carry this out economically, a long pot is used and the wire is drawn through the zinc bath at slow speeds and usually the temperature of the bath is increased above the normal working temperature of the bath. In the instant invention, a heavy zinc coating is produced and this is accomplished by employing a short bath, and high speeds resulting in the material remaining in the bath a short time and normal bath temperatures are used. It is pointed out that in the instant invention the coated wire is quenched with water immediately on the coated wire leaving the bath and before the heat of the base metal acts to increase the iron zinc alloy, the result of which produces a coating low in iron. It has been my experience that where excessive amounts of iron are present in the coating, if the coated article is quenched too soon, cracking of the coating results. In my invention, quenching of the coated article, as soon as possible after the article leaves the bath stops the formation of iron zinc alloys and leaves the coating bright and ductile. It has been my observation with the use of zinc as a coating that zinc substantially free from iron is very ductile and that the presence of even small amounts of iron reduces the ductility and bending qualities of the zinc and of course, with increasing amounts of iron in the zinc, this condition is aggravated. The average analyses of zinc coating stripped from coated materials show the iron content as high or higher than dross. Those who are familiar with the art realize the brittleness of dross. Analyses of coatings produced by my invention show the iron very low, sometimes less than 2% and free from the objections heretofore noted. While I have specifically mentioned wire, the conditions I have referred to will prevail, where zinc is used as a coating for iron or steel articles and this applies to sheets, plates and strip.

A preferred form of apparatus, such as may be employed for practicing my invention, will now be described. This apparatus is a unit adapted to be supported on the zinc pot 1, as shown in Fig. 1. This unit comprises a pan or tray, which is shallow as compared to the depth of the pot and is supported on the pot so that the greater portion of said pan or tray is partially submerged in the bath. This pan or tray is made up of the side walls 2, end walls 3 and 4, and a bottom 5. The latter is shown inclined downwardly and rearwardly, and adjacent the wall 4 is formed or provided with a depending tubular extension 6, for a purpose to be described, and as shown, is submerged in the bath. At a suitable point the inclined bottom wall 5 is inclined upwardly and forwardly so as to provide the more or less abrupt inclination 7 and thence again, inclined forwardly and upwardly, as at 8, at somewhat the same inclination as the main portion of the bottom, uniting with the end wall 3. The portions 7 and 8 of the bottom wall of the pan or tray are supported so as to be elevated above the normal bath line designated as A. The portion 8 of the bottom wall of the pan or vat is shown provided with an opening 9 with the front wall of the opening inclined downwardly, as indicated at 10. This opening is of a length, across the pan or tray, to accommodate as many wires, as may be desired and the width of the opening is such as to accommodate the location of the lower end of an open ended vertically disposed housing 12 through which coated wires B will travel, on leaving the

bath. This housing is of sufficient width to accommodate the necessary number of wires being coated, but is of shallow width in a transverse direction, as will be seen. The front and rear walls of the housing 12 converge toward each other, at both the lower and upper ends of the housing, for purposes to be described. It is pointed out, however, that the location of the lower end of the housing 12 in its relation to the opening 9 in the bottom wall portion 8 of the pan or vat restricts the opening 9 at the front of the housing, much more than appears at the opposite side, for purposes to be explained. The housing 12 is supported at or near its lower end from the side walls 2 of the pan or vat by braces 13 and from a super-structure, at its upper end, to be described. The housing 12 is of less width than the width of the pan or tray, between its side walls 2, for purposes to be explained. The rear wall 4 of the pan or vat 12 is cut lower than the opposite wall 3 to provide an overflow for the molten metal, at the rear end of said pan or vat and the top of this rear wall 4 is the normal metal line in the pan or vat, as designated by the dotted line *a*. An overlying cap or shed 14 is provided for the overflow top of the wall 4, as shown. The lower edge of the front wall of this cap or shed is submerged below the level *a* of the molten metal in the pan or vat to prevent oxides or other deleterious substances overflowing the wall 4.

The pan or vat, at its front end is provided with a depending compartment formed with depending side walls 15 and front and rear end walls 16 and 17, but with no bottom wall and being submerged within the molten metal of the bath provides a seal for this portion of the bath. The side walls 15 are extensions of the side walls 2 and the end wall 17 connects with and depends at right angles from the outer end of the bottom wall 5. The end wall 16 connects with the side walls 2 but does not extend to the full height of the side walls 2 and the space between the end walls 3 and 16 are connected by a closure which includes a clean out door pivoted at 19 to enable an operator or attendant to have access to the compartment for observation and clean-out purposes. Some oxides or other deleterious substances, if any, which may collect can thereby be easily removed. It is entirely probable that some oxides or other deleterious substances may be in the bath and if so they will constantly arise in an upward direction and this provision is made for their removal. Disposed within this compartment is a rotatable multiple winged scraper and valve 20 carried by a shaft 21 journaled in the side walls 15 and by means of which the scraper and valve may be rotated. A manual operating means, not shown, may be connected with an exposed end of this shaft for operating the same.

The pan or vat, at its rear end, is provided with a depending compartment formed with side and end walls, but with no bottom wall and being submerged within the molten metal of the bath to provide a seal for this portion of the bath. The side walls are designated 22 and are extensions of the side walls 2. The front wall is the wall 4 and its rear wall is the wall 23 which, however, is not of the full height of the side walls 2. The top wall of this compartment comprises the converging downward and inwardly inclined portions 24 and 25, the former connecting the wall constituting the outer wall of the overlying cap or shed 14. Inclined similarly to

the wall portion 24 and spaced therefrom is a wall 26 which together provide an outlet channel 24' for the overflowing molten metal carried over the top of the wall 4 from the pan or vat which finds its way beneath the cap or shed 14 and into the main bath through this compartment. Inclined similarly to the wall portion 25 and spaced therefrom is a wall 27, which together provide preferably a gas chamber 25' opening into and from this compartment. Between the walls 27 and 23, I provide a closure including a clean-out door 28 pivoted at 29 and this door functions in the same manner and for the same purpose as the door 18. At the lower end of the wall 27, there is provided a rotatable multiple winged scraper and valve 30 carried by a shaft 31 journaled in the side wall 22. This scraper and valve 30 functions in the same manner and for the same purpose as the scraper and valve 20. As I have heretofore stated and as is well known to those skilled in the art, the adherence of particles of oxides and other deleterious substances to the surface of the base to be coated, as it enters the molten bath, is so infrequent, the compartment and its appurtenances last described may or may not be used, except the overflow feature and a channel to conduct such overflow back into the main bath, the outlet end of which, of course, being submerged within the main bath. The troublesome threading of the wire therethrough, also, may not compensate for the prevention of the infrequent adherence of the particles of oxide and other deleterious substances to the surface of the article being coated and therefore may or may not be used. This can be left to the discretion of the operator. I am of the opinion, however, that such use will reduce the amount of skimmings accumulating in the main bath.

The super-structure, to which reference has been made, and from which the upper end of the housing 12 is supported comprises supports 32 connected to and upstanding from the pan or vat. These supports carry a water box 33 having a main chamber 34, a pressure chamber 35 and an overflow chamber 36. An outlet or discharge 37 from the overflow chamber is shown. Discharge outlets 38 from the pressure chamber are shown. Although not shown, these outlets may be few or many, as desired, depending on the character and kind of coated material to be quenched. A drain 39 is provided at the front end of the water box 33 and is supported thereby. This drain receives the water from the pressure chamber, which is employed to quench the coated material. This drain also has protruding thereinto the upper end of the housing 12, as shown and from the drain leads discharge outlets 40 and 41. In the instant showing, the housing 12 is a gas chamber up through which coated wires pass from the coating bath and such wires pass in front of the discharge outlets 38 which direct water onto and envelope the coated wires as they pass such outlets, the drain being so arranged that water will flow there-through with little or no water collecting in the drain. The water will not only be applied directly to the coated wires but will also envelope and run down the wires. The upper end of the housing 12 is within the drain and has inwardly converging end walls, such walls will deflect water off of the top of the housing into the drain. What small amount of water which may possibly enter the housing, on the wire, provides a longer cooling distance and steaming off passes

up and out of the upper end of the housing 12. The upper end of the housing 12 is of less width than the drain so that water circulates around the upper end of the housing.

5 Within the water box and the main chamber 34 thereof are located a plurality of sheave wheels 42, arranged side by side, one for each wire, and these sheave wheels are loosely journaled on a fixed shaft 43 carried by boxings at each side of  
10 the water box. Located in front of the sheave wheels 42 and coincident with the main chamber 34, but above the pressure chamber 35 are a plurality of smaller sheave wheels 44, arranged side by side, one for each wire, and these sheave  
15 wheels are loosely journaled on a fixed shaft 45 carried by boxings at each side of the water box. Wires which pass up through the housing 12 pass over sheave wheels 44 and down around and over the sheave wheels 42. Water is supplied from a  
20 suitable source to a feed pipe 46 and from the feed pipe water is supplied to the pressure chamber through a feeder 47 which empties into the pressure chamber at the point 48. For each sheave wheel 44, there is a feeder 49 which is connected to and receives water supplied to it from  
25 the feed pipe 46. Water accumulating in the main chamber 34, fed by the feeders 49 will overflow into the overflow chamber 36 and find its way to a drain through the discharge 37. The  
30 water accumulating in the main chamber 34 of the water box will act to further cool the coated material, which passes therethrough. The water discharged by the feeders 49 supplements the water passing out of the pressure chamber and  
35 accumulating on the sheave wheels 44 provides a film of water for the passage of the wires over these sheave wheels. Some of this water finds its way down and around the wires but the major portion drains off of the sheave wheels 44 into the  
40 main chamber of the water box.

The housing 12 constitutes a gas chamber whereby to provide an oxygen free atmosphere through which the coated wires will pass on leaving the molten metal bath. This chamber  
45 may receive such deoxidizing gas from any suitable source of supply through a feed pipe 50 from which extends a feeder 51 in communication with the interior of the housing 12. Also a feeder 52 connects with said feed pipe 50 and is  
50 connected to discharge such deoxidizing gas into the compartment to one side and below the lower end of the housing 12 in communication with such compartment. The gas chamber provided by the walls 25 and 27 at the inlet end of the  
55 pot 1 may also be fed with deoxidizing gas through a feeder 53 which may have connection, not shown, with the feed pipe 50 or may have a direct connection, not shown, with the source of supply.

60 Located in the depending tubular extension 6, which opens into the main coating bath is a propeller 54 so designed that when rotated, it will propel oxide free molten metal from within the body of the bath upwardly and over the inclined bottom of the pan or vat to and down  
65 through the opening 9 in the bottom wall 8 and down and around the lower end of the housing 12 and move across as well as down and around the wires, moving upwardly out of the body of  
70 the bath. This propeller is carried on the lower end of a vertically disposed operating shaft 55 which, at its upper end, is connected to and driven from a small electric motor 56 or other suitable power unit. The motor may be supported in any suitable manner, not shown, from

the water box and the shaft may be guided and have journal bearing in the bearings 57 and 58. Metal overflowing from the pan or vat will pass over the top of the wall 4 and beneath the cap or shed 14 down through the channel provided  
5 by the walls 24 and 26 and into the main bath.

Within the pot 1 and submerged within the molten metal is a guide 59, preferably a roller carried by a shaft 60 journaled in the side walls  
10 of the pot.

The apparatus which I have elected to show is designed primarily for the galvanizing of wire. To employ the same for galvanizing sheet material, as for example, sheets, strip and the like, some slight modifications would be made, which, however, would not change the principle of invention involved and it is not thought necessary  
15 to extend the drawing to that extent, since those skilled in galvanizing practice will be able to practice the invention for the uses intended.

To thread the apparatus with wire, the wires B, of whatever number would be threaded down through the gas chamber 25' at the inlet end of the pot, assuming it is desired to employ this structure, otherwise the wires would be directed  
20 into the inlet end of the pot over some suitable guiding means, and thence down and around the roller 59. This roller is so located in the pot that the wires may leave the roller and move preferably upwardly leaving the molten metal bath and travelling perpendicularly through the housing  
25 12 and without contact with any mechanical part or surface contact or rubbing element until the sheave wheels 44 are reached. By this time the quenching action of the water has so set the coating that the frictional contact of the sheave wheels 44 and 42 have no upsetting or disturbing effect on the coating.

During the coating operation, the motor 56 is set in motion which will rotate the propeller 54  
30 causing an upward movement of the oxide free metal from the body of the bath into and throughout the pan or tray and flowing down through the opening 9 in the bottom wall portion 8 of the pan or tray and overflowing the wall 4, beneath the cap or shed 14 and back into the bath through the channel 24'. The wires entering the bath will cross the flow of the metal flowing back into the bath which will envelope the wires as they enter the surface of the bath.  
35 The wires enter the pot through an oxygen free atmosphere, provided by the gas chamber 25' into which deoxidizing gas is introduced through the feeder 53. This gas will be drawn or sucked down and onto the surface at the inlet end of the bath by the inflow of the overflow metal and seal the surface of the bath within the compartment below the channel 24' and the gas chamber 25' and thereby provide an oxide free surface at the entrance end of the bath and prevent the formation or adherence of oxides or deleterious matter on the surface of the wire to be coated. The pressure of the gas itself will supplement this seal.

The oxide free metal which is circulated  
40 through the pan or tray by the propeller 54 will flow down and back into the bath through the opening 9 into which projects the lower end of the housing 12. This opening is such that the down flowing metal will flow down and back into the bath proper from both sides of said housing, somewhat as indicated by the arrows. The lower opposite beveled or inclined side walls of the housing 12 together with the arrangement of the walls of the opening in their relation to the hous-  
45 50 55 60 65 70 75

ing provides that the down flow of the metal through the opening 9 at the rear side of the housing shall be across the wires moving upwardly from the surface of the bath into the housing 12, so that the down flowing metal will completely envelope and run down the wires into the bath. This will tend to cause a more or less turbulent condition at this point within the bath. The metal flowing down into the main bath at the front side of the housing 12 is in a more or less downward direction and not so much across the wires and will also produce a turbulent condition. These turbulences will keep the surface of the bath, where the wires leave the bath, oxide free, because, if perchance there may be even small particles of oxide or other deleterious substances, they will be moved away presenting a substantially clean surface where the wires emerge from the bath.

On the wires leaving the bath, they enter an oxygen free atmosphere provided by the housing 12 which is supplied with a suitable deoxidizing gas. This gas is drawn or sucked down onto the surface of the bath beneath and within the compartment therebeneath, which is also supplied with gas in the manner described. The result is, that the surface of the bath within the compartment is sealed insuring that the wires leaving the bath pass out through an oxide clean surface. The pressure of the gas itself will supplement the seal within the compartment.

The wires after they leave the roller 59 are prevented from contact with any mechanical or rubbing surfaces, which would disturb or upset the coating, until after the coating is quenched immediately on emergence from the oxygen free atmosphere, which will then have no upsetting effect or disturbance of the coating. In this manner there is assured a substantially oxide free, heavy, uniform, bright and ductile coating which is high in electrical conductivity. A coating low in iron is also assured because of the short immersion, by reason of the use of a small pot, the speed at which the material is passed through the pot and the rapidity with which the coated article is cooled.

Emphasis is placed upon the fact that oxide free metal is continuously supplied to the pan or vat from within the body of the molten metal and from beneath the oxide surface of the metal in the pot 1 and that the down flow of the metal onto the emerging wires is from deep within the body of the metal in the pan or vat and from below the surface of the metal in said pan or vat. The accumulation of oxides and other deleterious matter on the surface of the metal in the pan or vat will be removed from time to time, as occasion requires. The surface of the metal in the pan or vat could, of course, be covered with a suitable flux to retard or prevent the formation of oxides. Such a flux, of course, would not come into contact with the wires.

The scraper and valve 20 and likewise the scraper and valve 30 are provided and arranged so that they may, when rotated, move or convey any oxides which may form in either of the designated compartments toward the closures or clean-outs, to be removed when such closures are opened. When these closures are opened, the scrapers or valves would be set in the positions shown to prevent the escape of gas.

In hot galvanizing, especially with wire, the base metal is usually moist resulting from the pickling solution or fluxes. Such moisture being drawn rapidly into the bath cause oxides to form

within the bath which constantly arise in an upward direction and may be removed from the designated compartments, from time to time, in the manner shown.

What I claim is:

1. An attachment for a pot containing molten zinc, comprising a support adapted for association with said pot, a pan connected with said support and when said support is located on said pot being partially submerged within the molten zinc, a compartment depending from one end of said pan and opening into the molten zinc and having an overlying wall having an opening for the passage of wires therethrough, a vertically disposed housing coincident with said opening and communicating with said compartment, means to supply the housing with a non-oxidizing gas, a water box supported above said pan, a drain at one end of said water box with which the upper end of said housing communicates, discharge outlets from said water box into said drain, wire guiding sheave wheels journaled to rotate within said water box, means to supply water onto certain of said sheave wheels, a propeller within said pan and within a depending open tubular extension therefrom, and means for operating said propeller.

2. An attachment for a pot containing molten zinc, comprising a support adapted for association with said pot, a pan connected with said support and when said support is located on said pot being partially submerged within the molten zinc, a compartment depending from one end of said pan and opening into the molten zinc and having an overlying wall having an opening for the passage of wires therethrough, a vertically disposed housing coincident with said compartment, means to supply the housing with a non-oxidizing gas, a water box supported above said pan, a drain at one end of said water box with which the upper end of said housing communicates, discharge outlets from said water box into said drain, wire guiding sheave wheels journaled to rotate within said water box, means to supply water onto certain of said sheave wheels, a propeller within said pan and within a depending open tubular extension therefrom, means for operating said propeller, and an overflow outlet from the end of said pan adjacent the location of said propeller.

3. An attachment for a pot containing molten zinc, comprising a support adapted for association with said pot, a pan connected with said support and when said support is located on said pot being partially submerged within the molten zinc, a compartment at one end of said pan and opening into the molten zinc and having an overlying wall having an opening for the passage of wires therethrough, a vertically disposed housing coincident with said opening and communicating with said compartment, means to supply the housing with a non-oxidizing gas, a water box supported above said pan, a drain at one end of said water box with which the upper end of said housing communicates, discharge outlets from said water box into said drain, wire guiding sheave wheels journaled to rotate within said water box, means to supply water onto certain of said sheave wheels, a propeller within said pan and within an open tubular port on, and means for operating said propeller.

4. An attachment for a pot containing molten zinc, comprising a support adapted for association with said pot, a pan connected with said support and when said support is located on said

- pot being partially submerged within the molten zinc, a compartment at one end of said pan and opening into the molten zinc and having an overlying wall having an opening for the passage of
- 5 wires therethrough, a vertically disposed housing coincident with said compartment, means to supply the housing with a non-oxidizing gas, a water box supported above said pan, a drain at one
- 10 end of said water box with which the upper end of said housing communicates, discharge outlets from said water box into said drain, wire guiding sheave wheels journaled to rotate within said water box, means to supply water onto certain of said sheave wheels, a propeller within said pan and within an open tubular portion,
- 5 means for operating said propeller, and an overflow outlet from the end of said pan adjacent the location of said propeller.

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