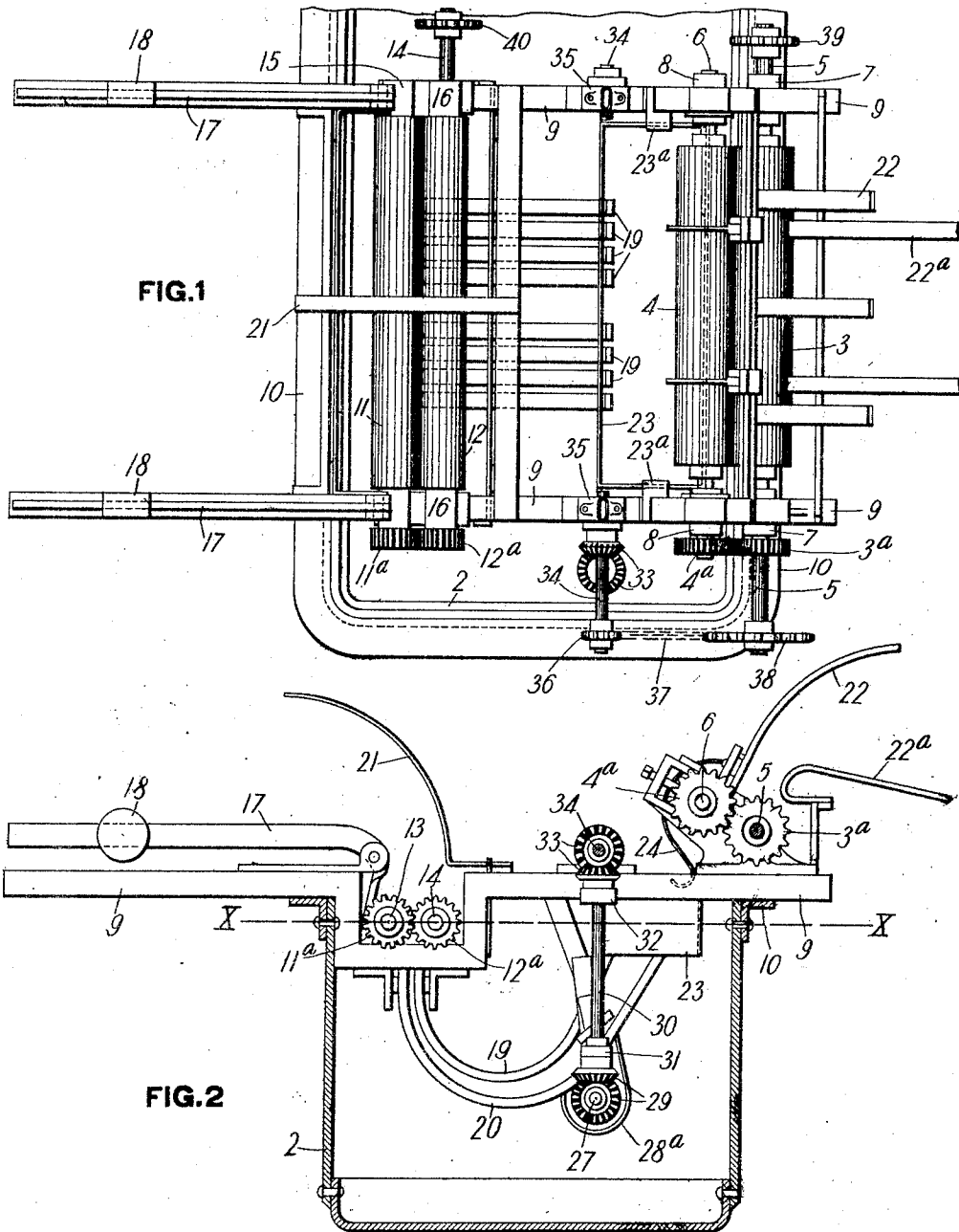


W. GIBSON, Sr.
 APPARATUS FOR COATING METAL.
 APPLICATION FILED MAY 20, 1911.

1,037,235.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 1.



WITNESSES

R. D. Little
M. P. Alexander

INVENTOR

William Gibson, Sr.
by Luthien Bell, Fuller
his Attorney

W. GIBSON, SR.
 APPARATUS FOR COATING METAL.
 APPLICATION FILED MAY 20, 1911.

1,037,235.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 2.

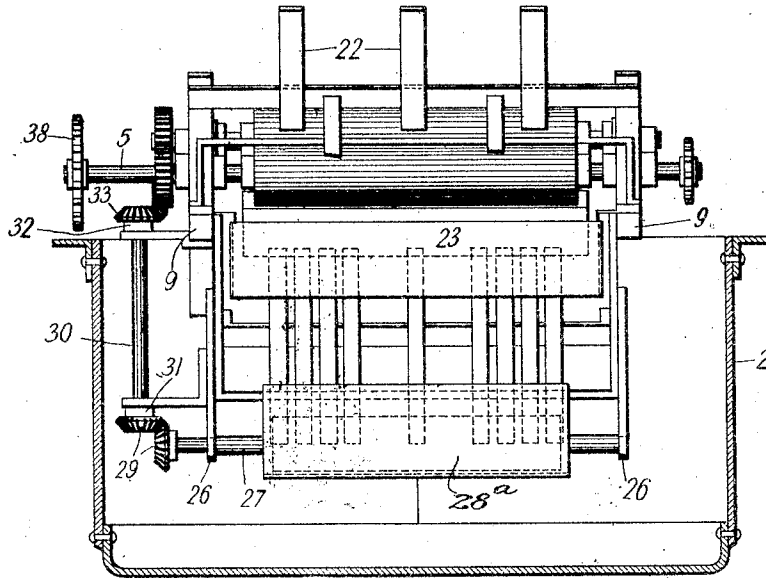


FIG. 3

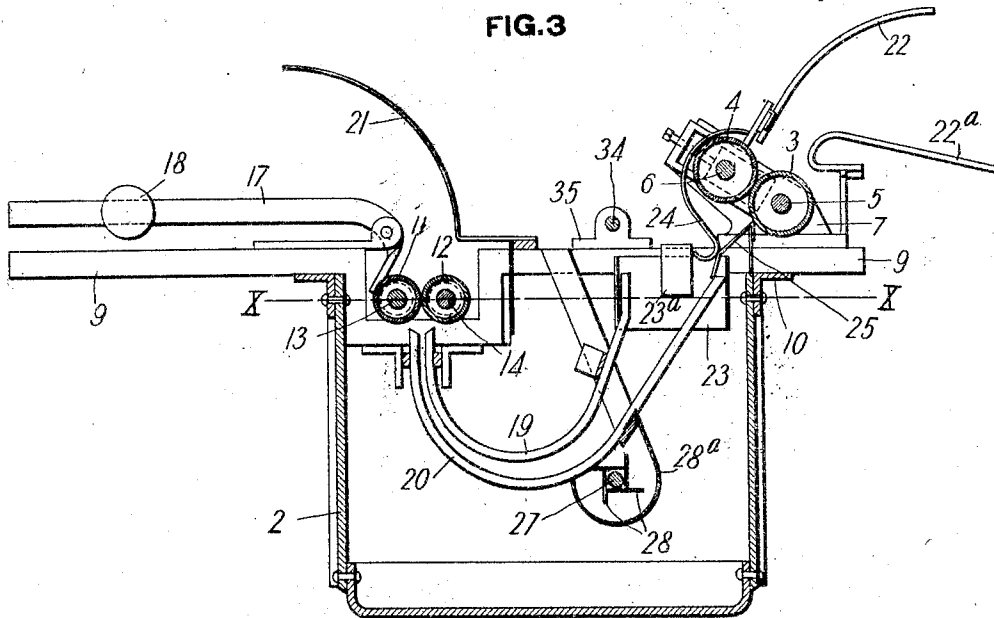


FIG. 4

WITNESSES

R. Little

M. P. Alexander

INVENTOR

William Gibson, Sr.
by Luther C. Bell, Fuller
his Attorney

UNITED STATES PATENT OFFICE.

WILLIAM GIBSON, SR., OF VANDERGRIFF, PENNSYLVANIA, ASSIGNOR TO AMERICAN SHEET & TIN PLATE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

APPARATUS FOR COATING METAL.

1,037,235.

Specification of Letters Patent.

Patented Sept. 3, 1912.

Application filed May 20, 1911. Serial No. 623,550.

To all whom it may concern:

Be it known that I, WILLIAM GIBSON, Sr., of Vandergriff, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Apparatus for Coating Metal, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to apparatus for coating metal, and more particularly relates to galvanizing apparatus used in coating metal sheets or plates with molten spelter or like coating metal.

Heretofore, in coating such materials, the sheets or plates or other articles being coated are caused to pass through the bath of molten coating material, entering and passing through the molten metal at one end and emerging from the opposite end of the galvanizing tank or melting pot. In the passage of the sheets or plates through the bath of molten coating metal, any impurities carried into the metal by the under surface of such plates are retarded and prevented from rising to the surface of the bath by the plates or sheets when dislodged therefrom in passing through the pot and in consequence a considerable quantity of the plates or sheets coated emerge from the pot having dirt adhering to the lower side of the plates and causing a dirty or streaked lower surface on such plates or sheets.

One object of my invention is to provide apparatus for coating sheets and plates by the use of which any dirt on the under side of such plates is dislodged and removed to the top of the bath of coating metal and by which the number of plates having an imperfect or streaked bottom surface is greatly lessened and reduced.

Another object of this invention is to provide a galvanizing or coating apparatus having improved means whereby the bath of molten coating material is stirred or agitated and currents are created therein beneath the surface of the bath and means adapted to direct a current of the molten material against the bottom or under surface of the plates during the passage of the plates through the bath of molten coating material in the melting pot to cause finely divided solids or other impurities on the

surface of the incoming plates to become dislodged and rise to the surface of the bath.

A further object of the invention is to provide a galvanizing or melting pot having novel means for agitating or stirring the molten metal and for guiding or directing the currents set up in the molten material, and having improved means for actuating the agitating mechanism.

Referring to the drawings, Figure 1 is a plan and Fig. 2 a sectional end elevation of a galvanizing or melting pot having plate feeding mechanism and agitating mechanism applied thereto, adapted for use in carrying out my invention, the guiding and feeding mechanism and the bath agitating mechanism being in end elevation in Fig. 2. Fig. 3 is a sectional side elevation of the pot showing the plate or sheet feeding and the bath agitating mechanism removably secured in position in the pot. Fig. 4 is a sectional end elevation of the melting pot, the feeding and guiding mechanism used in passing plates into and out of the bath of molten metal in the pot, and of the agitating mechanism forming part of this invention.

In the accompanying drawings, 2 designates a galvanizing or melting pot built up of rolled steel plates and angles in the usual manner. The pot 2 is equipped with any suitable heating apparatus by means of which the coating materials placed in the pot are melted and maintained in a molten condition when the apparatus is in use. The apparatus employed in heating the pot being old and well known and not forming part of this invention is not further described.

Removably located in the galvanizing pot is the plate feeding and guiding mechanism which is constructed and arranged to receive the plates at one end of the pot and deliver the plates into and below the level of the bath of molten metal maintained in the pot, and out of the pot at the opposite end thereof.

As shown, the feed-in mechanism at one side of the pot comprises the feed rollers 3 and 4 secured on shafts 5 and 6, the shafts being mounted in bearings 7 and 8 on the supports 9, 9, removably secured upon the marginal top flanges 10 of the galvanizing pot 2.

At the opposite side of the pot 2 are the feed-out rollers 11 and 12 which are secured on shafts 13, 14, carried in the bearings 15, 16, these bearings also being mounted on the supports or carriers 9, 9. Spur gears 3^a, 4^a, are provided on the shafts 5 and 6 and similar gears 11^a, 12^a, are secured on the roller shafts 13 and 14 to cause positive rotation of these rollers.

The feed-in roller 4 is yieldingly held by gravity in engagement with the plates passed between the rollers 3 and 4 so as to frictionally engage with and deliver the plates into the pot 2 and the feed-out roller 11 is adapted to be moved into engagement with the plates between this roller and the feed-out roller 12. In the construction shown, one end of the levers 17, which are pivotally secured on the supports 9, 9, engages with the bearings 15 for the roller 11 and a counterweight 18 is provided on the other end of the levers 17 so as to yieldingly hold the faces of the rollers 11 and 12 in contact with the plates, and, when the rollers are caused to rotate, to deliver or feed plates guided into the bite of these rollers out of the galvanizing or coating pot.

Secured to the supports 9, 9, for the feed-in and feed-out mechanism, are the curved guides 19 and 20 for the sheets or plates, these guides extending downwardly into the galvanizing pot. The curved top guides 19 and bottom guides 20 extend as shown, across the width of the pot 2, and are located at separated intervals in the length of the melting pot, so as to permit the molten coating metal to freely come in contact with the under surfaces of plates or sheets passed between these guides. The guides 19 and 20 engage with opposite sides of the sheets or plates delivered into the pot by the feed-in rollers 3 and 4 so as to direct the forward end of these plates downwardly and inwardly through the molten materials in the pot and then upwardly and outwardly into the bite of the feed-out rollers 11, 12. A guard 21 is secured on the supports 9, 9, to deflect the forward end of the sheets or plates downwardly as they emerge and pass upwardly from the pot and cause the plates or sheets to be discharged by the feed out rollers 11 and 12 upon a suitable conveying mechanism by which they are carried away from the galvanizing pot. The guard 22 and sheet or plate support 22^a also are provided, on the entrance side of the pot, to guide the forward end of the plates into the bite of the feed-in rollers 3 and 4.

A rectangular box 23 suspended by the angle brackets or knees 23^a in the galvanizing pot 2 is provided to maintain a supply of sal-ammoniac or other fluxing material on the surface of the molten metal in the pot 2. The box has an open top and bottom, the lower marginal edge of the box extending

to or preferably a slight distance below the level at which the molten spelter or other coating metal is maintained within the pot 2. The box 23 is located within the pot 2 in such position that the sheets or plates as they are delivered into the pot 2 by the feed-in rollers 3 and 4 first pass through the box, and the flux maintained therein before entering the molten metal in the pot.

Opposite guides or guards 24 and 25 are provided below the feed-in rollers 3 and 4 to direct the forward end of the plates between the guides 19 and 20 by which the plates are caused to pass into and through the bath of molten material.

Secured in bearings 26, 26, so as to be located in the bottom portion of the tank or pot 2 when the apparatus is assembled is a horizontal rotary shaft 27 having a series of paddles or arms 28 mounted thereon. The paddles 28 may extend continuously along the shaft 27, or they may be arranged at separated intervals in the length of the shaft 27. The end of the shaft 27 carrying the paddles or arms 28 is connected by means of the bevel gears 29, 29, to the vertical shaft 30 which is mounted in bearings 31, 32, the bearings being secured to the supports 9, 9, for the guiding mechanism. The upper end of the shaft 30 is connected by suitable bevel gears 33, 33, to a horizontal shaft 34 mounted in the bearings 35, 35, on the support 9 and on the outer end of the horizontal shaft 34 is a sprocket wheel 36 which is operatively connected by a sprocket chain 37 with the sprocket wheel 38 on the shaft 5 for the feed-in roller 3.

The shafts 5 and 6 for the feed-in rollers 3 and 4 are connected together by means of the spur gears 3^a, 4^a, and the shafts 13 and 14 for the feed-out rollers 11 and 12 by spur gears 11^a, 12^a, so that these rollers are positively driven in pairs. A sprocket wheel 39 on the shaft 5 and the sprocket wheel 40 on the shaft 14 are connected by suitable sprocket chains with a suitable driving motor or other prime mover (which for the sake of clearness is not shown.)

The paddles or beaters 28 are surrounded by a bent plate 28^a the marginal edges of this plate defining the side edges of a rectangular upwardly extending opening connecting the space inclosed by the plate with the spaces between the guides 19 and 20 and directing the currents set up in the molten materials upwardly against the plates passing between the guides 19 and 20. (See Fig. 4.)

In the operation of my improved apparatus the supports 9, 9, which carry the feeding and guiding apparatus for the plates or sheets, are placed in position in the pot, the supports 9, 9, for this apparatus being removably secured on the flanged top edges of the tank or pot 2. Be-

fore placing the supports 9, carrying the feeding and guiding mechanism, in position, heat is applied to the galvanizing tank or pot and a quantity of spelter or other coating material is melted therein, the molten coating material generally being maintained at about the level X—X in the pot and additions being made at necessary intervals to maintain this level in the pot.

10 The shafts for the rollers 3 and 4 are geared together by means of the spur gears 3^a, and 4^a, so as to rotate in unison and the driving sprocket wheel 38 on one end of the shaft 5 for the roller 3 is connected by the sprocket chain 37 to the sprocket wheel 36 on the shaft 34 through which the stirring or agitating mechanism is driven, when the roller 3 is rotated.

The sheets or plates or other materials to be coated, after being cleaned by pickling the surfaces of the sheets or plates, are caused to move from the pickling vats (not shown) until the front or forward ends of the sheets or plates enter the bite of the rollers 3 and 4. These feed-in rollers deliver the plates forwardly and downwardly, the forward end of the plates being directed by the guides 24, 25, located between the curved guides 19 and 20, and the rollers 3 and 4.

20 The curved guides 19 and 20 cause the sheets and plates to move downwardly and then upwardly in passing through the molten coating material, and the forward end of the plates is directed by means of the guides 19, 20, and caused to enter between the feed-out pinch rollers 11 and 12 on the discharge side of the apparatus. The rollers 11 and 12 are positively driven and by frictional engagement with the surfaces of the plates lift the successive plates out of the molten coating material. As the forward end of the plate emerges from between the rollers 11 and 12, it engages with and is deflected downwardly by the guide or guard 21 and is caused to move horizontally onto a suitable conveying mechanism on which the plates are taken away from the coating apparatus.

When the feed-in and feed-out rollers are rotated the paddle shaft 27 is also caused to rotate through the gears 29 and 33, on the shafts 30 and 34 and the paddles 28 on the shaft 27, when rotated, agitate or stir and set up currents in the molten material.

55 in the bottom of the pot. The opening in the top of the shield which surrounds the paddles 27 directs or guides the currents set up by the agitating mechanism beneath the surface of the molten contents of the pot or tank and the so-formed currents by striking against the downwardly and inwardly moving bottom surface of the plates, dislodging any dirt or other foreign substances carried into the bath on the under surface of the plates, such foreign materials,

when dislodged, rising to the top of the molten zinc or other coating metal in the pot or tank. Accumulations of such foreign materials are removed from time to time, as is found necessary. Any foreign materials on the top surface of the plates will become dislodged in passing through the coating material and being freed from the plates, will rise to the surface of the molten metal in the tank or pot out of the path of the sheets traveling through the apparatus.

The above described operations are repeated with the successive plates or sheets as often as required in the operation of my improved apparatus.

As it is frequently necessary to remove dross from the bottom of the melting pot the feeding and guiding mechanism is removably secured in place on the flanged top marginal edges of the pot or tank, so as to be readily removed and replaced when such cleaning operations become necessary or desirable in making necessary repairs.

The advantages of my invention will be apparent to those skilled in the art. By its use, foreign materials on the bottom surfaces of the plates or sheets when the plates enter the coating material, are dislodged and removed before entering the coating metal far enough to be carried out of the pot by the plates and sheets. The manufacture of galvanized or other metal coated sheets and plates having a streaked or dirty under surface is avoided and overcome.

The apparatus is simple and is easily kept in repair.

Modifications in the construction and arrangement of the parts may be made without departing from my invention.

The construction of the agitating mechanism and the means employed to drive the agitating mechanism may be changed and other variations in the construction and arrangement of the parts may be made without departing from my invention.

I claim:—

1. In apparatus for coating metal the combination with a pot for molten coating metal and means for passing metal to be coated into and out of said pot, of mechanism for agitating the molten contents of the pot, and means for actuating said agitating mechanism.

2. In apparatus for coating metal the combination with a pot for molten coating metal and means for passing metal to be coated into and out of said pot, of means for creating a current in the molten contents of said pot and mechanism for actuating said means.

3. In apparatus for coating metal the combination with a pot for molten coating metal and means for passing metal to be coated into and out of said pot, of means for creating currents in the molten contents

of said pot, and means for controlling the direction of flow of the currents created in the contents of the pot.

4. In apparatus for coating metal the combination with a pot for molten coating metal and means for passing metal to be coated into and out of said pot, of means for creating currents in the molten contents of said pot, and means for directing the so-formed currents upwardly toward the surface of the coating material in said pot.

5. Apparatus for galvanizing metal sheets or plates comprising a galvanizing pot containing molten spelter, means for delivering the sheets or plates into said pot, means for guiding the plates through the molten spelter, means for delivering the sheets or plates out of said pot and mechanism in the pot for stirring the molten spelter when the galvanizing apparatus is in operation.

6. Apparatus for galvanizing metal sheets or plates comprising a galvanizing pot containing molten spelter, means for delivering the sheets or plates into said pot, means for

guiding the plates through the molten spelter, means for removing the sheets or plates from said pot, and mechanism in the pot for creating a current in the molten spelter during the operation of the galvanizing apparatus.

7. Apparatus for galvanizing metal sheets or plates comprising a galvanizing pot containing molten spelter, means for delivering the sheets or plates into said pot, means for guiding the sheets or plates through the molten spelter, means for removing the sheets and plates from said pot and mechanism in the pot for creating and directing a current in the molten spelter against the bottom surface of sheets or plates passing through the galvanizing apparatus.

In testimony whereof, I have hereunto set my hand.

WILLIAM GIBSON, SR.

Witnesses:

A. H. BEALE,
R. G. SCOTT.