Dec. 30, 1930. J. CARROLL 1,787,141

GALVANIZING MACHINE

Filed Nov. 2, 1928 4 Sheets-Sheet 1

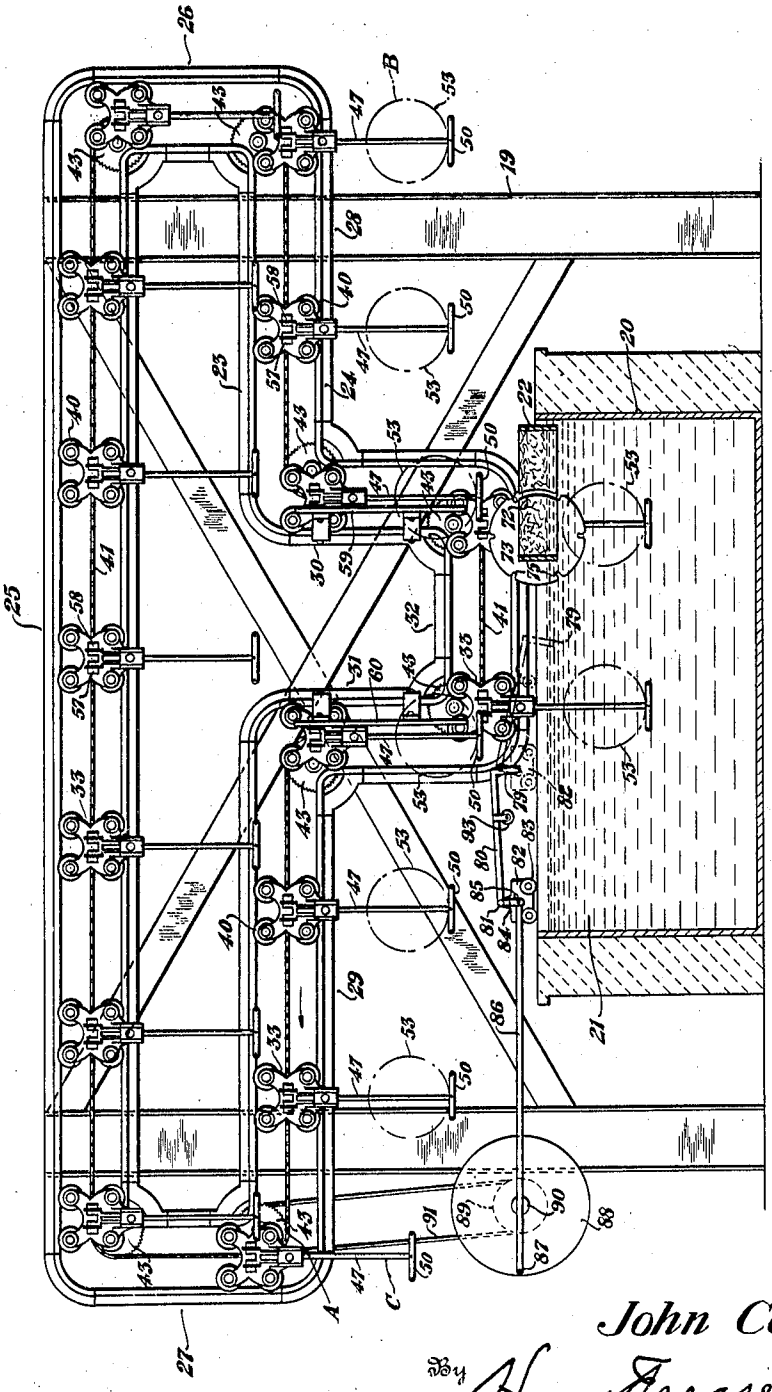


Fig. 1

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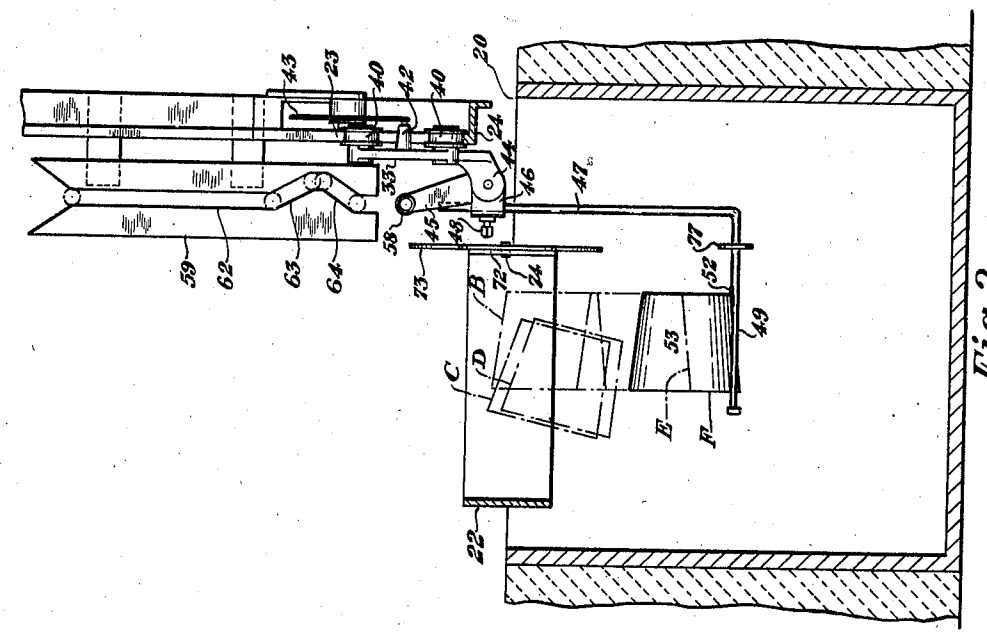


Fig. 2

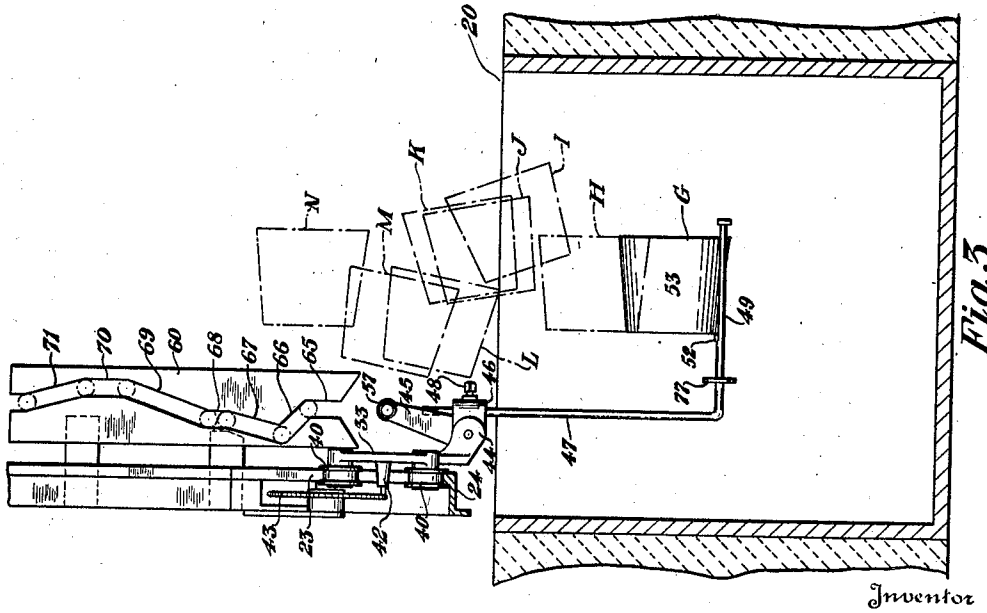


Fig. 3

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GALVANIZING MACHINE

Filed Nov. 2, 1928 4 Sheets-Sheet 3

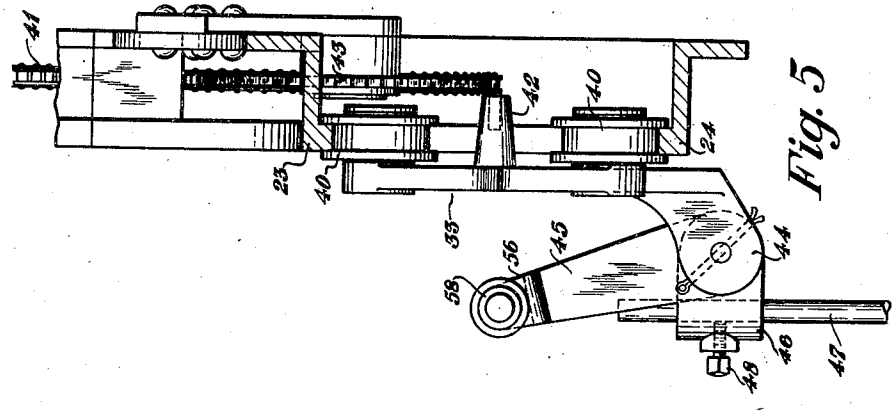


Fig. 5

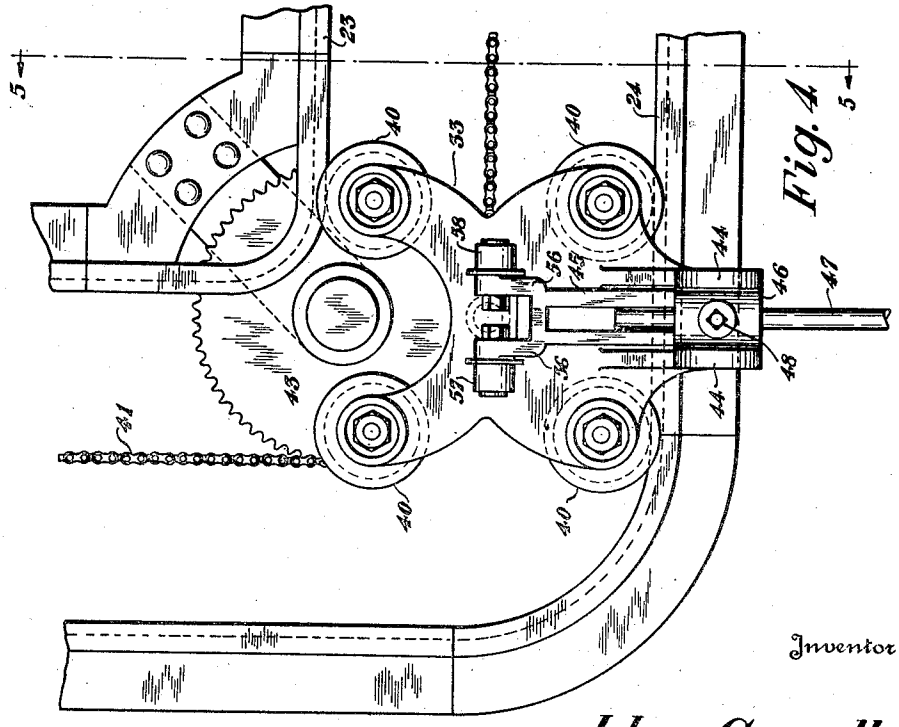


Fig. 4

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GALVANIZING MACHINE

Filed Nov. 2, 1928 4 Sheets-Sheet 4

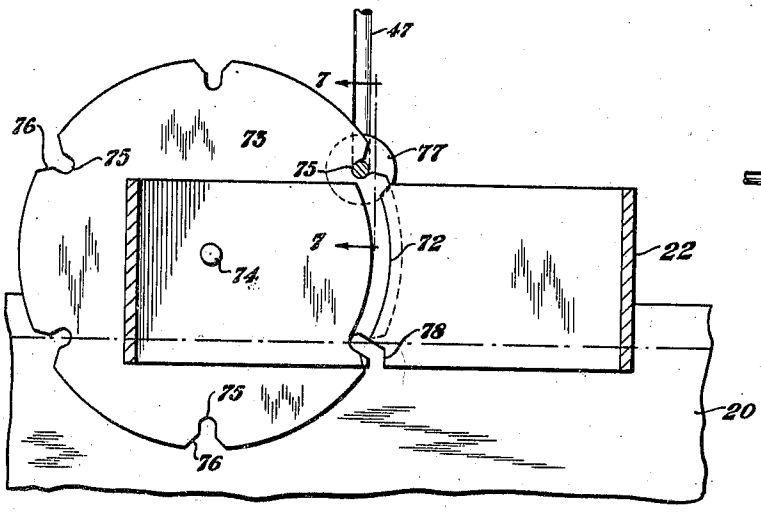


Fig. 6

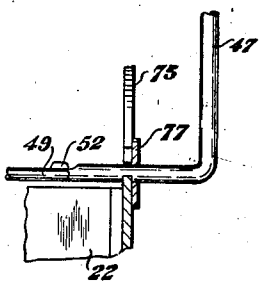


Fig. 7

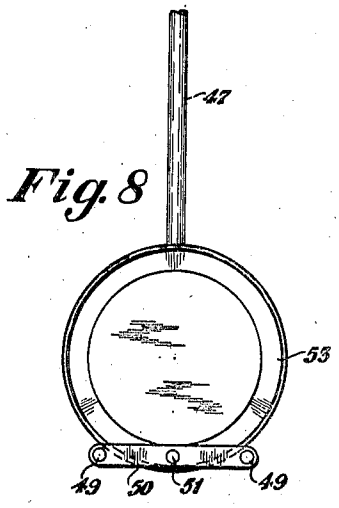


Fig. 8

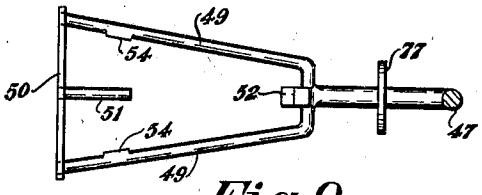


Fig. 9

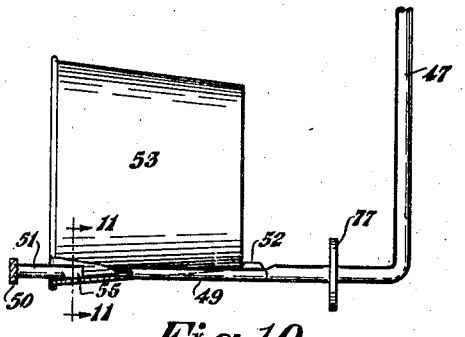


Fig. 10

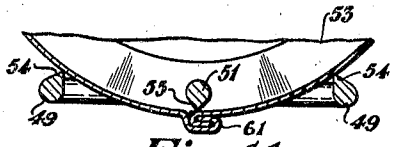


Fig. 11

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Patented Dec. 30, 1930 1,787,141

UNITED STATES PATENT OFFICE

JOHN CARROLL, OF WHEELING, WEST VIRGINIA, ASSIGNOR TO THE REEVES MANUFACTURING COMPANY, OF DOVER, OHIO, A CORPORATION OF OHIO

GALVANIZING MACHINE

Application filed November 2, 1928. Serial No. 316,754.

The invention relates to machines or apparatus for coating pails, buckets and other articles with zinc, tin or other coating materials.

In the manufacture of galvanized, tinned and other coated buckets, pails and other metal articles, the same are, under present practice, either formed from sheets which have been previously coated with zinc or tin; or the articles are formed of black sheets and then dipped in the molten zinc, tin or other coating material for coating the same.

The cheaper grades of such coated articles are usually formed from sheets which have been previously coated with zinc or tin, for the reason that a thin coating may be obtained by first galvanizing or tinning the sheet in the usual galvanizing or tin pot provided with rolls which engage opposite sides of the sheets and squeeze the surplus metal therefrom.

However, it has been found by experience that, particularly in the use of galvanized or zinc coated sheets, the coating breaks or cracks in forming the articles of the previously coated sheets. Also, it is not possible in so forming the articles to provide sufficient coating at the seams to properly protect the same against rust or corrosion in use.

For this reason, it is customary, under present practice, to make the better grade of such articles from black sheets and then dip the formed article into the molten zinc or tin for coating the same. The metal coating thus formed upon the article properly coats the seams of the article and is not subjected to the cracking or breaking common in the forming of the articles from the previously coated sheets.

Although it is known that attempts have been made to produce machines for mechanically coating formed pails, buckets and the like and some few patents have been obtained upon such machines, there is no such apparatus, to applicant's knowledge, which has ever been capable of commercial use.

Therefore, all such articles, which are first formed of black sheets, or the like, are dipped by hand into the molten zinc or tin in order to coat the same. This hand dipping is not only very slow and expensive but does not permit of a uniform coating of metal being applied throughout the entire surface of the article and usually results in a coating considerably heavier than is necessary, thus materially increasing the cost of the finished coated article.

The object of the present improvement is to provide an apparatus for coating buckets, pails and other receptacles with zinc, tin or other coating material; and for applying a uniform coating of the desired thickness upon the articles; and for properly covering the seams with a substantial coating of the metal.

The above and other objects may be attained by providing, in combination with a pot containing the molten zinc, or other coating material, an endless conveyer which may include a track located above the pot and having thereon one or more carriages with means for moving the same along the track, each carriage having a frame suspended therefrom for supporting a pail or other article to be coated and for passing the article first through the flux and down through the flux box, a gate being provided therein to permit the frame to pass through the flux box without allowing the flux to escape from the box

Means, such as a cam track, is provided for engaging each frame as it nears the pot and swinging the frame, whereby the pail enters the molten metal in substantially horizontal position and is quickly tilted upward to cause the molten metal to rapidly flow into the same and then tilted back to horizontal position and passed through the pot to a point near the exit end, at which place the frame is again swung to rapidly tilt the pail upward in order to flow the metal over the seam of the pail, which is located at the bottom thereof, the pail being then quickly tilted in the opposite direction to pour all of the molten metal therefrom and then raised in horizontal position, ready for removal from the frame; a reciprocating blade being operated in unison with the movement of the carriages for removing the scale, oxide, and other foreign material from the surface of the molten

metal just before each pail emerges therefrom.

An embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is an elevation, partly in section, of the improved coating machine;

Fig. 2, a sectional view through the machine, showing the steps through which the pail is moved in entering the pot of molten metal;

Fig. 3, a similar view, showing the positions through which the pail is moved in leaving the metal pot;

Fig. 4, an enlarged detail elevation of one corner portion of the track, showing one carriage thereon;

Fig. 5, a section on the line 5—5, Fig. 4;

Fig. 6, a sectional view of the flux box and the gate located therein;

Fig. 7, a section on the line 7—7, Fig. 6;

Fig. 8, a front elevation of one of the frames, showing a pail supported therein;

Fig. 9, a plan view of the frame;

Fig. 10, a side elevation of the frame shown in Fig. 8, showing the pail thereon; and

Fig. 11, a section, on an enlarged scale, taken substantially on the line 11—11, Fig. 10.

Similar numerals refer to similar parts throughout the drawings.

For the purpose of illustration, a preferred form of the improved apparatus is more or less conventionally illustrated in the drawings, no attempt having been made herein to represent the machine with mechanical exactness but the main principles and operative features of the apparatus are clearly indicated.

The metal pot, which may be of any usual construction, is illustrated generally at 20 and contains the molten zinc or other material, for coating the articles, as indicated at 21. A flux box 22 is preferably located in the upper portion of the pot at the point where the articles to be coated enter the same.

Located above the pot, and supported upon any suitable structure such as indicated generally at 19, is a conveyer, which may include a track comprising the spaced inner and outer rails 23 and 24. This track may be continuous as shown in Fig. 1, comprising the horizontal upper portion indicated generally at 25, the vertical end portions 26 and 27 depending therefrom and the aligned lower horizontal portions 28 and 29, having at their inner ends the depending substantially vertical portions 30 and 31 joined at their lower ends by the short horizontal portion 32 forming a depending U-shaped portion directly above and adjacent to the top of the pot.

Carriages, indicated generally at 33, may be provided for conveying the articles through the apparatus, each carriage being provided with flanged wheels 40 for engagement with the inner and outer rails of the track. If desired, these carriages may be connected together, in spaced relation, as by means of an endless chain 41 suitably connected to a boss 42 upon the rear side of each carriage, whereby the carriages may be moved in unison around the endless track.

This endless chain may be located over the sprocket wheels 43 placed at the several bends in the track and one of these sprocket wheels, preferably that indicated at A, may be driven from any suitable power means such as a motor, line shaft or the like (not shown), to drive the chain in the direction of the arrow shown on Fig. 1.

Each carriage 33 may be provided, at its lower portion, with a pair of spaced ears 44 between which is pivoted a bell crank comprising the upright arm 45 and the substantially horizontal arm 46. From the latter arm a rod 47 depends, being preferably adjustably secured thereto as by the set screw 48.

A normally horizontal frame is carried at the lower end of each rod 47 and comprises a pair of diverging arms 49 connected at their outer ends as by the bar 50 to the center of which is fixed the rearwardly extending finger 51.

In the crotch of the arms 49 is provided a lug 52, adapted to support the bottom portion of the pail, or bucket, indicated at 53, while the upper portion of the bucket rests upon the knife edge lugs 54 formed upon the arms 49, the finger 51 extending into the open end of the pail and engaging the interior thereof at a point spaced from the top of the pail as best shown in Figs. 10 and 11. This finger 51 is also preferably provided, on its under side, with a knife edge 55 for engagement with the pail.

The upper end of the arm 45, of the bell crank, is provided with the bearing portions 56 upon which are journaled the aligned flanged rollers 57 and 58 for engagement with means such as the cam tracks 59 and 60, respectively, supported in vertical position adjacent to the depending portions 30 and 31, respectively, of the main track.

These cam tracks are arranged to cooperate with the rollers to tilt the pail-carrying frames into various positions, as the pail passes through the molten zinc, or other material, in the pot, in order to so move the pail through the coating material that the same is uniformly coated throughout its entire surface with a coating of the desired thickness of zinc or other coating material and to properly coat the seam of the pail with zinc or other material.

It should be understood that in placing the pails in the frames, the seam, indicated at 61, of each pail, is located at the bottom, as best illustrated in Fig. 11. The pails are placed on the frames, as above described, at the right hand side of the machine and pass through

the apparatus, being removed at the left side thereof, referring to the position of the machine shown in Fig. 1.

As each carriage moves down the depending portion 30 of the main track, the roller 57 thereof will engage the cam track 59 and will first ride downward for a considerable distance in the vertical slot 62 of said cam track.

At the lower end of this vertical portion of the cam slot the frame, and pail carried thereby will still be in the normal position as indicated at B. The roller will then pass down the inclined portion 63 of the cam slot, tilting the pail upward or backward to the position indicated at C, just as the pail enters the coating material in the pot, in order to quickly flow the coating material into the interior of the pail.

The pail then moves downward in the same tilted position to the point shown at D, at which time the roller engages the oppositely inclined portion 64 of the cam groove, riding down the same and tilting the pail back into the normal position shown at E.

The pail then further descends into the coating material, in this position, as shown at F and then passes horizontally through the pot to the point indicated at G, still remaining in the normal position as indicated in Fig. 3.

As the carriage then ascends through the portion 31 of the main track, the pail is raised, still in the normal position, to the point H, at which time the roller 58 engages the vertical portion 65 of the cam track 60.

As the roller then engages the inclined portion 66 of the cam track, the pail is quickly tilted backward to the position shown at I, flowing the molten metal or other coating material once more backward into the interior of the pail and entirely along the seam 61 thereof, as the pail is raised above the level of the coating material.

The roller then passes up the oppositely disposed angular portion 67 of the slot and into the short vertical portion 68 thereof, carrying the pail above the level of the coating material, still slightly tilted backward, as shown at J and K.

As the roller then passes up through the inclined portion 69 of the cam track, the pail is quickly tilted forward to the position L, pouring all of the coating material therefrom, the pail being then raised to the point shown at M, still in the same tilted position, as the roller passes up through the vertical portion 70 of the cam groove.

The roller then passes through the inclined portion 71 of the cam groove, tilting the pail to the normal position, shown at N, as the roller reaches the top of said cam groove. In this relative position the pail is then carried throughout the remaining portion of the main track and may be removed from the carriage at the left end of the machine.

It will be seen that each pail passes downward through the flux box before it enters the molten zinc or other coating material in the pot, and for this reason it is necessary to provide a slot in the side of the flux box, to permit the rod 47 to pass therethrough. This slot is shown at 72 in the drawings.

In order to keep this slot closed at all times, so as not to permit the flux to pass through the slot, and over the surface of the molten zinc or other coating material, a gate in the form of a disk 73 is pivoted to the adjacent side of the flux box, as indicated at 74 and normally seals the slot 72.

This gate is provided at intervals, around its periphery, with notches 75, preferably flared outward, as at 76, to permit the horizontal portion of the rod 47 to easily enter and leave the same.

The slot 72, in the side of the flux box, is arcuate and constructed upon the center of the pivot 74, being in line with the notches 75. As best shown in Fig. 6, the gate 73 overlaps this slot, substantially closing the same at all times.

As each frame is lowered, the horizontal portion of the rod 47 engages one of the notches 75 at about the point shown in Fig. 6, the flange collar 77, upon the rod, entirely closing the notch, and thus preventing leakage of flux through the notch as the gate rotates past the flux box.

The horizontal portion of the rod 47 then travels down through the arcuate slot 72 and as it reaches the lower end of the same, passes out of engagement with the notch and through the angular lower portion 78 of the slot 72.

It is well known that there is scale, oxide and other matter usually floating upon the surface of the molten zinc or other coating material, in the pot, and in order that none of this matter is deposited upon the surfaces of the pails, as they emerge from the coating material, a device is included in the apparatus for scraping this scale and other matter from the surface of the coating material at the point where the pails emerge therefrom.

This device includes a blade 79, carried upon the forward arm 80 of a bell crank, pivoted as at 81 upon a carriage 82 which is provided with rollers 83 for moving the carriage upon the top edge of the pot. The other arm 84, of the bell crank, is adapted to engage a stop pin 85 to prevent the blade from being moved above the full line position shown in Fig. 1.

A pitman rod 86 connects the arm 84, of the bell crank, with a wrist pin 87, upon the pitman wheel 88, which is journaled at one side of the pot. A sprocket wheel, or pulley 89, is fixed upon the shaft 90, of the pitman wheel, and operatively connected, as by a belt or chain 91, with a similar sprocket wheel

or pulley upon the shaft of the sprocket wheel 43 indicated at A in Fig. 1.

The pitman wheel 88 will thus be continuously rotated, in synchronism with the movement of the carriages 33, upon the main track. With each rotation of the pitman wheel, the carriage 82 will be carried forward from the full line position to the dotted line position in Fig. 1, the bell crank and blade remaining in the raised position until the carriage reaches the dotted line position, at which time the rearward or outward pull upon the pitman rod 86 will tilt the bell crank into the dotted line position shown.

This causes the submerging of the blade 79 below the surface of the molten zinc or other coating material and the moving of the same through the coating material as the carriage moves back to the full line position, just as the time that each pail reaches about the position shown at G, thus cleaning the surface of the molten zinc or other coating material of scale, oxide and the like immediately before each pail emerges from the pot.

As the carriage 82 is moved backward, to the initial position, with the blade 79 below the surface of the molten zinc or other coating material, the roller 93, carried by the arm 80 of the bell crank, will engage the upper edge of the pot, holding the blade 79 just submerged below the surface of the coating material as shown in broken lines in Fig. 1.

The operation of the apparatus is as follows: The pails are placed upon the frames suspended upon the rods 47, at the point indicated at B, at the right side of the apparatus as shown in Fig. 1, each pail being placed with its axis in horizontal position, and resting upon the lug 52 and knife edge lugs 54, with the finger 51 engaged in the open end of the pail, to hold the same firmly upon said lugs, the seam 61 of the pail being located at the bottom, as shown in Figs. 8, 10 and 11.

As the carriages 33 move to the left, in the direction of the arrow on Fig. 1, each pail will be carried down as its carriage passes down the vertical portion 30 of the U-shaped portion of the main track, passing the pail through the flux, in the flux box 22, and immersing the same in the molten zinc or other coating material.

As above described, as each pail moves downward, the frame carrying the same will be tilted through the various positions shown in Fig. 2, by the cooperation of the roller 57 and cam track 59. As the pail passes from the flux into the bath of coating material, the same will be tilted backward to flow the material entirely inside of the pail, which is then tilted again to the horizontal position and passed downward, and then laterally, through the molten zinc or other coating material in this position.

As the roller 58 engages the cam track 60, during the raising movement of each pail, the pail is tilted backward as it emerges from the coating material, flowing the same backward along the seam 61 of the pail.

Then as the pail is raised, out of the coating material, it is tilted forward, to drain all of the surplus coating therefrom, and again tilted into the horizontal position as it continues to move upward.

When the horizontal portion 29, of the main track, is reached by each carriage, the pail is carried to the left, away from the pot and removed from its frame, at the point C, the empty frames then traveling upward in the main track, and back to the right, where they are again loaded.

Just before each pail emerges from the bath, the blade 79 is raked across the surface of the coating material, at the point where the pails emerge therefrom, cleaning the scale, oxide and other material from the surface, just prior to the raising of the pail above the surface, preventing the deposit of any foreign material upon the surface of the freshly coated pail.

As each rod 47 passes downward through the slot 72, in the flux box, it will be received in one of the peripheral notches 75 of the gate 73, as above described, the flange collar 77, upon the rod, sealing said notch, while the gate 73 seals the slot 72, thus preventing the flux from passing outward through the slot 72 onto the surface of the molten zinc or other coating material.

Although the invention is illustrated and described as applied to the galvanizing of pails or buckets, it should be understood that the same is applicable to tinning or other coating, of not only pails, or buckets, but tubs, cans and other articles, without any material change in the apparatus excepting such changes in size as may be necessary for articles of various sizes.

It should also be understood that although the principles and operation of the apparatus are clearly illustrated and described, no attempt has been made to illustrate the minor details of construction which may be necessary or desirable in actual practice.

I claim:

1. Apparatus for coating metal articles, including a pot of coating material, a carriage movable adjacent to the pot, a frame pivoted upon the carriage and adapted to carry a pail and the like, means for moving the carriage to pass the pail through the coating material, and a cam track for swinging the frame upon its pivot to tilt the pail in different directions as it passes through the coating material.

2. Apparatus for metal coating pails and the like, including a pot of molten metal, a carriage movable adjacent to the pot, a frame pivoted upon the carriage and adapted to carry a pail and the like, means for moving the carriage to pass the pail through the

molten metal, a cam track for swinging the frame upon its pivot to tilt the pail in different directions as it passes through the metal, a reciprocating blade for scraping oxide and the like from the surface of the molten metal and means for operating said blade in unison with the movement of the carriage.

3. Apparatus for coating metal articles, including a pot of coating material, an endless conveyer located above the pot and provided with a substantially U-shaped depending portion, a spaced plurality of frames pivotally connected to the conveyer and adapted to carry pails and the like, means for continuously driving the conveyer in one direction to pass the pails through the coating material, and means adjacent to the U-shaped portion of the conveyer for swinging the frames upon their pivots to tilt the pails in different directions as they pass through the coating material.

4. Apparatus for coating metal articles, including a pot of coating material, an endless conveyer located above the pot and provided with a substantially U-shaped depending portion, a spaced plurality of frames pivotally connected to the conveyer and adapted to carry pails and the like, means for continuously driving the conveyer in one direction to pass the pails through the coating material, and cam means adjacent to the U-shaped portion of the conveyer for swinging the frames upon their pivots to tilt the pails in different directions as they pass through the coating material.

5. Apparatus for coating metal articles, including a pot of coating material, an endless conveyer located above the pot and provided with a substantially U-shaped depending portion, a spaced plurality of frames pivotally connected to the conveyer and adapted to carry pails and the like, means for continuously driving the conveyer in one direction to pass the pails through the coating material, and cam tracks adjacent to the U-shaped portion of the conveyer for swinging the frames upon their pivots to tilt the pails in different directions as they pass through the coating material.

6. Apparatus for metal coating metal articles, including a pot of molten metal, an endless conveyer located above the pot and provided with a substantially U-shaped depending portion, a spaced plurality of frames pivotally connected to the conveyer and adapted to carry pails and the like, means for continuously driving the conveyer in one direction to pass the pails through the molten metal, means adjacent to the U-shaped portion of the conveyer for swinging the frames upon their pivots to tilt the pails in different directions as they pass through the metal, a reciprocating blade for scraping oxide and the like from the surface of the molten metal, and means for operating said blade in unison with the movement of the conveyer.

7. Apparatus for metal coating metal articles, including a frame for carrying an article to be coated, a pot of molten metal, a flux box at the top of the molten metal and provided with a slot through one side, a rotatable gate covering said slot and having a notch in its periphery to receive the frame, and means for moving the frame to pass the article through the flux box and through the molten metal.

8. Apparatus for metal coating metal articles, including a frame for carrying an article to be coated, a pot of molten metal, a flux box at the top of the molten metal and provided with a slot through one side, a rotatable gate covering said slot and having a notch in its periphery to receive the frame, means for moving the frame to pass the article through the flux box and through the molten metal, and a flange upon the frame for covering the notch in the gate.

In testimony that I claim the above, I have hereunto subscribed my name.

JOHN CARROLL.