C. C. ROBERTS.

TINNING OR COATING MACHINE.

APPLICATION FILED NOV. 23, 1907.

911,613.

Patented Feb. 9, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

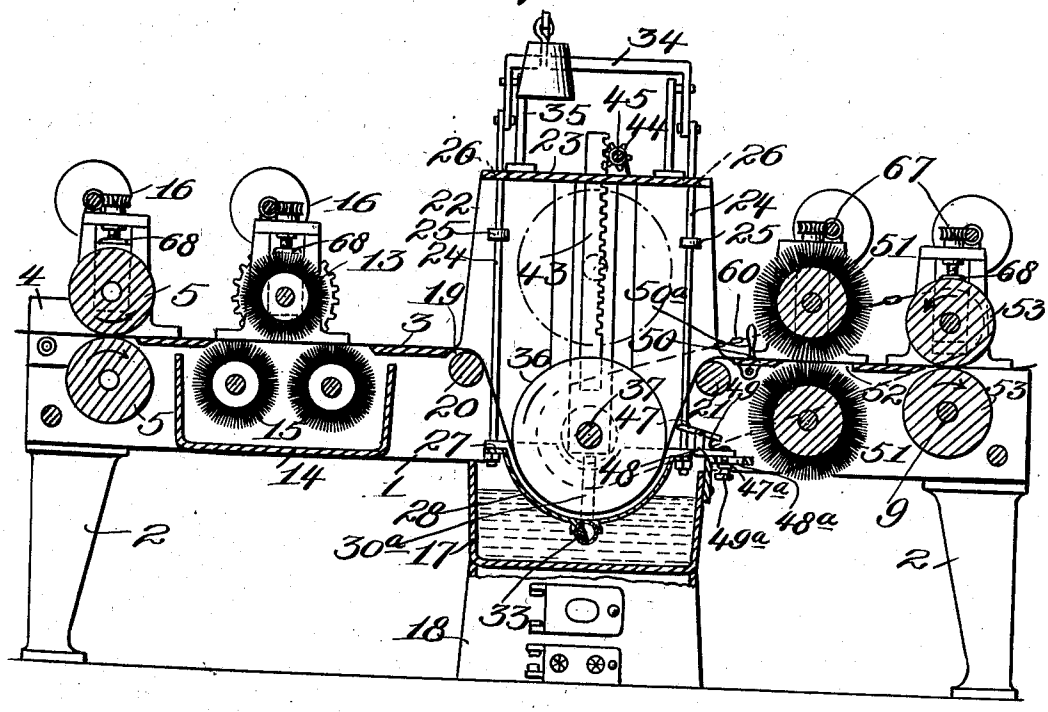
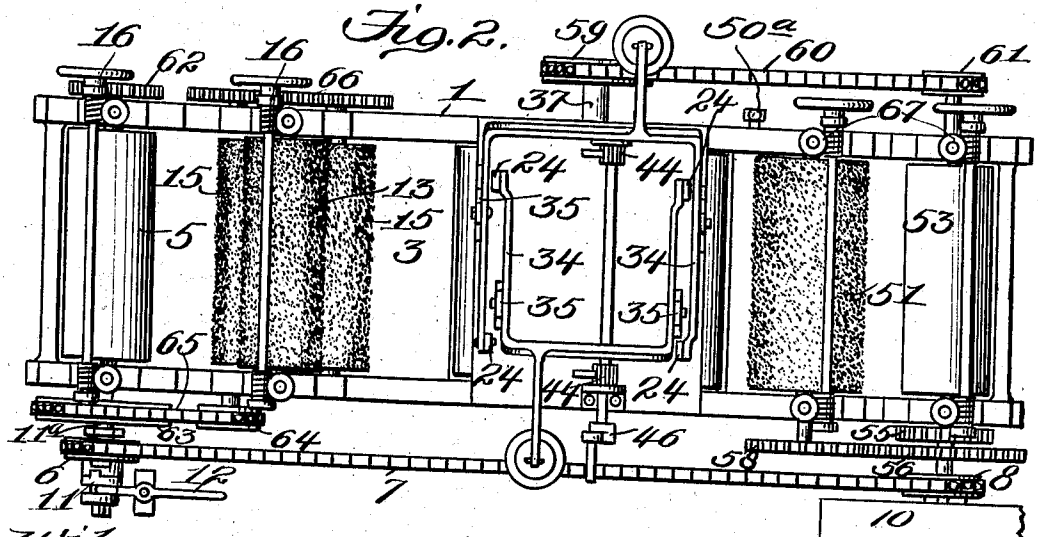


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

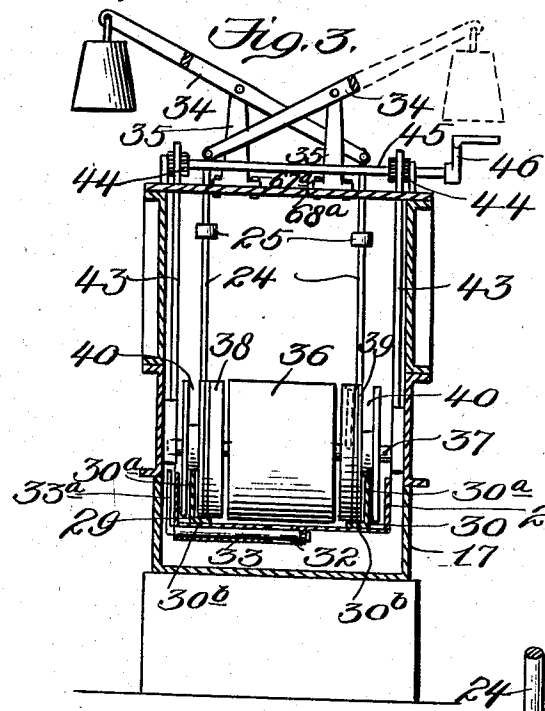


Fig. 6.

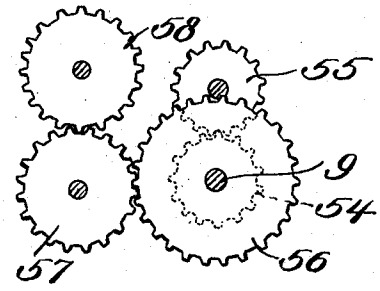


Fig. 5.

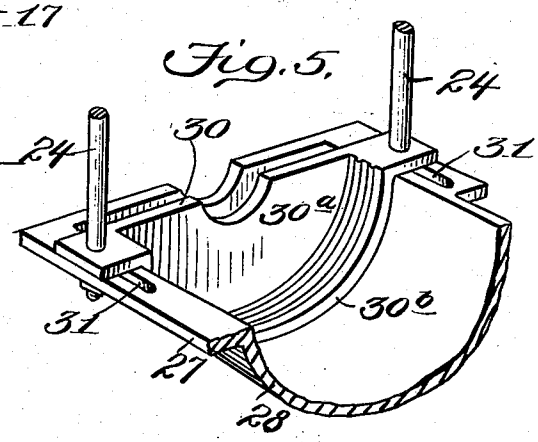


Fig. 4.

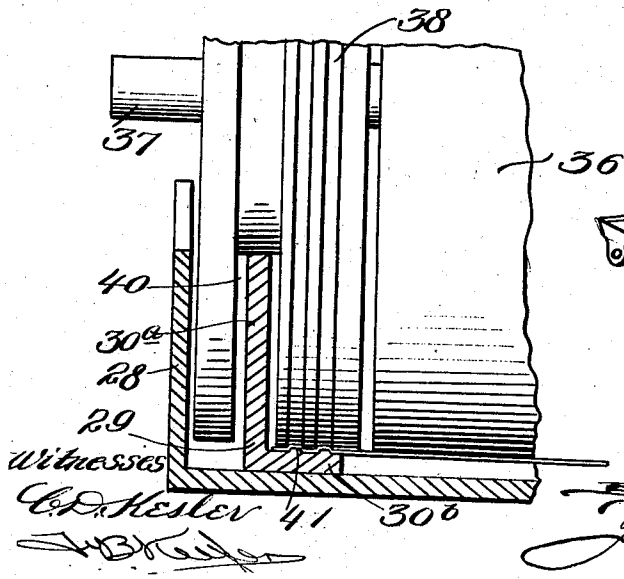


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES C. ROBERTS, OF ANSONIA, CONNECTICUT.

TINNING OR COATING MACHINE.

No. 911,613. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed November 23, 1907. Serial No. 403,515.

To all whom it may concern:

Be it known that I, CHARLES C. ROBERTS, a citizen of the United States, residing at Ansonia, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Tinning or Coating Machines, of which the following is a specification.

This invention relates to tinning machines and embodies an organization of elements which have been particularly devised for tinning metal sheets on one side, though capable of arrangement to tin the sheets on both sides.

In referring to the invention as particularly relating to tinning machines it should not be considered that such machine is limited in its use for tinning plates or sheets of metal, as the machine may be employed with facility for coating sheets or plates with materials other than tin; and in the subjoined description the operation of tinning sheets which will be particularly described is only intended to demonstrate one of the practical functions of the mechanism embodying the features of the invention.

The improved machine is comparatively simple in its construction, compact, and capable of uniformly and quickly coating sheets or plates with the desired material without waste of the coating material and with a superiority in the coated product.

The machine which will be presently described includes in its organization many accessories for facilitating the application of the coating of tin or other material to sheets or plates, but the essential features of the invention consist in an elevatable and depressible engaging member for the sheet, preferably including adjustable means to accommodate sheets or plates of different widths and having a dross guard and clamping straps coöperating therewith, the dross guard being valved to admit the coating liquid to the sheet or plate.

The invention also consists in the details of construction and arrangement of the several parts which will be more fully hereinafter specified.

In the accompanying drawings: Figure 1 is a longitudinal vertical section of a tinning or coating machine embodying the features of the invention. Fig. 2 is a top plan view of the same. Fig. 3 is a transverse vertical section. Fig. 4 is an enlarged transverse vertical section showing a portion of the dross guard, sheet engaging roll, one of the clamping straps or members, and one of the collars coöperating with the strap or member. Fig. 5 is a detail perspective view of a portion of the dross guard, one of the clamping straps or members, and two of the hanger or supporting rods. Fig. 6 is a detail elevation of a portion of the gearing. Fig. 7 is a detail view of a tilting table forming part of the apparatus.

Similar characters of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates a suitable frame supported by legs 2 and having a bed 3 over which the sheets or plates successively move during the coating operation. The feed end of the machine is provided with a guide 4 and pair of feed rollers 5, the rollers 5 being suitably geared to each other and the shaft of one equipped with a sprocket wheel 6, which is engaged by a chain belt 7 also engaging a sprocket wheel 8 on a drive shaft 9, carrying a suitable band pulley 10. The shaft of the lower roller 5 which carries the sprocket wheel is also equipped with a suitable clutch or shifting mechanism 11 having a shifting lever 12, the object of this mechanism being to throw the sprocket wheel 6 into and out of rotatable relation with respect to the shaft of the roller with which it engages. The purpose of this clutch or shifting mechanism is to stop and start the machine at intervals for a purpose which will be more fully hereinafter explained. In advance of the feed rollers 5 is a brush roller 13, and below the latter is an acid tank 14 containing brush rollers 15. Over the rollers 5 and 13 suitable hand-wheels and gears 16 are mounted for adjusting the top roller 5 and the said brush roller 13. The rollers 5, 13 and 15 rotate in the directions indicated by the arrows thereon, and the rollers 13 and 15 are driven at about three times as fast as the speed of movement of the sheet over the bed 3, the roller 13 serving to hold the sheet down on the bed, while the rollers 15 properly apply acid from the tank 14 to the under side of the sheet or plate.

At an intermediate point under the frame 1 a tin pot or receptacle 17 is mounted and provided with a heater or furnace 18 to maintain the contents in proper fluid condition. The upper portion of the frame over the tin pot or receptacle 17 has an open-

ing formed therein, as at 19, and extending transversely across the frame close to the side walls of the opening are guide rollers 20 and 21. Erected over the opening 19 and rising a suitable distance above the bed 3 is a frame 22 which includes a top plate 23. Movably extending through the top plate 23 are pairs of rods 24 having collars 25 thereon at suitable elevations, the top plate 23 having slots 26 formed therein of such dimensions that one pair of the rods may be adjusted or moved to compensate for the endwise movement or adjustment of the parts with which they coöperate and which will now be explained. The lower ends of the rods 24 are secured in the upper side flanges 27 of a dross guard 28, the latter being of arcuate form and having disposed therein and movable therewith a pair of clamping straps or members 29 and 30, the strap 30 being endwise adjustable or movable in the dross guard to accommodate tinning or coating sheets or plates of various widths, the rods 24 connected to the strap 30 being movable in elongated slots 31 in the dross guard flanges to permit adjustment of the rods proportionately to the movement of the strap 30. The clamping straps occupy positions within the dross guard adjacent to the opposite ends of the latter, and in the center of the lowermost portion of the said guard is a valve opening 32 having a half-round valve 33 therein which, when turned in one direction, will close the said opening, and when moved in the opposite direction will open the valve opening and permit the melted tin or other material in the pot or receptacle 17 to pass through the dross guard between the clamping straps. The rods 24 have weighted counterbalancing levers 34 secured to their upper ends and supported on fulcrums 35, the object of these counterbalancing levers being to lift the dross guard and clamping straps 29 and 30 clear of the tin or other molten material within the pot or receptacle 17. The collars 25 on the rods 24 serve as stop means to prevent the rods from elevating above a predetermined point, and the degree of elevation of the clamping straps and dross guard will be only to such an extent as to permit the said guard and straps to clear the molten material in the pot or receptacle 17.

Coöperating with the dross guard and clamping straps just explained is a tinning or coating roller 36 keyed on a shaft 37; and adjacent to the opposite ends of this roller are collars 38 and 39, the collar 38 being stationary on the shaft 37 and the collar 39 adjustable to and from the adjacent end of the roller 36. Both collars are circumferentially grooved, as at 40, near their outer ends to receive the upstanding members 30^a of the clamping straps, the collars rotating with the shaft 37 and having threads or corrugations 41 at points inward from the grooves 40 to engage similar threads or corrugations on the horizontal portions 30^b of the clamping straps so as to insure the formation of a tight joint between the straps and collars to prevent leakage of the tinning or coating material above the lower side of the plate or sheet operated upon or receiving the coating on one side thereof. The shaft 37, together with the roller 35 and collars 38 and 39 is vertically movable, suitable rack-bars 43 being attached to the bearings and vertically movable through the top plate 23 on which are disposed pinions 44 held by a shaft 45, which is driven by a hand-wheel 46 to raise and lower the shaft 37, roller 36 and collars 38 and 39.

The shaft 37 with the parts disposed thereon as described, and particularly the roller 36, is elevatable by the racks 43 above the plane of the bed 3 so as to permit the sheet or plate fed over the bed to come fully under the said roller 36 and the collars 38 and 39 prior to a depression of the said plate into the tinning or coating bath. When the shaft carrying the roller 36 and collars 38 and 39 is depressed, the weight of the same and the parts just specified is sufficient to overcome the counterbalancing weighted levers 34 attached to the rods 24; and when the roller 36 and its shaft and cooperating collars are lowered into the dross guard the latter is depressed with the roller 36, shaft 37 and collars 38 and 39, and will be maintained in depressed condition until the weight pressure of the roller 36, shaft 37, and collars 38 and 39 is relieved therefrom, and as soon as this relief ensues the counterbalancing weighted levers 34 will cause the dross guard and clamping straps carried thereby to move upwardly clear of the tinning or coating bath, but the collars 25 will limit the upward movement of the dross guard and clamping straps and hold the latter below the bed 3 to insure an accurate disposition of the plate or sheet to be coated or tinned over the dross guard and clamping straps or between the latter, the roller 36 and the collars 38 and 39.

When the plate or sheet to be tinned or coated is properly positioned between the roller 36, collars 38 and 39 and the dross guard and clamping straps, the shaft 37 with the parts mounted thereon is lowered, thus forcing the metal sheet or plate downwardly therewith into the dross guard and in such position that the opposite side edges thereof will be engaged by the inner opposing ends of the lower horizontal members of the clamping straps and in which position the upper side of the plate or sheet to be tinned or coated is protected and the tinning or coating material is prevented from flowing thereover by the clamping straps.

The under side of the metal sheet or plate will, however, be engaged by the fluid tinning or coating material as soon as the valve 33 is opened, the latter having a lever 33ª for conveniently operating the same. The sheet metal plate when depressed by the shaft 37, roller 36 and collars 38 and 39 into the dross guard and between the clamping straps 29 and 30 will be moved or fed through the dross guard between the clamping straps by rotation of the shaft 37, roller 36, and collars 38 and 39, the direction of movement of the roller being from left to right so as to feed the metal sheet or plate upwardly towards the guide roller 21, and in this upward movement of the coated sheet or plate the surplus tinning or coating material is removed from the plate by a scraper 47 held on a projection 48 attached to or forming part of the tank 17, the said scraper being held in normal position by a spring 49, and is adjustable to and from the dross guard and coated sheet by a stem 47ª, forming part of the scraper, movably held in a slot 48ª in the projection 48, and the stem 47ª is engaged by a clamping hand wheel 49ª. The purpose of adjusting the scraper is to clear the same from contact with the dross guard when necessary. The surplus tinning or coating material scraped from the sheet or plate falls back into the dross guard and the sheet or plate after passing the scraper is engaged with the guide roller 21 and from the latter moves over a tilting table 50 and between wiping brushes 51 disposed above and below an opening 52 in the bed 3, and then passes on through a pair of pulling rollers 53 from whence it is taken in completed condition, or it may be submitted to other treatments, if desired, by other machinery or devices. The tilting table 50 is very effective in properly directing the sheet after it leaves the tinning or coating bath.

It will be understood that the wiping brushes are revolving against the sheet or in a direction reverse to the feeding movement of the sheet and when the first sheet is run through the machine the upper or top brush 51 is raised high enough so that it will not strike the advancing front end of the sheet. The table 50 is tipped up through the medium of the handle 50ª at one end so that the front end of the sheet will not strike the lower brush 51. If the advancing sheet did not strike the lower brush 51 it is obvious that the progress of the sheet would be repelled and result in a doubling up or bending of the sheet. After the sheet is directed between the brushes 51 the upper brush is lowered to bear hard on the sheet so as to cause the bottom brush 51 to effectively wipe the adjacent coated side of the sheet and have a forceful bearing and continuous contact with the said side of the sheet. The brushes 51 are always revolving when a sheet is fed between them, and the upper brush serves as a pressure means to keep the sheet fully in contact with the lower brush. When the sheet is brought down flat on the bed of the machine between the brushes 51, the tilting table 50 assumes its normal position as shown by Fig. 1.

The shaft 9 is provided with a gear 54, as shown by Fig. 6, meshing with a corresponding gear 55 of the upper pulling roller 53, the said shaft 9 directly operating the lower pulling roller. The shaft 9 also has a gear 56 thereon of greater diameter and consequently slower speed than the adjacent gear 54, the said gear 56 meshing with a gear 57 on the shaft of the lower wiping brush 51, the upper wiping brush 51 having a gear 58 of the same dimensions as the gear 57 and meshing with the latter. In view of the difference in dimensions between the gears 56 and 57, the gear 57 being much smaller than the gear 56, the speed of rotation of the brushes 51 is greatly increased as compared to the feed movement of the sheet, and the upper brush 51 operates to hold the sheet down on the bed of the machine for practical engagement with the lower brush 51.

The shaft 37 is rotated by a sprocket wheel 59 engaged by a chain belt 60 also surrounding the sprocket wheel 61 on the end of the shaft of the upper pull roller 53, it being obviously apparent that the shaft 37 may be raised and lowered without interfering with the operating mechanism just explained for the reason that the chain belt 60 will swing on the sprocket wheel 61 after the manner of a fulcrum.

As shown by Fig. 2, the shaft of the lower feed roll, and indicated by 11ª, constitutes the main driving element at the feed end of the machine, the upper roller 5 being geared to the lower roller 5, as at 62. The shaft 11ª also carries thereon a sprocket wheel 63, and the adjacent lower acid roller 15 has its shaft also provided with a sprocket wheel 64, the sprocket wheels 63 and 64 being engaged by a chain belt 55. The remaining roller 15 and the upper roller 13 are geared to the roller 15 carrying the sprocket wheel 64, as at 66. The brushes or brush cylinders 51 and the pulling rollers 53 are provided with suitable gears and hand wheels 67, similar to the gears and hand wheels 16, for raising the upper brush or brush cylinder 51 and pulling roller 53.

In starting the machine it will be understood that a dummy plate or sheet is fed therethrough, and the machine continues to operate until the said dummy plate is engaged by the rollers 53, when the mechanism is stopped and the inner extremity or end of the said plate or sheet is bent upwardly to form a hook-like connecting means. At

this time a second sheet or plate to be coated will have reached and extend across the opening 19 in position to be depressed into the dross guard 28 by the roll 36, and after said plate sheet to be coated is so depressed the scraper 47 will be moved up into engaging position with respect to the said plate or sheet to be coated and at a proper interval a connection will be made between the inner extremity of the dummy plate and the adjacent end of the coated plate. All of the succeeding plates of a given width which are fed into the machine will be connected up in a manner similar to the connection between the dummy plate and the first plate fed thereafter to receive the coating material, care being taken to have the shoulders or edges of the joints uppermost or to present as smooth an under surface as possible to pass the scraper. In other words the joints between the several connected plates or sheets are so disposed as not to form an obstruction with relation to the scraper.

The first pair of rollers 5 and the last pair of rollers 53 have on the top portions of their boxes or bearings a dished spring device 68, one on each box or bearing. The rollers just specified are normally screwed down or brought in such close relation as to effectively feed the plates or sheets interposed there-between, but when any unusual thickness comes between the said rollers, such as the joints of the coupled plates or sheets to be coated, the upper rollers will yield sufficiently through the medium of the dished spring devices 68 to permit the said joints to pass between the said rollers.

The feeding operation will be so conducted that the several sheets to be coated will be disposed regularly over the opening 19 in the bed 3 for engagement with and depression by the roll 36 and collars 38 and 39 into the dross guard and clamping straps or members 29 and 30. When the successive sheets are depressed into the dross guard 28 the opposite side edges thereof will be held tightly between the threads or corrugations of the collars 38 and 39 and the clamping straps or members 29 and 30, as shown by Fig. 4, and by this means the liquid tin or coating material flowing upwardly into the dross guard against the underside of each sheet will be prevented from leaking through the joint thus formed at the side edges of each sheet, and thus provide for coating the several sheets on one side only. The indentations that may be made in the side edges of the sheets by the coacting threads or corrugations and grooves of the collars 38 and 39 and the clamping straps or members 29 and 30 will be so small in actual practice that they will disappear or be rolled out after the sheet has passed through the pulling rollers 53. Furthermore, the side edge portions of the sheet which do not become coated by reason of their engagement and inclosure between the clamping members or straps 29 and 30 and the collars 38 and 39 will be acted upon by the wiping brushes or brush cylinders 51, and the uncoated edge portions of the sheet will be coated by the said brushes drawing out a portion of the moist coating material from the intermediate parts of the sheets which have been fully exposed in the dross guard to the liquid or coating material.

It will be understood that in the operation of coating the several sheets the valve 33 in the bottom or lower central portion of the dross guard will be opened and closed at intervals for obvious reasons.

While the improved machine has been particularly constructed and is adapted to coat metal plates or sheets on one side only, it is possible to adapt the machine for coating sheets on both sides, and for this purpose a suitable acid feeding pipe is arranged in cooperative relation with the upper brush or brush cylinder 13, and the dross guard, together with the clamping straps or members carried thereby, are removed, as well as the rods 24 and counterbalancing levers 34. The most important feature of the invention, however, is the dross guard and its cooperating parts, particularly in view of the well known disadvantages and detriments to coating operations due to the exposure of the sheets or plates to the dross gathering on the melted tin or coating material. It will be seen that the dross guard depresses below the upper level of the liquid tin or coating material at a point to permit the coating material to flow into the guard and be free of any portion of the dross with the material advantage that the coat will be more evenly and regularly applied and a sheet of greater commercial value will be produced.

A particular form of driving mechanism for the several parts has been shown and described, but it will be understood that the mode of gearing up the several rotary elements may be modified at will. It will also be understood that when the successive plates or sheets are brought into proper position over the opening 19 the driving mechanism will be controlled through the medium of the shifting devices specified to cause a cessation of the feed, such stoppage of the feed ensuing at regular intervals when the successive sheets or plates are depressed into the dross guard. Immediately after the several sheets have been properly lowered into the dross guard and the latter moved down, together with the roll 36 within the liquid tin or coating material in the tank or receptacle 17, the feed of the several sheets is again set up.

When the collar 39 and adjacent clamping member or strap 30 are adjusted to compensate for sheets or plates varying in width,

the rods 24 are moved simultaneously with the said clamping member or strap in the slots 26 of the plate 23, and the weighted levers 34 connected to the rods 24 coöperating with the clamping member or strap 30 are likewise adjusted by shifting the fulcrums or supports 35 for the said levers or lever, as the case may be. The shifting of the fulcrum or support 35 just specified may be accomplished in many ways, but will be preferably pursued by loosening the fastening bolts or other means holding the fulcrum or support and moving the latter a distance corresponding to the adjustment of the collar 39 and clamping member or strap 30. These bolts indicated by the numeral 67ª may project through suitable slots 68ª in the top plate 23, as shown by Fig. 3 in dotted lines. It is also obvious that the weighted levers 34 may be of the form shown, or otherwise constructed, there being no limitation as to the exact form of said levers so long as they perform their desired function, and which is to counterbalance the dross guard and clamping straps or members.

Having thus described the invention, what is claimed, is:

1. In a machine of the class specified, a coating receptacle, feeding mechanism, a vertically movable sheet depressing means involving a roll which is rotatable at intervals, and mechanism for rotating the said roll at intervals.

2. In a machine of the class specified, a coating receptacle, feeding mechanism, and vertically movable depressing means consisting of a roll and dross guard.

3. In a machine of the class specified, a coating receptacle, a feeding mechanism, and sheet depressing means consisting of a roll and a valved dross guard.

4. In a machine of the class specified, a coating receptacle, feed mechanism, and a sheet depressing means consisting of a roll and a dross guard having vertical movement, the roll being rotatable at intervals and the sheet moving between the roll and dross guard.

5. In a machine of the class specified, a table, a coating receptacle for treating metal sheets depending below the table, a rotatable roll depressible through the table into the receptacle for bringing successive sheets into contact with the coating material in the receptacle, the sheets being movable longitudinally over the table and in contact with the latter, and mechanism for positively rotating the roll while depressed into the receptacle to feed the sheets engaged thereby.

6. In a machine of the class specified, a receptacle containing coating material, an elevatable and depressible roll coöperating with the receptacle, and adjustable means in operative relation to the said roll for accommodating sheets of different widths.

7. In a machine of the class specified, a receptacle for coating material, a vertically movable sheet depressing roll coöperating with the said receptacle, and a vertically movable dross guard to coact with the roll, the roll and dross guard being elevatable to different heights with relation to the receptacle.

8. In a machine of the class specified, a receptacle for containing coating material, an elevatable and depressible roll coöperating with the receptacle, and an automatically elevating dross guard coacting with the roll.

9. In a machine of the class specified, a receptacle for containing coating material, an elevatable and depressible roll coöperating with the receptacle, and a vertically movably dross guard coacting with the roll and having a valve in its lower portion.

10. In a machine of the class specified, a receptacle for coating material, an elevatable and depressible roll for forcing sheets down into the receptacle, a dross guard cooperating with the roll and also having vertical movement, and clamping members movable with the dross guard and coöperating with portions of the roll, the dross guard being provided with means for admitting the coating material in the receptacle to flow thereinto.

11. In a machine of the class specified, the combination of a receptacle for coating material, a vertically movable roll for depressing sheets into the receptacle, collars coöperating with the roll, a vertically movable dross guard coacting with the roll and having a lower valve, and clamping members movable with the dross guard and coöperative with the collars to hold a sheet and prevent the coating material from engaging the upper side of the sheet.

12. In a machine of the class specified, a receptacle for coating material, a vertically movable roll for depressing sheets into the coating material, a vertically movable dross guard coacting with the roll and provided with a lower valved inlet means, and means coöperating with the roll and dross guard for holding individual sheets and preventing the coating material from flowing over the top of the sheet.

13. In a machine of the class specified, a coating receptacle, a vertically movable roll for depressing sheets into the receptacle, a dross guard carrying clamping members and having a lower valved opening, the dross guard being also vertically movable, collars arranged adjacent to opposite extremities of the roll, one of the collars being adjustable, clamping members carried by the dross guard and coacting with the collars, one of the clamping members being adjustable, and means for raising and lowering the roll, collars, and the dross guard.

14. In a machine of the class specified, a coating receptacle, a vertically movable roll for depressing sheets into the receptacle, a dross guard having a vertical movement and also provided with a lower valved opening, means for limiting the upward movement of the dross guard, and means for raising and lowering the roll.

15. In a machine of the class specified, a coating receptacle, an elevatable and depressible roll coöperating with the receptacle, a vertically movable dross guard coacting with the roll and having a lower valved opening, the dross guard being depressed by the roll when the latter is moved downwardly, and means for operating the roll.

16. In a machine of the class specified, a coating receptacle, an elevatable and depressible roll coöperating with the receptacle, and a vertically movable dross guard coacting with the roll and having a valved opening, the dross guard being depressed into the receptacle by the depression of the roll.

17. In a machine of the class specified, an elevatable and depressible roll, a coating receptacle with which the roll coöperates, a vertically movable dross guard coacting with the roll, and counterbalancing weight means connected to the dross guard and operating to automatically elevate the latter when disengaged from the roll, the dross guard being lowered into the receptacle by the depression of the roll against the resistance of the counterbalancing weight means.

18. In a machine of the class specified, an elevatable and depressible roll, a coating receptacle with which the roll coöperates, a vertically movable dross guard coacting with the roll, and means coöperating with the roll and in part carried by the dross guard for preventing the coating material engaging the upper side of a sheet depressed by the roll into the dross guard.

19. In a machine of the class specified, a coating receptacle, sheet feeding, acid applying and wiping devices, a sheet depressing roll movably disposed over the receptacle, a dross guard vertically movable with relation to the receptacle and coacting with the roll, the dross guard being provided with a valved opening, and means for operating the roll and dross guard.

20. In a machine of the class specified, a coating receptacle, a vertically movable shaft carrying a roll and collars and disposed over the said receptacle, and means for raising and lowering and for rotating the shaft and the roll and collars on the latter.

21. In a machine of the class specified, a coating receptacle, a vertically movable shaft carrying a roll and disposed over and depressible into the said receptacle, the shaft and roll also being elevatable above the receptacle, rack bars connected to the shaft, means for operating the rack bars to raise and lower the shaft and roll, and means for positively rotating the shaft and roll at intervals to impart a feeding movement to the latter.

22. In a machine of the class specified, a coating receptacle and a vertically movable sheet engaging roll disposed over and depressible into the receptacle and provided with means for giving it a positive rotating feeding movement while in the receptacle.

23. In a machine of the class specified, a coating receptacle, a scraper movably held adjacent to said coating receptacle, feeding, acid applying and wiping devices, and means over the receptacle for depressing a sheet, the sheet when depressed being in operative adjacency to the scraper.

24. In a machine of the class described, means for coating a sheet, a tilting table, and wiping brushes adjacent to said table.

25. In a machine of the class specified, the combination with means for coating a sheet, of sheet feeding means, a tilting table, and wiping means adjacent to the tilting table.

26. In a machine of the class specified, a coating receptacle, sheet depressing means and clamping devices carried by and movable with the said sheet depressing means.

27. In a machine of the class specified, a coating receptacle, sheet depressing means, and sheet engaging devices carried by and vertically movable with the sheet depressing means.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES C. ROBERTS.

Witnesses:
AUSTIN P. KIRKHAM,
WILLIAM H. JACKLIN.