No. 780,383. PATENTED JAN. 17, 1905.

C. C. ROBERTS.

TINNING MACHINE.

APPLICATION FILED MAR. 16, 1904.

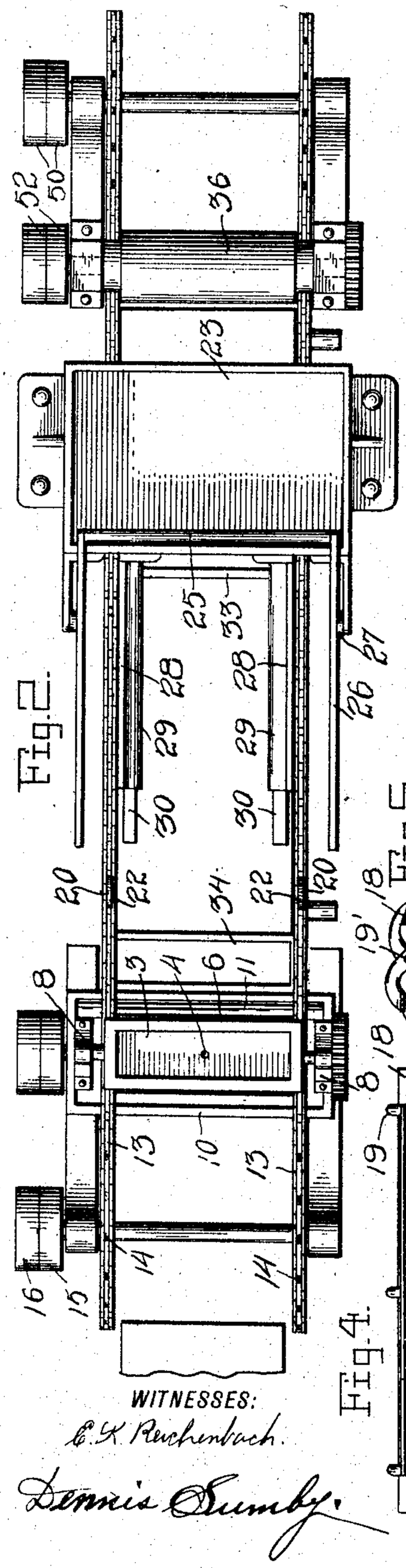

Fig. 2.

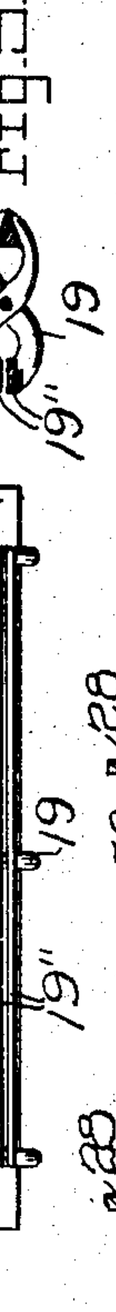

Fig. 5.

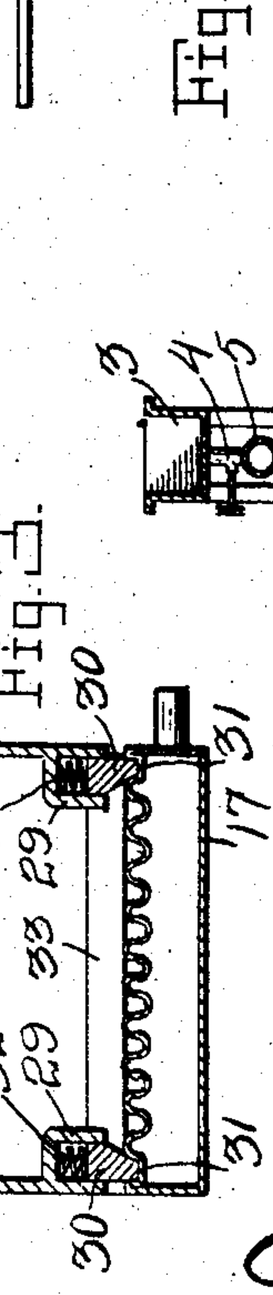

Fig. 4.

Fig. 1.

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No. 780,383. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

CHARLES C. ROBERTS, OF ANSONIA, CONNECTICUT.

TINNING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 780,383, dated January 17, 1905.

Application filed March 16, 1904. Serial No. 198,414.

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-Machines, of which the following is a specification.

This invention relates to tinning-machines. While I have thus designated the invention, this should not be considered in any sense as a limitation, for that particular embodiment of the invention which I have selected for illustration in the accompanying drawings, forming a part of this specification, and hereinafter more fully described, may be in whole or in part used with facility in other connections. For example, while I shall describe the machine as organized for coating sheets of material with tin, it is obvious that said machine can be utilized for coating other kinds of articles with other substances. Said machine, hereinafter described, is simple in construction, compact, and uniformly and quickly coats sheets with the desired material without an unnecessary waste of material, thereby assuring economy.

The improved machine embodies other objects and advantages which, with the foregoing, will be hereinafter set forth at length, while what I consider to be novel will be embraced in the claims succeeding the following description. It will of course be understood that divers changes respecting the disposition and character of the parts, as well as features of a kindred nature, may be adopted within the scope of my said claims.

Referring to the drawings, Figure 1 is a sectional side elevation of a tinning-machine involving my invention. Fig. 2 is a plan view of the same. Fig. 3 is a transverse sectional elevation, the section being taken through the heating-table. Fig. 4 is an elevation of the plate-holding means. Fig. 5 is a cross-sectional elevation of the same. Fig. 6 is a detail in elevation of a portion of one of the feed-chains.

Like characters refer to like parts throughout the several views.

The framework for carrying the different parts of the machine may be of any desirable character. That represented is denoted in a general way by 2.

As previously indicated, the machine will be described as adapted for tinning, and where I employ the terms "tinning-tank" and "acid-tank" in the present instance these terms should not be accepted in a limited sense, for I intend that they should each have a generic meaning, as the tank which contains the tinning material may contain any other liquid material for coating a plate or equivalent, while it is not essential that the so-called "acid-tank" should contain acid, for it may contain a flux or other substance. The so-called "acid-tank" is denoted by 3, and it is located at or near the head end of the machine, being shown as suitably supported above the sheet to be coated. From the under side or bottom of the tank depends a valved tube or pipe section 4, with the lower terminal portion of which the acid-supply pipe 5 is connected. The lower portion of the supply-pipe 5, which extends across the machine, is perforated to assure the jetting or spraying of the acid gravitating from the tank 3 onto acid-applying means, hereinafter described, when the valve in the tube or pipe section 4 is open.

The acid-applying means includes in its construction a roll 6, located above a roll 7, the shafts of the two rolls being intergeared to effect the movement of said rolls in unison, at which times their peripheries travel in contact. One of the rolls is power-driven, as will hereinafter appear, whereby the simultaneous operation of both of them can be effected. Bearings for the shaft of the upper roll are vertically slidable in the slotted uprights, as 8, mounted on and constituting, in fact, a part of the framework 2, springs, as 9, bearing against the bearings of said upper shaft and also against the tops of the respective slotted uprights 8 to normally hold the upper roll in contact with the companion roll. The lower roll is submerged or runs in the water contained in a tank 10, mounted on the framework 2, which water keeps the periphery of the lower roll in a clean condition. Any acid that may adhere to the periphery of said

lower roll is scraped or removed therefrom by a scraper 11, consisting of a plate pivotally mounted in the water-tank 10 and the lip or free edge of which is held in contact with the periphery of the water-roll 7 by means of a spring or springs, as 12, pressing against the plate.

In Fig. 1 I have indicated by arrows the direction of rotation of the coöperating-rolls 6 and 7, it being understood from the foregoing description that the upper one is yieldingly mounted—that is to say, it can recede from its companion roll—and this recession is brought about, as will hereinafter appear, upon the movement of the plate to be coated. As soon as the upward thrust is removed from the upper roll the latter is instantly returned to its primary position by the springs 9.

The sheets of material are successively advanced through the machine to be brought under the action of the acid-applying and tinning means, the latter to be hereinafter described, and the mechanism shown for advancing the sheets will now be set forth. Said mechanism involves two belts 13, shown as chains of flexibly-connected links, the belts or chains being passed around the band or sprocket wheels 14, the shafts of which are shown as rotatively mounted near the opposite ends of the framework 2. Two belts or chains 13 are illustrated, they being arranged in parallelism and separated or spaced sufficiently to perform the particular work desired. The shaft carrying the two head sprocket-wheels 14 is power-driven in some suitable way, as by means of a pulley 15, fast on said shaft and running beside a second pulley 16, loose on said shaft. A belt (not shown) running from a suitable motor is adapted to rotate the pulley 15, and thereby the feed chains or belts 13, through the intermediate connections. On shipping the belt to the loose pulley the motion of the chains will be stopped, and vice versa.

The upper runs of the belts or chains 13 are angular to the horizontal, and the angular position agrees approximately with that of the heating-table 17, over the upper side of which the sheets of material to be coated are drawn. The inclined heating-table is hollow and may be heated in any desirable way—for example, by means of steam supplied to and exhausted therefrom in any desirable way. By running the plates along and in contact or substantially in contact with the heating-table the stock is heated to such an extent that there is less liability of the molten metal applied to the surface to be coated spattering than if the sheet were cool. The stock or sheets may or may not, as desired, be heated prior to the application of acid thereto. The sheets are successively drawn through the machine over and in contact with the heating-table 17 by power derived from the traveling belts or chains 13, holding means for a plate, a suitable form of which will be hereinafter described, being detachably connected to the said belts or chains. Said holding means includes an elongated bar 18, the ends of which are suitably detachably connected with alined links in the respective belts or chains 13. This bar 18 coöperates with a plurality of crossed levers 19, arranged in coöperating pairs and each pair presenting a tong-like structure. There may be any desirable number of pairs of such crossed levers, they being represented as having a common pivot 19′. The jaws or plate-gripping portions of these crossed levers are furnished with plates 19″, corrugated on their adjacent surfaces and fastened in place in any desirable manner. The plates 19″ are of a length equaling approximately the width of a plate gripped between the same. The plates 19″, it will be perceived, are carried by what might be properly considered the rear arms of the several levers, the forward arms of the levers being adapted to straddle the bar 18, which is shown as being of wedge form in cross-section and the ends of which, it will be remembered, are detachably connected with alined links of the feed-chains 13, so that when the holding means is drawn through the machine the wedge-like bar 18 will close the working portions of the several levers firmly against the plate to be tinned.

The advancing means proper for the plate-holding means is shown as consisting of two of the links in the belts or chains 13, each of which links I will denote by 20. The said links 20, which extend when on the upper runs of the belts above the other links, have slots or notches 21, constituting seats to receive the opposite reduced ends of the bar 18, this construction of course constituting a detachable union between said plate-holding means and carrier or feed chains. The two slotted links 20, it will be seen, have cam portions 22, the faces of which are adapted to engage the upper roll 6 in order to lift the same and permit the proper feed of the plate through the machine, while the said cam portions perform a like office with respect to the upper of two rolls hereinafter described.

The tinning-tank is denoted by 23, the tin in the same being kept in a molten condition by means of a suitable furnace, gas-burner, or other agent. This tinning-tank is illustrated as supported by the framework of the machine, although it may, if desired, be suspended from overhead. It is equipped with a depending nozzle or supply-tube 24, controlled by a valve 25, having an elongated stem rising therefrom and connected at its upper end to one terminal portion of the yoke-shaped hand-lever 26, fulcrumed by linkage means 27 upon brackets or arms extending toward the front of the machine on the said tinning-tank. By lowering the front end of said hand-lever 26 the valve 25 will be opened to permit the molten tin to pass from the tank by way of

the nozzle 24 onto the advance end of the sheet of material connected with the plate-holding means or cross-bar 18.

The vertically-disposed plates 28 are connected to the opposite forward sides of the tinning-tank 23 and extend forward therefrom, said plates 28 being illustrated as having on their inner sides and practically coextensive therewith the flanges 29 of substantially angular form in cross-section, the spaces between the plates and the vertical portion of the respective flanges serving as a channel to receive the guides 30 for the plate. The inner or effective portions of the respective guides are of beveled form, the same sloping downward and outward from near the top toward the bottom thereof. The bottoms of the guides fit in channels 31 in the upper side of the inclined heating feed-table 17. The tops of the two guides receive the thrusts of springs, as 32, the upper portions of which act against the horizontal sections of the two flanges 29, the springs forcing the guides 30 normally in a downward direction with their lower ends into the channels 31. The rear portions of the two guides 30 are connected by a cross-bar 33, the whole structure being, in effect, of yoke form and the cross-bar serving as a scraper for the leading or forward edge of the plate, said scraper or cross-bar being adapted to engage the upper surface of the tinned plate in order to remove any surplus tin therefrom, which flows down the inclined plate and into a trough 34, shown as removably mounted at the entering end of the table 17. This trough at intervals can be dismounted in order to discharge an accumulation of tinning material into the tank 23 and can afterward be mounted in its operative position. The top of the trough of course is slightly below the plane of movement of the traveling plate, so that the proper action of said plate will not be affected. Not only does the trough catch the surplus tin that may be scraped from the plate by the scraper 33, but it also receives any other of the molten metal that may run from the plate or table, the latter, it being remembered, having been set forth as inclined, and naturally the same disposition of the plate ensues. The upper side of the feed-table is represented as being of corrugated form, so as to reduce to the lowest possible extent the friction between the table and the plate as the latter advances in contact with the former.

To tin a sheet, the following procedure will be adopted: Initially the opposite ends of the rod 18 will be introduced in the notches or slots of two alined cam-links 20 and the forward arms of the levers 19 straddling the said bar, and a sheet to be tinned being between the two gripping-plates 19″ said bar 18 on the movement of the upper run of the feed-chains in a forward direction will cause the rear arms of the several levers 19, through the coacting plates 19″, to firmly grip the sheet between the same. At the commencement of operation the cam-links 20 will be in front of the two rolls 6 and 7, and naturally the same applies to the leading edge of the sheet or stock. The feed belts or chains 13 will then be started by shifting the driving-belt (not shown) from the loose pulley 16 onto the fast pulley 15, whereby the upper runs of the belts will be advanced to carry the sheet through the machine. As the working portions of the cam-links engage the upper or acid-applying roll 6 the latter is lifted thereby, so as to provide for the passage of the said links and sheet. The moment that the said cam-links pass free of the said upper roll the latter by its springs 9 is immediately thrust downward and in contact with the upper surface of the sheet. Upon the attachment of the plate or sheet holding means to the cam-links the valve in the tube 4 is opened to permit the gravitation of acid from the tank 3 through said tube to the supply-pipe 5, from which pipe the acid is jetted or sprayed to the roll 6, which roll when it rotates applies the acid to the upper surface of the moving shaft or plate to put the plate in proper condition to receive the tin—that is, so that the latter will adhere to said plate when applied thereto. At the point that the forward end of the plates reaches the nozzle 24 the valve 25 is opened by the manipulation of the hand-lever 26, so as to permit the molten metal from the tank 23 to leave the same and fall upon the plate, the metal traveling down the inclined plate to effectually cover the latter and any surplus passing into the trough 34. The forward ends of the guides 30 are shown as beveled in a forward upward direction upon their under sides, so that the bar 18 can start under said guides and elevate the same, the springs 32 subsequently pressing the guides downward into solid contact with the bar. When the plate has moved a certain distance, the side edges thereof strike the inclined faces 35 of the guides 30 and remain in contact with said inclined faces while the tin is being applied thereto and while the scraper 33 is exercising its function. The guides 30 prevent side flow of the material from the plate and also hold the latter in a flat condition in order to assure the proper distribution of the tinning material upon the upper surface of the plate. When the forward portion of the plate comes opposite the nozzle 24, the movement of the two belts 13 is stopped, after which the valve 26 is opened. Upon the opening of the valve the belts are started and the valve remains open until the tail or last end of the plate or sheet has passed the scraper 33, at which point the valve is closed. It will be found that when the rear end of the plate passes the scraper 33 the tin will be found to be applied to the upper surface of the plate in a uniform manner and that there will be no waste of the tinning ma-

terial and that the latter when applied to the sheet will not spatter. During the rotation of the upper roll 6 it of course applies the acid to the plate, the latter at this time moving, while the lower roll will be washed free of acid by the water in the tank 10, such object being aided by the spring-controlled scraper 11. After the sheet is tinned the upper surface thereof is brought under the action of a brush-roll, as 36, intergeared with and located above a guide-roll 37, the line of contact of the two rolls being substantially in the plane of the upper side of the two feed-chains 13. The periphery of the brush-roll may be clothed or covered with brushes or the like, and said roll is yieldingly held downward by means of springs, as 38, mounted and operating exactly like the springs 9 hereinbefore described. The periphery of the brush-roll engages the upper surface of the coated plate in order to thoroughly wipe and dry said plate. The said wiping and drying or brush roll 36 is yieldingly mounted and is elevated at the proper point by means of the cam-links 20.

After the feed-belts 13 have been started subsequent to the completion of the tinning operation the sheet is advanced through the machine, and when the cam-links 20 strike the roll 36 the latter will be elevated, and as soon as the cam-links pass out of contact therewith the said roll will be lowered by means of the springs 38, so as to bring the periphery of said roll, which at this point is rotating, into contact with the upper tinned surface of a plate in order, as previously expressed, to effectually dry the said tinned or coated surface.

In conjunction with the feed chains or belts 13 I provide what may be termed "feeding-out" chains 39, running on sprocket-wheels, as 40, only two of which, or the forward ones, are represented. The feeding-out chains 39 are driven, as will hereinafter appear, at a higher rate of speed than the feed-chains, and their links are equipped with hooks 41. The feeding-out chains 39 are not spaced apart as far as the feed-chains, by reason of which the hooks on the links thereof can engage under the bar 18, constituting part of the plate-holding means, when said bar is near the end of the machine. The feeding-out chains operate at a greater velocity than the feed-chains in order to assure the proper separation of the plate-holding means from the feed-chains. The entering end of the feeding-out means, consisting of the two chains, is situated at and above the discharge end of the feed means, consisting of the two chains 13. When the bar 18 comes within the range of action of two alined hooks 41, said hooks will engage under the bar in order to pull the opposite ends of the same from the slots 21. Therefore it will be evident that the feeding-out chains wholly separate the plate-holding means from the feed-chains, and as the feeding-out chains rotate at an accelerated speed with respect to the feed-chains there is no possibility of the stock buckling.

The plates are discharged by the feeding-out chains 39 onto the upper side of the storage-table 42, from which they can be removed by attendants.

I have described the machine as having coated only one side of a plate. After one side is coated the plate may be run through the machine to have its other side coated.

The shaft of the feed-chains and the front shaft of the feeding-out chains are shown as provided with pulleys, each denoted by 50, suitably fixed thereon, the lower pulley being of greater diameter than the upper one, which pulleys are adapted to be connected by a belt, as 51, whereby a differential speed of the two chains can be secured.

The rolls 6 and 7, it will be remembered, are intergeared, while the same applies to the rolls 36 and 37, the shaft of the lower roll in each case being provided with fast and loose pulleys, each denoted by 52. By running a belt on the pulleys 52 the lower rolls in each case can be driven, whereby the coöperating upper roll will be rotated through the agency of the intermeshing gears.

The machine is simple and effective, is compact, and thoroughly and evenly coats the plates or sheets, and by reason of the fact that the tin is drawn from the bottom of the tinning-pot, the precipitation of dirt and dross from the tank onto the plate is avoided, as said objectionable matter invariably accumulates on the top of the molten tin.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, the combination with a roll for coating a plate with a suitable fluid, of feed-belts provided with cams for actuating said roll in a direction to permit the movement of the feed-belts, and plate-holding means connected with said belts.

2. In an apparatus of the class described, the combination with a roll for coating a plate with a suitable fluid, of feed-belts provided with cams for actuating said roll in a direction to permit the movement of the feed-belts, and plate-holding means connected with the cams.

3. In an apparatus of the class described, the combination with a roll for coating a plate with a suitable fluid, of feed-belts provided with cams for actuating said roll in a direction to permit the movement of the feed-belts, and plate-holding means removably connected with the belts.

4. In an apparatus of the class described, the combination with a pair of superposed rolls, one of which is yieldingly mounted, of feed mechanism provided with sheet-holding

means and also having means for actuating the movably-mounted roll to permit the passage between the rolls of said sheet-holding means.

5. In an apparatus of the class described, the combination of an inclined heating-table, means for moving a sheet across said table, and a tank to contain a coating material, located in a plane above the table and having means for delivering such material onto the sheet.

6. In an apparatus of the class described, the combination of an inclined heating-table, means for drawing a plate across the table, a tank above the table for containing a coating material for the plate and having a valve to control the discharge of such material, and means for catching excess coating material passing from the plate.

7. In an apparatus of the class described, the combination of a heating-table, means for drawing a sheet of material across said heating-table, a tank located above the table, having a valve-controlled outlet for delivering material onto the sheet, and manually-controlled means for operating said valve.

8. In an apparatus of the class described, the combination of an inclined heating-table, means for drawing a plate across the table, means for applying tinning material to the plate, and means to prevent side flow of the material from the plate.

9. In an apparatus of the class described, the combination of an inclined heating-table, means for drawing a plate across the heating-table, a tank situated above and substantially at the head end of the table, adapted to contain a coating material and having means for supplying such material to said plate, and means at the opposite end of the table for catching the surplus material from said plate.

10. In an apparatus of the class described, the combination of means for feeding a plate, means for causing the plate to assume an inclination at a predetermined point, means for applying a coating material to the plate while in its inclined position, means for scraping said plate and means arranged to catch the surplus material passing off the rear end of the plate.

11. In an apparatus of the class described, the combination of an inclined heating-table, means for drawing a plate across the same, means for applying a coating material to the plate, and yieldable guide means for the plate for engaging the side edges thereof.

12. In an apparatus of the class described, the combination of an inclined heating-table, means for drawing a plate across said table, a tank situated above the table for containing a coating material and having means for supplying such material to the plate, guide means for engaging the side edges of the plate, a scraper for scraping the coated surface of the plate as the same is advanced, and means for catching the surplus material removed from the plate.

13. In an apparatus of the class described, the combination with a yieldingly-mounted acid-applying roll, of mechanism provided with sheet-holding means and also having means for actuating said acid-applying roll to permit the passage of the sheet-holding means, means for applying molten material to the sheet, and means for effecting the separation of the sheet from the feed means.

14. In an apparatus of the class described, the combination of acid-applying and brush rolls, each yieldingly mounted, feed mechanism provided with sheet-holding means and with means for actuating the two rolls to permit the passage of the feed mechanism, and means for applying a coating material to the sheet at a point between the rolls.

15. In an apparatus of the class described, the combination of acid-applying and brush rolls, each yieldingly mounted, feed mechanism provided with sheet-holding means and with means for actuating the two rolls to permit the passage of the feed mechanism, means for applying a coating material to the plate at a point between the rolls, and means for effecting the separation of the sheet from the feed mechanism.

16. In an apparatus of the class described, the combination of a pair of superposed rolls, a water-tank to receive the lower one, the upper one being yieldingly mounted, means for supplying acid to the upper roll and the latter serving to apply acid to a sheet, feed mechanism provided with sheet-holding means, and means for actuating said upper roll to permit the passage of the feed mechanism.

17. In an apparatus of the class described, the combination of a pair of superposed rolls, a water-tank to receive the lower one, the upper one being yieldingly mounted, means for applying acid to the upper roll, feed mechanism provided with sheet-holding means, means for actuating said upper roll to permit the passage of the feed mechanism, and means for applying molten material to a sheet after it passes the said rolls.

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

CHARLES C. ROBERTS.

Witnesses:
JOHN W. KELLEY,
WM. MCGIBBON.