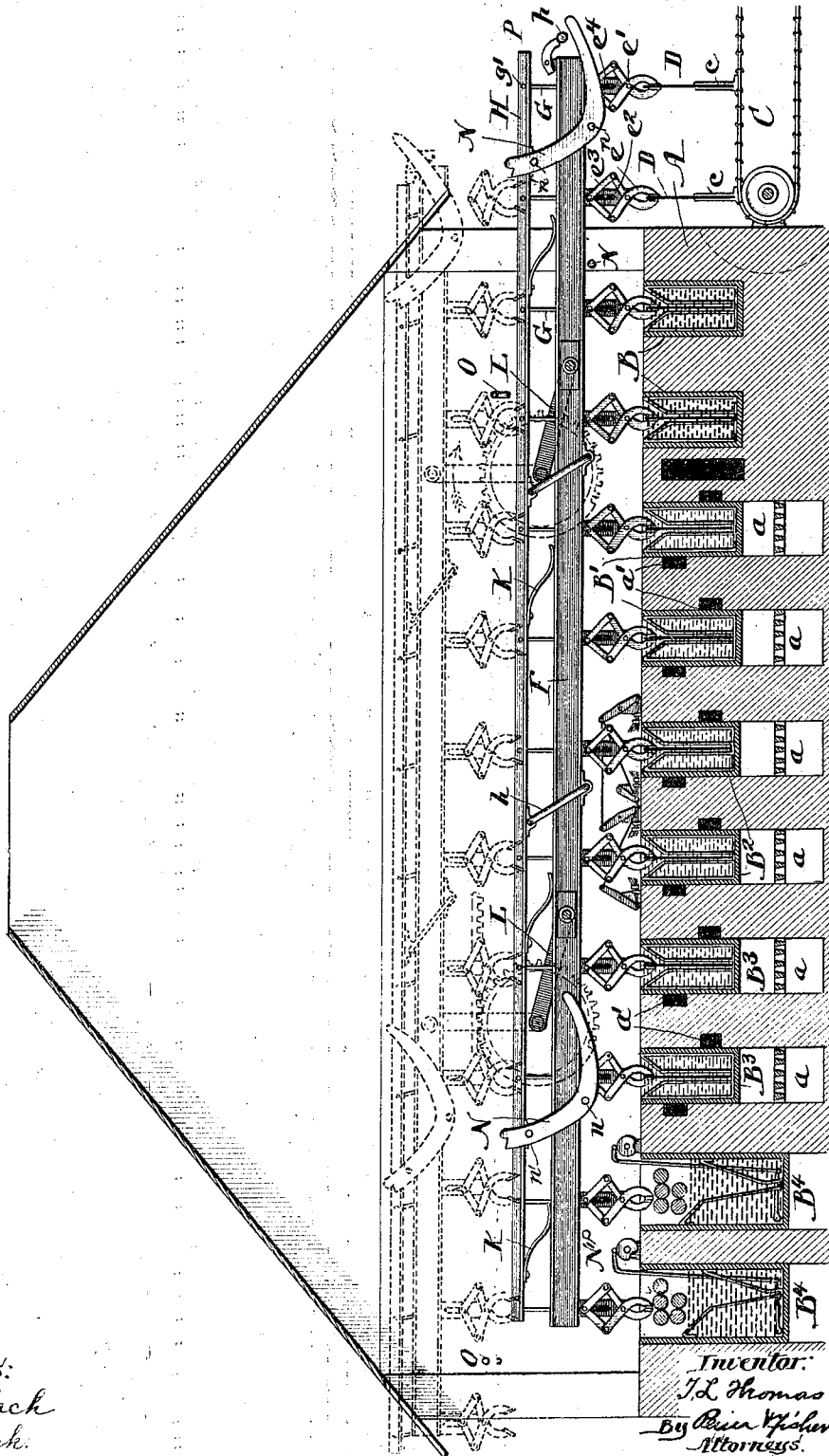


T. L. THOMAS.
APPARATUS FOR COATING METAL PLATES.

No. 527,628.

Patented Oct. 16, 1894.

Fig. 1.



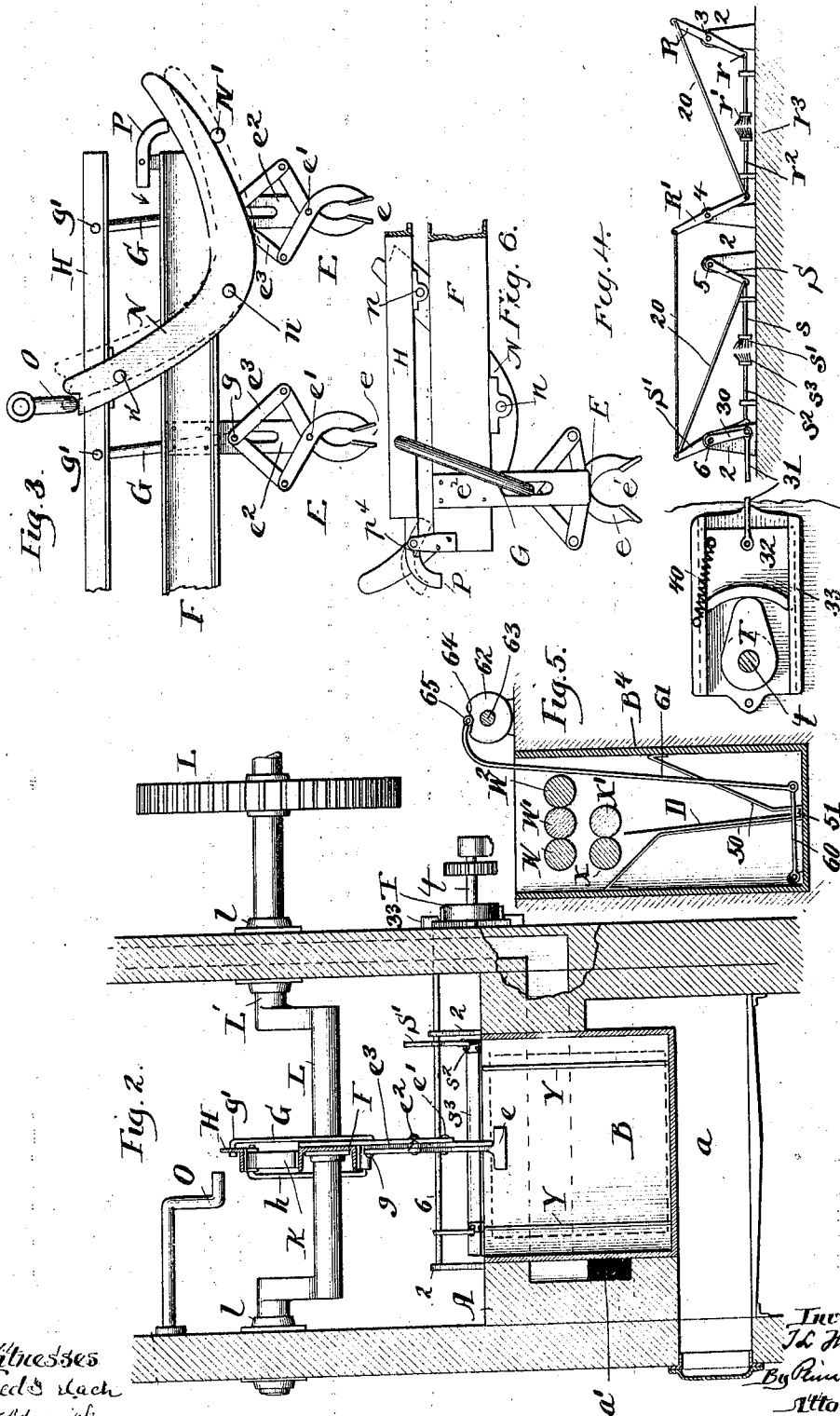
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THEODORE L. THOMAS, OF CHICAGO, ILLINOIS.

APPARATUS FOR COATING METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 527,628, dated October 16, 1894.

Application filed January 31, 1893. Serial No. 480,220. (No model.)

To all whom it may concern:

Be it known that I, THEODORE L. THOMAS, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Apparatus for Coating Metal Plates, of which I do declare the following to be a full and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The process of coating metal plates with tin, as at present commonly practiced, is substantially as follows: The sheets of metal, cut into the desired sizes having been "pickled," annealed and rolled, and again "pickled" and washed, in manner well known to the art, are subjected to a bath of palm oil or melted tallow, and placed in the first bath of tin. Then after proper interval they are plunged in a second bath of tin, after which they have the dross brushed off and are subjected to a third bath of tin from which they are taken and placed into a bath of oil or tallow, and after having been passed between smoothing rolls they are finally cleaned and sorted.

My present invention has for its object to provide mechanism whereby the plates after they have been washed and are in readiness for the first immersion in the oil bath, can be mechanically delivered to and removed from the several baths, and pass between suitable brushes and rolls in readiness for the final cleaning operation. This object of invention I have accomplished by the novel apparatus herein described, illustrated in the accompanying drawings and particularly pointed out in the claims at the end of this specification.

Figure 1, is a view partly in vertical longitudinal section, and partly in side elevation of my improved apparatus. Fig. 2, is an enlarged view in vertical transverse section on line 2—2 of Fig. 1. Fig. 3, is an enlarged detail view in side elevation showing more particularly the mechanism for opening and closing the plate holders. Fig. 4, is a detail view in side elevation of the mechanism for operating the brushes whereby the dross is removed from the plates. Fig. 5, is a view in vertical section through one of the final tin pots. Fig. 6 is a detail side view of the

delivery end portion of the carrier, the releasing bar being shown in engagement with the latch bar for retaining the jaws of the plate holders open.

The series of pots into which will be dipped the plates of metal to be tinned are set in a brick structure A (commonly called the "stow"), the pots containing the liquid tin being mounted upon furnaces *a* from which the products of combustion are carried away by suitable flues *a'* that pass around the furnace walls, and thence to a suitable stack.

In the accompanying drawings I have shown an apparatus adapted to subject two sets of plates simultaneously to each of the steps of the tinning operation, and for this reason, the drawings illustrate the brick work or stow as provided with two pots B that will contain palm oil or like suitable flux, two pots B' that will contain the first tin bath, two pots B² that will contain the second bath, two pots B³ that will contain the third or refined tin bath, and two pots B⁴ containing palm oil, tallow or the like. Adjacent the delivery end of the apparatus will extend a suitable conveyer belt C that will be operated by appropriate mechanism to deliver the plates D, that are to be tinned into position to be received by the plate holders E, the conveyer belt C being provided with suitable arms *c* adapted to retain the plates D in upright position.

When an apparatus having ten pots, is employed, as illustrated in the annexed drawings, there should be twelve plate holders E, and these plate holders will have simultaneous movement imparted thereto by a common carrier frame or beam F to which all the plate holders are connected. Preferably each of the plate holders E consists of creeping jaws *e* that are pivoted, as at *e'* to a bracket *e²* that depends from beneath the carrier beam F and the upper ends of the jaws *e* are united by the toggle links *e³* to the bent end *g* of the shifting rod G; the upper end of this rod being attached as at *g'* to the main shifting bar H. (See Fig. 2.) It will be observed that each of the brackets *e²* is formed with a vertical slot *e⁴* through which passes the end *g* of the shifting rod G, the slot thus permitting the rod G to open and close the jaws of its corresponding plate holder E. The main shifting bar K is united

to the common carrier or beam F by suitable pivot links *b* and is held normally at a distance therefrom by means of the plate springs K that are interposed between the beam F and the bar H, one end of each of these springs being attached to the bar H as shown, or to the beam. The carrier beam F is sustained by the cranks I, the shafts L' of which are journaled in suitable bearings *l* in the side walls of the structure, while the outer ends of the shafts are provided with suitable gear wheels L² by which the desired movement will be imparted thereto.

The operation of the mechanism as thus far defined, will be as follows, it being assumed that the conveyer belt C has delivered two plates D into the position shown in Fig. 1 of the drawings, and that these plates have been grasped by the plate holders E. The gear wheels L² will have revolution imparted thereto in the direction of the double arrows in Fig. 1, thereby turning the shafts L' and their cranks L in such manner as to lift the carrier beam F, and with it, the plate holders E, and the plates D, thereby withdrawing the plates D from the conveyer belt C. As the revolution of the gear wheels L² continues, the carrier beam F will be raised such distance that the plates D will be lifted above the level of the several pots containing the baths into which the plates are to be immersed, and when the beam F is lowered by continued revolution of the shafts L' the plates D will be delivered into the pots B containing the bath of palm oil or like material. It will be understood that while the carrier beam F is being thus lifted, the conveyer belt C will be operated by suitable mechanism so as to deliver new plates D into position to be grasped by the plate holders when the movement of the beam F and the plate holders just described, has been reversed. When the plates D have been delivered into the pots B containing the palm oil (or into either of the other pots), it is necessary that the plates D should be released from the holders, and this releasing of the jaws of the plate holders is effected by the following mechanism: To the beam F is pivotally connected, as at *n*, one or more shifting levers N, the upper end of these levers being pivotally connected as at *n'*, to the releasing bar H. The lower ends of the releasing levers N are so extended, that when these levers are lowered (as shown in Fig. 3) as the beam is moved downward to deposit the plates D into the pots, the ends of the levers N will contact with the releasing pins N' that extend outward from some fixed part of the structure, and the levers N will be caused to rock about their pivot points *n*, thereby forcing the releasing bar H to move nearer to the beam F and consequently causing the releasing rods G to depress the toggle links *e*², and open the jaws *e* of the plate holders. Hence it will be seen that when the plate holders are moved downward so as to deposit the plates into the pots,

their jaws will be opened to release the plate; and when the releasing levers N have been thus rocked about their pivot points, the upper end of each of these levers N will swing beneath the pivoted crank arm O that projects from a fixed part of the structure into the path of its corresponding releasing lever. Consequently, when the revolution of the gear wheels L² is reversed so as to move the plate holders backward, into position to engage the next succeeding plates, the crank arms O will continue to hold the upper ends of the releasing levers and check the rising movement of the releasing bar H, until the carrier beam F so nearly approaches the releasing bar H that the pivoted latch or dog P mounted on the end of the carrier beam F shall pass behind and engage the end of the releasing bar, as shown by dotted line in Fig. 1 of the drawings. It will be understood, of course, that the latch or dog P is pivoted to move from its normal position in the direction shown by the arrow in Fig. 3. The latch or dog P is so pivoted (or is provided with a suitable shoulder *p*⁴), as to limit the downward movement of its longer end in order to present the latch in proper position to engage the end of the releasing bar H as seen in Fig. 6. When the releasing bar H has been thus locked to the carrier beam F by the dog or latch P, the upper end of the releasing levers N will pass from engagement with the pivoted cranks O, and the releasing bar H and the carrier beam F will thus remain locked together, until these parts have moved so far toward the position shown by full lines in Fig. 1, that the free end of the dog or latch P will strike the fixed stop *p* which will turn the dog or latch P about its pivot point until its disengagement from the end of the releasing bar H, thereby permitting the releasing bar to be forced upward by the springs K so as to cause the jaws *e* of the plate holders E to be closed upon the plates D. Hence it will be seen that as the plate holders are moved in forward direction their jaws will securely hold the plates therein, but during the backward movement of the plate holders the jaws will be opened in readiness to engage a new set of plates. It will also be seen that by the first forward movement of the plate holders the two plates, first taken from the carrier belt C, will be delivered into the oil pots B, and that by the succeeding forward movement of the plate holders these two plates will be advanced first into the tin pots B, then into the tin pots B', next into the tin pots B², next into the tin pots B³, next into the oil pots B⁴, and finally these plates will be withdrawn from the apparatus, and it will also be observed that at each forward movement of the plate holders two new plates D will be taken from the carrier belt C and delivered into the oil pots B, whence, by successive steps they will be delivered into the several remaining pots.

In order to remove the dross from the plates

as they are withdrawn from the second set of tin pots, I employ the brushes, and means for operating them, next to be described, reference being had more particularly in Figs. 1, 2, and 4 of the drawings. Upon suitable brackets 2 which rest upon the brick work adjacent the top of the tin pot B² are mounted the shafts 3, 4, 5 and 6. The shaft 3 has fixed thereto a rocking lever R, to the lower end of which is connected a rod r that carries at its opposite end a brush r'. The shaft 4 carries a rocking arm R' to the lower end of which is connected a rod r² that carries at its outer end the brush r². In like manner the shaft 5 has attached thereto a rocking lever S to the lower end of which is connected a rod s carrying a brush s', and the shaft 6 carries the rocking lever S' to the lower end of which is connected the rod s² that carries the brush s². Preferably the several rocking levers are connected together by the pitman rods 20, as shown in order to insure the union movement of these several levers and the brushes. One of the shafts 6 is extended outside its journal bearings, as shown in Fig. 2 and at such point is provided with a crank arm 30 that is connected by the pitman 31, the opposite end of which is attached to a block 32 that is mounted in a slide way 33. (See Fig. 4.) The slide block 32 has a curved end as shown, that will be engaged by an eccentric arm T mounted upon the shaft t suitably geared with the operating mechanism of the apparatus, so that this arm shall move at proper intervals to correspond with the movement of the other parts of the mechanism. A spring 40 connected to the slide block 32 and its guide way 33 serves to hold the block normally in the path of the arm T. The rotation of the shaft t that carries the eccentric arm T will be so timed that the eccentric arm will operate the sliding block 32, and through the intermediate mechanism will close the brushes r', r², s', s², at the instant that the plates are being withdrawn from the tin pots B², and consequently, these brushes will serve to remove the dross from the surface of the plates.

In order to effect the rolling of the metal plates as they are withdrawn from the final oil pots, I provide that the metal plates shall be deposited into the pots at one point and withdrawn therefrom at another point, and to effect this, I employ the mechanism next to be described: Inside the pots B⁴ are arranged the plate guides 50, these guides consisting of wires bent preferably to the shape shown so as to form a flaring mouth to guide the plates into the inclined space or channel 51 and thereby set the plates to one side of the vertical line and in such position that when the plates are lifted they will pass into the bite of the smoothing rollers within the tops of the pots. These rolls preferably consist of the arrangement shown, that is to say, in the top of each of the pots B⁴ there are five rolls, the three upper rolls W, W', W² being arranged above the

lower rolls X and X', and in such position that when the plates of metal are introduced into the pots B⁴, they will descend between rolls W' and W², and will be guided by the rolls 50 into the channels 51 at the base of the pots and when withdrawn, will pass between rolls X and X', W and W'. In order to lift the metal plates out of the guide ways 51 and cause them to pass into the bite of the smoothing rolls X and X', I place at the bottom of each of the oil pots B⁴, a lifting bar 60 pivoted at one end and having its opposite end connected to the lower end of a lifting rod 61, the upper end of which rod is held in contact with the periphery of the cam wheel 62 that is mounted upon a suitably driven shaft 63. The cam wheel 62 has a depression 64 in its periphery and when the end 65 of the lifting rod 61 is within this depression the lifting bar 60 is at the base of the guide way 51; but when the cam wheel 62 is revolved, the rod 61 will be lifted and will raise the metal plate from out the guide way 51 and cause it to pass into the bite of the lower smoothing rolls X and X'. The rolls X, X' and W, W² will be driven by appropriate mechanism as indicated by the arrows Fig. 1, so that when the plates are lifted into the bite of the rolls X and X' they will be delivered by said rolls between the rolls W and W' and into position to be received by the jaws of the final plate holders E.

It will be observed that the two final plate holders serve simply to remove the plates from the final oil pots and deliver them on to the appropriate table (not shown), and it will be seen by reference to Fig. 1 of the drawings that these two final plate holders while occupying the same relative position with respect to each other as do the remaining plate holders of the series, are separated from said remaining plate holders a distance slightly greater than the distance of the other plate holders of the series. The reason for this arrangement is that the two final plate holders are to remove the plates from the final oil pots B⁴ at a different point from that at which the plates are delivered into such pots. The smoothing rolls in the final oil pots B⁴ will serve to smooth the plates, after which they will be rubbed with bran leather, or the like and packed in boxes for shipment.

It will be observed that in each of the several pots of the series, I have provided wire guide frames Y having the flaring mouths to receive the plates as they are delivered into the pots by the plate holders. Inasmuch as the plates are delivered separately into the pots, their entire surfaces will be instantly exposed to the action of the baths and consequently, it is only necessary that they should remain a very short time in the baths.

It will be understood of course, that the mechanism which drives the conveyer belt will have an intermittent motion imparted thereto, and that the mechanism whereby the carrier beam F, the brushes, and the smoothing rolls are operated will be con-

nected by suitable gearing so as to perform their several functions at the proper times.

It is manifest that the precise details of construction above set out, may be varied without departing from the spirit of the invention. Thus for example, instead of duplicate sets of pots and plate holders, these might be arranged in triplicate sets, and so, also, if desired the pots might be broadened and two parallel sets of plate holders might be simultaneously operated. It is obvious also, that instead of employing two sets of smoothing rolls in each of the smoothing pots B⁴, one set of such rolls might be used, and if desired, the rolls W² can be removed entirely.

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

1. In apparatus of the character described, the combination with a series of pots for containing different baths, of a series of plate holders supported above said pots containing different baths and corresponding in arrangement with said series of pots, whereby said series of plate holders may be simultaneously operated to deposit or withdraw plates into or from said pots containing different baths, and suitable mechanism for simultaneously shifting said plate holders to effect the transfer of the metal plates from the different pots into the succeeding pots of the series, substantially as described.

2. In apparatus of the character described, the combination with the plural series of pots for containing different baths, of the plural series of plate holders supported above said pots containing different baths corresponding in arrangement with said series of pots whereby said plate holders may be simultaneously operated to deposit or withdraw the plates into or from said pots and suitable mechanism for simultaneously shifting said plate holders to effect the transfer of the metal plates from the different pots into the succeeding pots in each series, substantially as described.

3. In apparatus of the character described, the combination with a series of individual pots for containing different baths, of a series of plate holders corresponding in arrangement with said series of individual pots whereby said series of plate holders may be simultaneously operated to deposit or withdraw plates into or from said pots, suitable means for connecting said individual plate holders and suitable mechanism for simultaneously lifting, shifting and lowering said plate holders, substantially as described.

4. In apparatus of the character described, the combination with a series of pots for containing different baths, of a series of plate holders supported above and corresponding in arrangement with said series of pots, whereby said series of plate holders may be simultaneously operated to deposit or withdraw plates into or from said pots, and suitable mechanism for shifting said holders back

and forth between said pots to effect the progressive transfer of the metal plates from the different pots to the succeeding pots in the series and means for operating said plate holders to grasp and release the plates, substantially as described.

5. In apparatus of the character described, the combination with a series of individual pots for containing different baths, of a series of plate holders corresponding in arrangement with said series of pots whereby said series of plate holders may be simultaneously operated to deposit or withdraw plates into or from said pots, suitable mechanism for simultaneously shifting said holders to effect the transfer of the metal plates from the different pots to the succeeding pots of the series and mechanism for automatically opening and closing said plate holders to release and grasp the plates, substantially as described.

6. In apparatus of the character described, the combination with a series of pots for containing different baths, of a series of plate holders supported above and corresponding in arrangement with said series of pots whereby said series of plate holders may be simultaneously shifted to deposit or withdraw plates into or from said pots, a common carrier whereto said plate holders are attached and suitable mechanism for shifting said carrier to effect the transfer of the metal plates from the different pots into the succeeding pots in the series, substantially as described.

7. In apparatus of the character described, the combination with a series of equi-distant pots for containing the liquid baths, of a series of plate holders and a common carrier to which said plate holders are connected at distances apart corresponding to the distance between the pots, and mechanism for lifting, shifting and lowering said plate holders, substantially as described.

8. In apparatus of the character described, the combination with a series of pots for containing liquid baths, of a series of plate holders, a common carrier whereto said plate holders are attached, parallel cranks connected to said carrier and mechanism for operating said cranks to shift said carrier and the plate holders carried thereby, substantially as described.

9. In apparatus of the character described, the combination with a series of pots for containing different baths, of a series of plate holders corresponding in arrangement with said series of pots, each of said plate holders comprising two pivoted jaws, a carrier whereto said plate holders are attached, mechanism for shifting said carrier back and forth between the pots and a movable releasing bar connected with the jaws of the plate holders and means for operating said releasing bar in order to open and close the jaws of the plate holders, substantially as described.

10. In apparatus of the character described, the combination with a series of pots for containing the liquid baths, of a series of plate

