J. POWANDA.

MACHINE FOR COATING WITH METAL.

APPLICATION FILED NOV. 1, 1917.

1,289,260.

Patented Dec. 31, 1918.

2 SHEETS—SHEET 1.

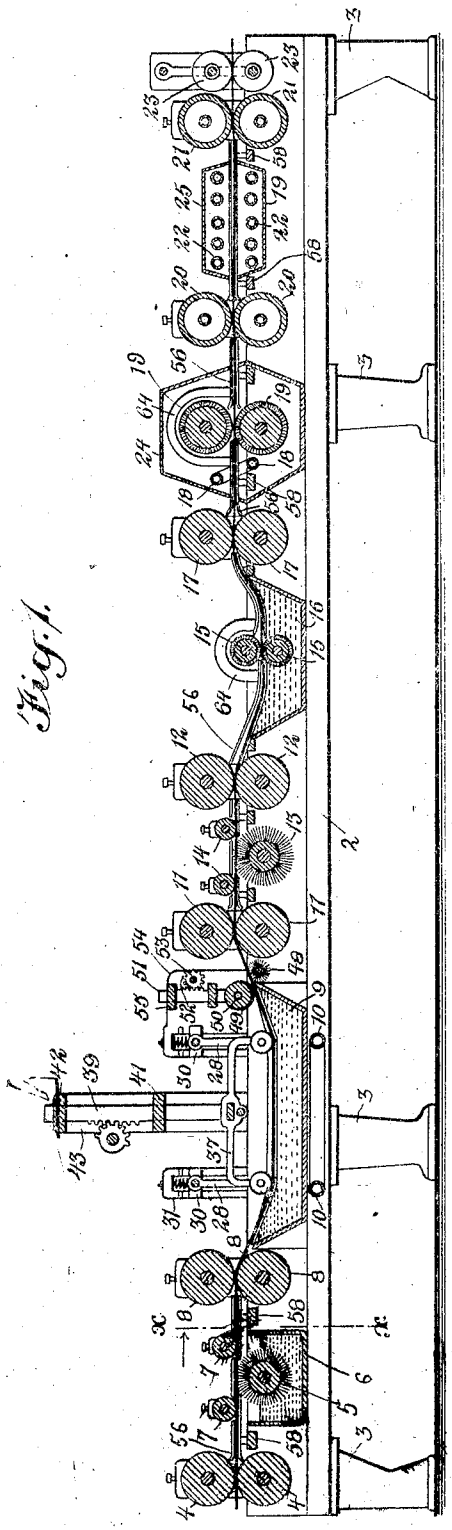


Fig. 1.

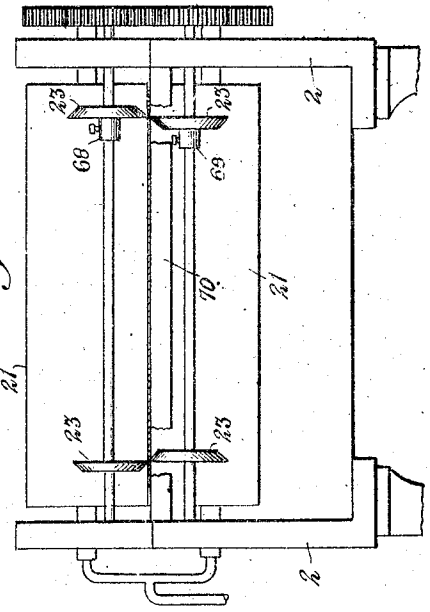


Fig. 6.

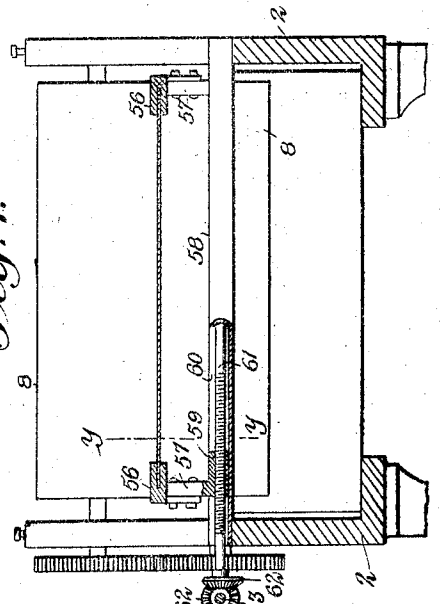


Fig. 4.

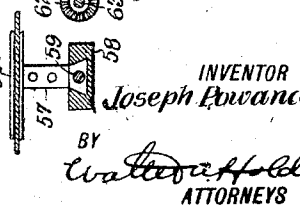


Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 2.

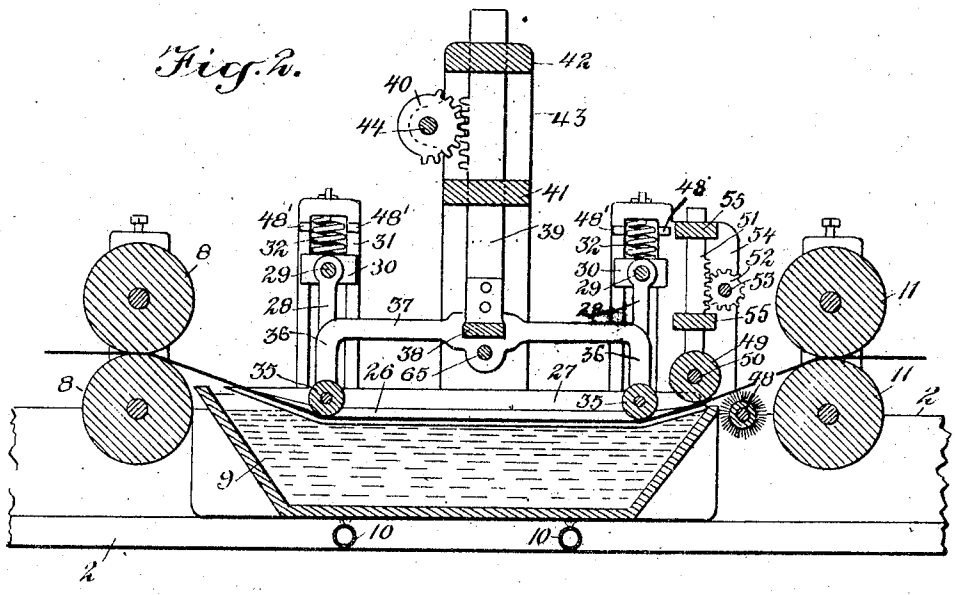
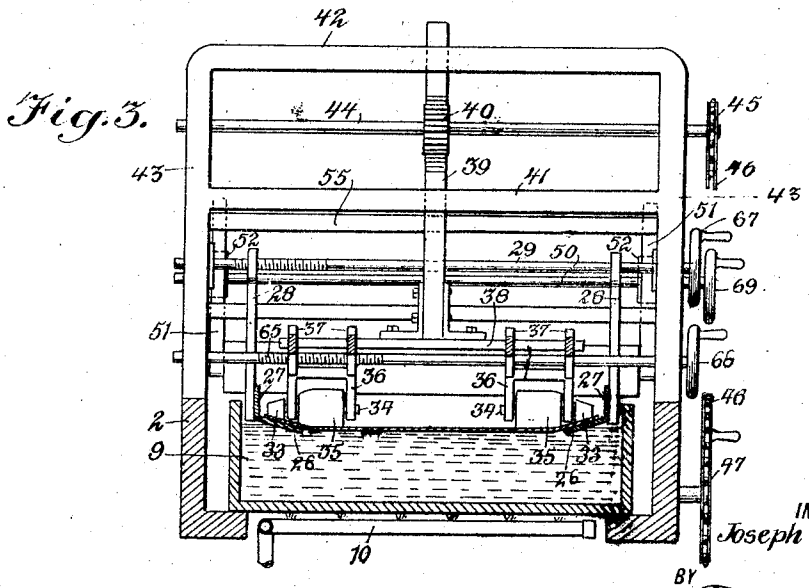


Fig. 3.



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JOSEPH POWANDA, OF ANSONIA, CONNECTICUT.

MACHINE FOR COATING WITH METAL.

1,289,260. Specification of Letters Patent. Patented Dec. 31, 1918.

Application filed November 1, 1917. Serial No. 199,659.

To all whom it may concern.

Be it known that I, JOSEPH POWANDA, a citizen of the United States, residing at Ansonia, in the county of New Haven and State of Connecticut, have invented a certain new and useful Improvement in Machines for Coating with Metal, of which the following is a specification.

My invention relates to machines for coating sheet metal but is particularly devised for tinning sheets on one side although capable of tinning sheets on both sides.

In order that my invention may be better understood by those skilled in the art I have embodied the same in a machine which not only comprises instrumentalities to effect the tinning operation proper, but also a bath for cleaning the opposite side of the sheet and a series of instrumentalities for washing, drying and clipping the edges of the sheet, whereby the machine delivers the sheet in a condition ready for the market, either cut in lengths or reeled in coils. The detail mechanism embodying my invention for tinning the under side of the sheet may not only be utilized in my particular machine but also in tinning machines generally wherever applicable.

In the subjoined description the operation for tinning and finishing the 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.

In the drawings:

Figure 1 is a longitudinal, sectional view of the machine;

Figs. 2 and 3, enlarged longitudinal and transverse sectional views of the mechanism for effecting the tinning operation;

Fig. 4, an enlarged transverse sectional view taken on line x—x in Fig. 1;

Fig. 5, a detail transverse sectional view taken on line y—y in Fig. 4, and

Fig. 6, a detail transverse sectional view of the knives for clipping the edges of the sheet.

The several parts of the machine are mounted in a suitable frame 2 which is supported on legs 3. The front end of the machine is provided with a pair of feed rolls 4, 4 immediately beyond which is an acid brush 5 mounted to revolve in an acid receptacle 6. A pair of rolls 7, 7 serve to hold the sheet in contact with the acid brush. Beyond the acid receptacle 6 is another pair of feed rolls 8, 8 and beyond these feed rolls is a receptacle 9 for the tinning bath in which the tin is kept in a molten condition by the burners 10, 10 located beneath the bath. Beyond the tinning bath are two pair of feed rolls 11, 11 and 12, 12 between which is mounted a wiping brush 13. Beyond the feed rolls 12, 12 is a pair of scouring brushes 15, 15 mounted to revolve within a receptacle 16 for the cleaning bath. Beyond the receptacle 16 is a pair of feed rolls 17, 17 and beyond these feed rolls are the upper and lower water pipes 18, 18 provided with suitable spray nozzles arranged in transverse alinement above and below the path of the sheet. Immediately beyond the spray nozzles is a pair of drying brushes 19, 19 and beyond the drying brushes are two pair of steam-heated rolls 20, 20 and 21, 21 between which are located upper and lower steam coils 22, 22 arranged respectively above and below the path of the sheet. Beyond the steam rolls 21, 21, and arranged on each side of the sheet, is a pair of circular knives 23, 23. The water pipes 18, 18 and drying brushes 19, 19 are suitably inclosed in a housing 24 and the steam coils 22 are suitably inclosed in an oven 25.

The detail structure of my machine in which the tinning operation takes place, is shown in Figs. 2 and 3. This mechanism is mounted on the frame between the feed rolls 8, 8 and 11, 11 respectively. The tinning receptacle 9 is of a width greater than that of the widest sheet to be tinned and suspended over the same are the longitudinally disposed shoes 26, 26 which are deflected upwardly at each extremity so that when their intermediate portions are below the surface of the bath their extremities will project upwardly out of the bath. These shoes, which are inclined downwardly and inwardly toward each other, are provided with side plates 27, 27 which also project upwardly above the surface of the bath and are bolted to hangers 28, 28 carried by shafts 29, 29 journaled in blocks 30, 30 which slide in vertical ways in the standards 31, 31 and which are in turn suspended from the top of the standards by springs 32, 32. Mounted at intervals above the shoes are the gripping rollers 33, 33 carried on the extremities of the shafts 34, 34. These gripping rollers are inclined to conform to the inclination of the shoes 26, 26 and when pressed toward the shoes co-act therewith to grip the edges of

the sheet. Mounted on the shaft 34, 34 between the gripping rollers 33, 33 are the sheet- depressing rollers 35, 35 which may be inclined at their outer extremities if desired to conform to the curvature of the sheet when the body portion of the latter is depressed as shown in Fig. 3. I have only shown two depression rollers but any number may be employed. The shafts 34, 34 are journaled to revolve in the lower extremities of the hangers 36, 36 which depend from the forward and rear extremities of the side arms 37, 37 which latter are carried by the cross beam 38 attached to the lower extremity of the rack 39 which meshes with the pinion 40. The rack 39 passes through bushings in the cross girders 41 and 42, connecting the uprights 43, 43 mounted on the frame 2 of the machine. The pinion 40 is mounted on a shaft 44 journaled in the uprights 43, 43. Mounted on one extremity of the shaft 44 is a sprocket 45 which is connected to the sprocket 46 by the chain 47 whereby the rack and pinion may be operated to raise and lower the gripping rollers 33, 33 and depression rollers 35, 35. When these rollers are depressed they force down the shoes 26, 26 and when they are elevated the shoes, by virtue of the elevating action of the springs 32, 32 follow the rollers out of the bath to a position immediately below the plane of the normal path of the sheet where they are held by the stops 48′, 48′ mounted on the standards 31, 31, while the gripping and depression rollers continue to rise farther upwardly to a position some distance above the path of the sheet. Between the forward end of the tinning receptacle 9 and the feed rollers 11, 11 is mounted a dripping or wiping brush 48 against which the underside of the sheet is pressed by a depression roller 49 mounted on the shaft 50 carried by the lower extremities of the racks 51, 51 which are raised and lowered by the pinion 52 carried by the shaft 53 journaled in the uprights 54, 54 on the side of the frame. The rack 51 passes through bushings in the cross girders 55, 55 connecting the uprights 54, 54.

In tinning machines generally through which a sheet is fed by guiding rolls it has always been necessary when starting the sheet to carry its front edge through the machine by manually manipulated means to prevent the forward edge or head of the sheet from dropping down between the various sets of feed rolls. One way has been devised to carry the head of the sheet from one set of rolls to the other automatically which consists of devices propelled by endless socket chains, which devices carry the forward edge or head of the sheet, a particular instance being shown in the patent granted to C. C. Roberts, Jan. 17, 1905, No. 780,383. Devices of this character necessitate the employment of a complex train of mechanism and also considerable time in attaching the same to and detaching the same from the sheet. I overcome these disadvantages by employing a mechanism which automatically picks up the head of the sheet as it enters the machine and automatically releases the same as it leaves the machine, without the necessity of any attachments or adjustments with the exception of that required in setting the machine generally to different widths of sheets. My preferred form of this mechanism is shown in Figs. 1, 4 and 5, and consists of slotted guideways 56, 56 disposed in the normal plane of the traveling sheet so that the edges of the latter move in the slots. These slotted ways are mounted on standards 57, 57 carried by the cross girders 58 disposed at intervals along the frame of the machine wherever necessary to support the guideways. The standards 57 on the left hand side of the machine are carried by shoes 59 which slide in channels 60 in the girders 58. These shoes 59 are carried by screw threaded rods 61 operated by the bevel gears 62 so that the movement of the shoes 59 and the consequent transverse adjustment of the slotted ways 56 may be regulated from a shaft 63 journaled along the side of the machine as shown in Fig. 4. If desired a transverse adjustment of the ways 56 on the right hand side of the machine may be effected in a like manner. An adjustment of the ways on one side alone, however, is all that is essential to enable them to accommodate different widths of sheets. Since the length of some of the various brushes operating at intervals on the surfaces of the sheet should be equal to the width of the widest sheet, which the machine is to take, it is necessary that the slotted ways be interrupted to enable these brushes to contact with the full width of the sheet especially when the slotted ways are moved inwardly to accommodate narrow sheets. Where the brush operates on one side of the sheet alone as is the case of the fluxing brush 5 the under half of the slotted ways 56 is cut away leaving the upper half to bridge the interval. Where a pair of brushes are employed, however, operating on opposite surfaces of the sheet at the same point, as is the case with the scouring brushes 15, 15 and the drying brushes 19, 19, it is necessary that the ways should be interrupted entirely leaving an opening for both brushes to contact with the side edges of the sheet. In such a case the continuity of the way is preserved by means of bridges 64. With the exception of the interval between the feed rolls 8, 8 and 11, 11 these slotted ways control and maintain the direction of the sheet between all of the feed rolls by picking the same up at a point behind the first

set of rolls and delivering the same at a point close up in front of the succeeding set of rolls. The upper and lower walls of the slots in the ways are flared at their front extremities as shown so that they will present a throat or open lips at points immediately behind each set of feed rolls for the purpose of catching the front edge of the sheet should the latter be swung slightly upwardly or downwardly out of its normal path. In the interval between the feed rolls where it is necessary for the sheet to dip or be depressed downwardly, as is the case when it passes through the cleaning bath in the receptacle 16, the ways may be inclined downwardly and upwardly to guide the sheet into and out of the bath. When this circuitous travel of the sheet is effected by the ways it is sometimes necessary to widen the slots for the purpose of controlling the direction of the sheet as is shown immediately beyond the feed rolls 12, 12. While I have shown these guides for controlling the direction and maintaining the elevation of the head of the sheet as consisting of slotted ways I may employ any other suitable devices which are adapted to engage and control the marginal edges of the sheet in a like manner. When adjusting the ways 56 to accommodate different widths of sheets it is also necessary to likewise adjust the shoes 26 which take the place of the ways in controlling the head of the sheet when it passes over the tinning receptacle. Like the left hand ways 56, the left hand shoes 26 may be adjusted transversely of the machine by means of a screw-threaded shaft 29 passing through the left hand hanger 28. This shaft may be operated by a crank wheel 66 projecting from the right hand side of the machine so that when the shaft is revolved its screw threads operate in the internal screw threads in the hanger after the manner of a worm and gear thereby causing the hanger to advance and recede along the shaft carrying with it the shaft 34 on which is journaled the gripping and depression rollers. The circular knives 23, 23 on the left hand side of the machine may be adjusted transversely by moving the bolted collars 68, 68 to which they are attached.

The operation of my machine is as follows: The front edge of the sheet, which may either be a short sheet of a reeled sheet, is inserted between the first set of feed rolls 4, 4, the machine having first been set for the proper width and the driving mechanism started. The forward edge of the sheet then passes between the slotted guides 56, 56 over the fluxing brush 5 against which it is depressed by the rollers 7, 7 and is finally picked up by the feed rolls 8, 8, the advancing movement of the sheet being now caused by both sets of the feed rolls. The forward edge is then advanced over the forward extremities of the guide shoes 26, 26 which have been raised to a position to receive the sheet as it comes from between the feed rolls 8, 8. The sheet then advances over the tinning receptacle 9, its direction being controlled by the guide shoes until its forward edge is shot over the top of the brush 48 into the feed rolls 11, 11. Without stopping the machine the gripping and depression rollers 33, and 35, which have been held elevated until the sheet is picked up by the feed rolls 11, 11, are then depressed through the medium of the rack 39 and gear 40 by turning the crank sprocket 46 so that the marginal portions of the sheet are warped and held in close engagement with the shoes 26, 26. The gripping and depression rollers are then further lowered, pushing down the guide shoes 26, 26 against the action of the springs 32, 32 in the standards 31, 31 until the inner edge of the shoes is below the surface of the bath, the outer edges remaining above the surface of the bath. In this position it is apparent from reference to Fig. 3 that the side edges of the sheet are held in a position above the surface of the tinning bath while the body portion of the sheet is depressed into the bath so that the bath comes in contact with the under side of the sheet only. In this manner the entire under surface of the sheet, with the exception of a very narrow portion along each marginal edge, is subjected to the action of the bath so that no portion of the tinning solution comes in contact with the top surface of the sheet. The depression roller 49, which has been held elevated above the path of the sheet before this time, is now lowered to a position where it will hold the sheet in contact with the scraping or wiping roll 48, which latter revolves rearwardly, or in a direction opposite to the hands of a clock, so as to throw the surplus tin back into the receptacle 9. The forward end of the sheet then passes from the feed rolls 11, 11 to the feed rolls 12, 12, its side edges passing through the slots in the guideways 56 and its under surface being subjected to the action of the wiping brush 13 against which the sheet is pressed by the pressure rollers 14. 14. The sheet then passes from the feed rolls 12, 12 to the feed rolls 17, 17 between the scouring brushes 15, 15 which operate on both sides of the sheet below the surface of a cyanid of potassium bath. The bath is below the normal plane of travel of the sheet and the slotted guide ways direct the sheet downwardly in front of the scouring brushes and upwardly in the rear of the scouring brushes instead of directing the sheet horizontally above the bath. The sheet is in this manner subjected to a scouring operation which removes any discolorations from its untinned surface. The sheet then passes from the feed rolls 17, 17 to the steam rolls

20, 20 between which sets of rolls it is subjected to the action of the water sprays directed upwardly and downwardly against both surfaces of the sheet from the pipes 18, 18. The sheet is also subjected to the action of the drying brushes 19, 19 which also act on both surfaces of the sheet. The sheet then passes from the steam rolls 20, 20 to the steam rolls 21, 21 between the upper and lower coils 22 in the oven 24 and thereby becomes thoroughly dried. The sheet then passes from the steam rolls 21, 21 to the circular knives 23, 23 which clip off the marginal edges. The sheet is then delivered to a table 70 or to a reel according to the manner desired.

In order to practically tin sheet metal by means of a bath it is essential that the temperature of the sheet should be raised to a point near to that of the bath before it leaves the bath and that this temperature should be maintained until the wiping of the sheet has been effected, for if the temperature of the sheet is considerably lower than that of the bath, or in other words if it is attempted to tin a cold sheet, the sheet will pick up dross from the surface of the bath and will cool the coating of tin and destroy the effect of the wiping operation. In my machine I am enabled to raise the temperature of the sheet to the desired degree by prolonging its travel through the bath, that is, instead of the sheet traveling around a large single drum into and out of the bath I provide a series of rollers spaced at intervals, the number of which can be increased or decreased as desired, which rollers give the sheet a travel through the bath in a horizontal direction for any distance desired and in this manner the sheet may be kept in contact with the bath for a sufficient period to enable it to approach the temperature of the bath. In this manner I eliminate the accumulation of dross on the sheet and permit the wiping brushes to effect a proper distribution of the tin after the sheet leaves the bath. This is a very important feature of my invention since ordinarily the running of a relatively cold sheet into and out of a bath, without provision being made for raising the temperature of the sheet, turns out an imperfect product. The heating of the sheet due to its contact with the bath causes a discoloration of its untinned surface and to remove this discoloration I employ a bath of cyanid of potassium, or any other suitable character of bath for the same purpose. I prefer, however, a bath of cyanid of potassium since the latter not only effectively removes the discoloration but does not affect the tinned surface, thereby enabling the sheet to be immersed within the bath while subjected to the action of the scouring brushes. The water sprays effectively wash the cyanid bath off the surfaces of the sheet. For the purpose of thoroughly drying the sheet I employ an oven, but I am enabled to reduce the length of this oven by making the guide rolls between which the oven is disposed in the form of steam rolls so that the sheet has three successive heating operations. The shearing knives are arranged to clip off the marginal edges of the sheet which are imperfectly tinned on account of being gripped between the rollers and shoes during the tinning operation.

It should be noticed that in my machine all the necessary operations are performed which are incident to the tinning of the sheet so that it is not necessary, as is the custom, to employ different machines for performing these operations, and where it is not intended to further finish the sheet, such as polishing and buffing the same, the product of the machine is ready for the market. It should be further noticed that the adjustment of the various parts to accommodate the machine to sheets of various widths can be effected very speedily and with great accuracy by turning the crank wheels disposed along the sides of the machine. The bent marginal portions of the sheet caused by the gripping instrumentalities during the tinning operation are subsequently smoothed out by the feed rolls. In the embodiment of my invention disclosed herein I have shown the machine in operation for tinning the under side of the sheet, but it is obvious that the various instrumentalities employed may also be employed to advantage in machines for tinning both sides of the sheet. In such a case it would be merely necessary to remove the guide shoes and to depress the sheet a sufficient depth into the bath so that the top side of the sheet would be immersed in the bath.

Having now described my invention what I claim and desire to protect my Letters Patent is:

1. A machine for plating sheet metal wherein a bath is maintained in contact with one surface of an advancing sheet characterized by the fact that means are provided for holding the side edges of that portion of the sheet which is in contact with the bath above the surface of the bath.

2. In a machine for plating sheet metal on one side a plating bath, means for guiding an advancing sheet into and out of the bath and guide shoes for holding the side edges of the sheet above the surface of the bath.

3. In a machine of the class wherein a plating bath is maintained in contact with one surface of an advancing sheet, a pair of oppositely arranged guide shoes provided with sheet-engaging surfaces which are in-

clined downwardly and inwardly into the bath in a direction transverse to the travel of the sheet.

4. In a machine of the class wherein a plating bath is maintained in contact with one surface of an advancing sheet, means for supporting the side edges of the sheet above the surface of the bath and guide rollers for engaging the top surface of the sheet during its travel through the bath.

5. In a machine of the class wherein a traveling metallic sheet is passed through a plating bath, means for supporting the side edges of the sheet above the surface of the bath and oppositely arranged guide rollers for engaging the top surface of the sheet, the said guide rollers having their surfaces inclined downwardly and inwardly in a direction transverse to the travel of the sheet.

6. In a machine for plating sheet metal a plating bath, means for supporting the edges of the sheet above the surface of the bath and means for depressing the body portion of the sheet into the bath.

7. In a machine of the class wherein a plating bath is maintained in contact with one surface of an advancing sheet, oppositely disposed and transversely adjustable means for holding the side edges of the sheet above the surface of the bath.

8. In a machine wherein a plating bath is maintained in contact with one surface of an advancing sheet, vertically adjustable means for holding the side edges of the sheet above the surface of the bath.

9. In a machine for plating sheet metal on one side a plating bath, yieldingly supported guide shoes for holding the side edges of a traveling sheet above the bath during its passage through the bath and means for depressing the guide shoes toward the bath.

10. In a machine of the class wherein a plating bath is maintained in contact with one surface of an advancing sheet, means for holding the side edges of the sheet above the surface of the bath and vertically adjustable guide rollers for engaging the top surface of the sheet.

11. In a machine of the class wherein a traveling metallic sheet is subjected to the action of a plating bath shoes and rollers arranged to co-act along the side edges of the sheet for guiding the sheet during its travel through the bath, the said shoes and rollers being separable from each other to receive the sheet.

12. In a machine for plating sheet metal on one side a plating bath, yieldingly supported guide shoes for holding the side edges of the sheet above the bath during the travel of the sheet through the bath and guide rollers arranged to press the edges of the sheet against the guide shoes.

13. A machine wherein sheet material is advanced characterized by the fact that vertically adjustable guides are provided at sufficiently frequent intervals to support the marginal edges of the sheet leaving one face of the body portion exposed between the portions of its marginal edges which are engaged by said guides.

14. A machine for plating sheet metal wherein a bath is maintained in contact with one surface of an advancing sheet characterized by the fact that means are provided for bending upwardly the marginal edges of the sheet and depressing the body portion of the sheet below the level of the bath but maintaining the side edges of the sheet in a position above the level of the bath.

15. A machine for plating sheet metal wherein a bath is maintained in contact with one surface of the advancing sheet characterized by the fact that means are provided for bending upwardly the marginal edges of the sheet and depressing the body portion of the sheet below the level of the bath but maintaining the side edges of the sheet in a position above the level of the bath, and further characterized by the fact that means are provided for rolling out the bent marginal edges of the sheet.

16. In a machine of the class wherein a plating bath is maintained in contact with one surface of an advancing sheet, oppositely disposed means for holding the side edges of the advancing sheet above the surface of the bath during its travel through the bath whereby one surface of the sheet only is subjected to the action of the bath.

17. In a machine wherein the plating bath is maintained in contact with one surface of an advancing sheet, oppositely disposed means for holding the side edges of the sheet above the surface of the bath and means for simultaneously adjusting said edge-holding means transversely to accommodate sheets of different widths.

In testimony whereof I have hereunto set my hand at Ansonia, in the county of New Haven and State of Connecticut, this 30th day of October, A. D. 1917.

JOSEPH POWANDA.