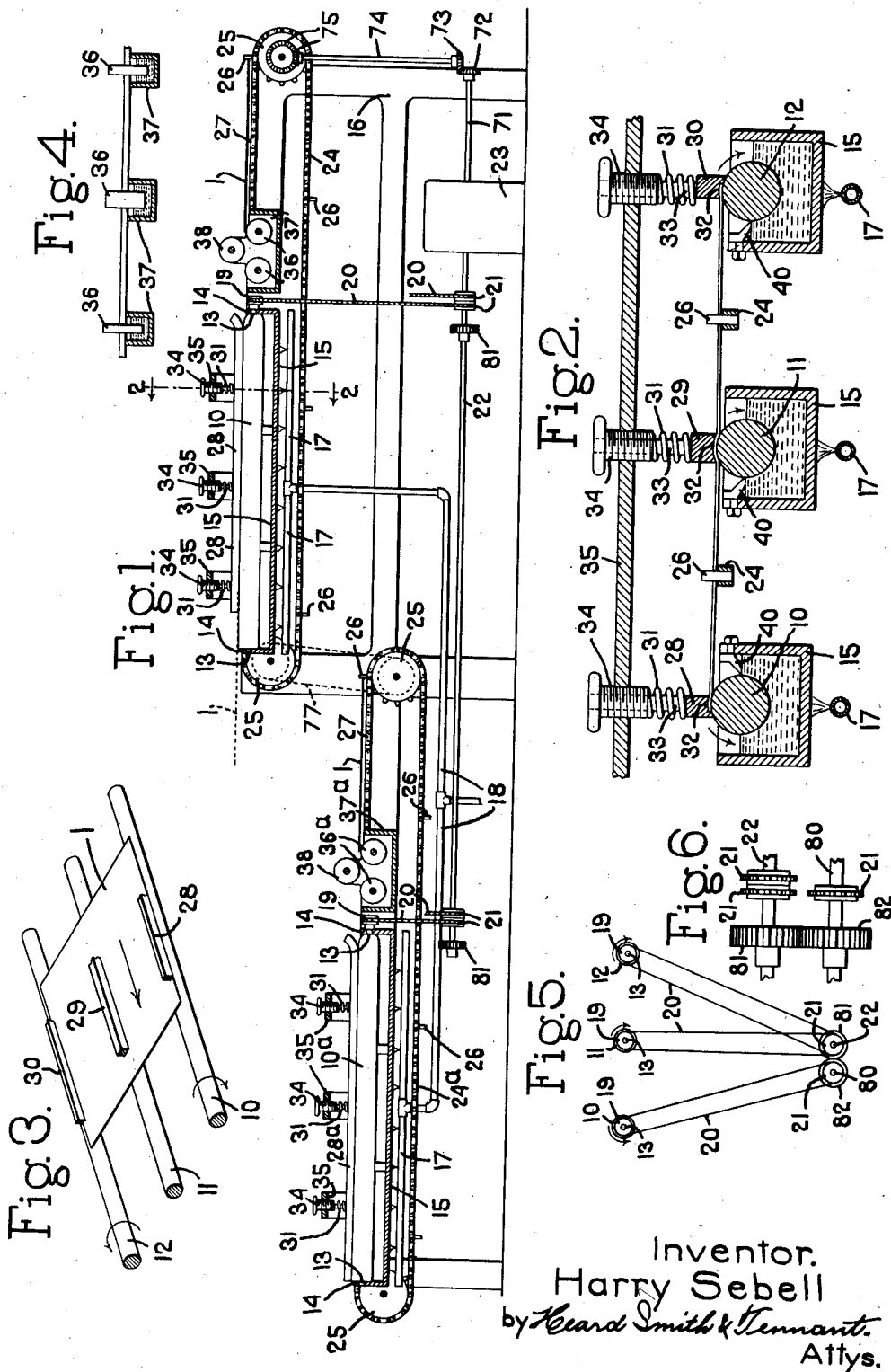


Feb. 3, 1942.

H. SEBELL
 APPARATUS FOR TINNING BLACK PLATE SHEETS TO USE
 FOR FORMING CAN BODY BLANKS
 Filed March 18, 1940

2,271,780

2 Sheets-Sheet 1



Inventor.
 Harry Sebell
 by *Heard Smith & Tennant.*
 Attys.

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2 Sheets-Sheet 2

Fig. 7.

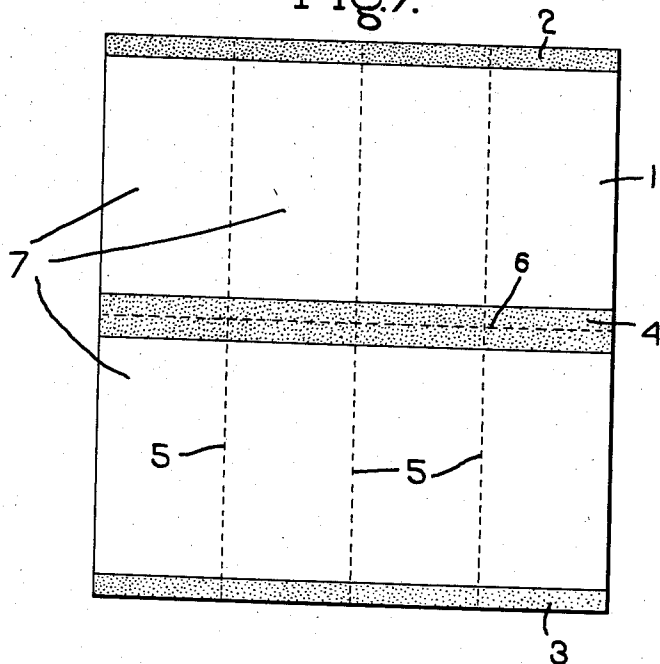


Fig. 8.

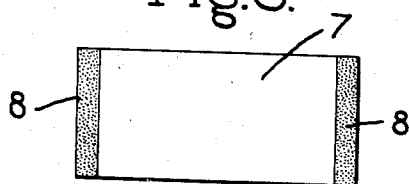
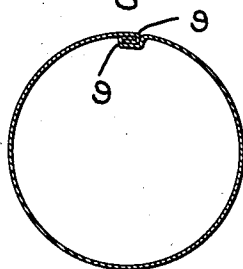


Fig. 9.



Inventor.
Harry Sebell
by *Heard Smith & Tennant*
Attys.

UNITED STATES PATENT OFFICE

2,271,780

APPARATUS FOR TINNING BLACK PLATE SHEETS TO USE FOR FORMING CAN BODY BLANKS

Harry Sebell, Newton, Mass., assignor of one-half to Arthur H. Parker, Lexington, Mass.

Application March 18, 1940, Serial No. 324,568

5 Claims. (Cl. 91—12.2)

This invention relates to tinning black plate sheets preparatory to being cut into blanks for making can bodies.

In order to make a satisfactory can body from black plate, it is necessary to provide the edge portions of the blank from which the can body is made with a tin coating so as to enable the side seam of the can body to be satisfactorily soldered. The blanks from which can bodies are made are usually cut from larger sheets, each sheet being divided into a plurality of blanks, the number of blanks which can be cut from any sheet depending somewhat on the size of the can bodies to be made.

An object of my present invention is to provide a novel machine by which the coating of tin is applied to the portions of the sheet of black plate that eventually constitute the edge portions of the can body blank that are to be soldered together, by rubbing action of a tinning element against the sheet.

A further object of the invention is to provide an apparatus for this purpose by which the tin coating is applied to the sheet of black plate by means of an elongated rotating roller over which the sheet to be tinned moves in the direction of the length of the roller, so that the sheet has a sliding engagement with a rotating roller.

Other objects of the invention are to improve generally machines of this type in the particulars hereinafter set forth.

In the drawings, wherein I have illustrated a selected embodiment of the invention:

Fig. 1 is a side view of an apparatus made in accordance with the invention.

Fig. 2 is an enlarged fragmentary sectional view on the line 2—2, Fig. 1.

Fig. 3 is a somewhat diagrammatic view illustrating the manner in which the apparatus operates to apply tin coating to the black plate sheet.

Fig. 4 is a sectional view on the line 4—4, Fig. 1.

Fig. 5 is a view illustrating the driving mechanism for the tinning rollers.

Fig. 6 is a fragmentary view illustrating part of said driving mechanism.

Fig. 7 shows a black plate sheet which has been tinned by the apparatus herein illustrated.

Fig. 8 shows one of the blanks for making a can body which has been cut from the sheet shown in Fig. 5.

Fig. 9 is a cross sectional view through a can body which has been made from the blank shown in Fig. 6.

Referring first to Fig. 7, 1 indicates a sheet of black plate which has been provided on each edge on both sides with a coating of tin, as shown at 2 and 3, and which has also been provided on each side with a coating of tin along a central band or zone, as shown at 4.

This sheet 1 is intended to be cut along the transverse lines 5 and along the central longitudinal line 6 to form a plurality of blanks 7, from each of which a can body can be made. When the sheet 1 is divided, as above set forth, each blank 7 will have a tinned zone 8 along each edge on both sides, and in forming the can body, the blank will be bent into the circular shape and the tinned edges soldered together. If the side seam of the can body is to be a lock seam, then each of the tinned edges 8 of the blank will be bent into a hook shape shown at 9, in Fig. 9, and these two hook portions will be interhooked before they are soldered together, as usual in forming can bodies.

It will be understood that the object of providing the edge portions of the blank with the coating of tin is to facilitate the soldering of the side seam of the can body, since it is very difficult if not impossible to make a satisfactory soldered bond between two untinned surfaces of the black plate.

One feature of my present invention relates to a novel apparatus for thus applying the tin coatings to the zones 2, 3 and 4 of the sheet 1.

In accordance with the invention, the application of the coating of the tin along either of the zones 2, 3 or 4 is accomplished by feeding the sheet 1 forward in contact with a tin-applying element and, at the same time, producing a rubbing engagement between the tin-applying element and the sheet, which serves to force the tin into the sheet metal and also operates to produce a more even coating of tin. One way of providing for such rubbing engagement is by feeding the sheet 1 over and in contact with an elongated rotating tinning roll, the movement of the sheet being in the direction of the length of the roll. This is illustrated somewhat diagrammatically in Fig. 3 wherein 10, 11 and 12 indicate three long rolls or shafts which are arranged parallel to each other and which have a length considerably greater than that of the sheet to be tinned. These rolls are rotating about their axes, and each roll is partially submerged in a bath of melted tin. The tinning operation is accomplished by moving the sheet 1 lengthwise of the rolls in contact therewith and during the movement of the sheet 1 over

the rolls, each roll will apply to the face of the sheet a coating of tin along the zone where the sheet contacts with the roll, it being understood, of course, that the portions of the sheet to be tinned will first be provided with an application of some fluxing medium.

The sheet 1 not only has a sliding engagement with each roll in the direction of its length, but the rotation of the roll during such sliding engagement serves to produce a rubbing action which is very effective in applying an even coating of tin to the surface of the sheet.

These timing rolls 10, 11 and 12 may be supported and rotated in any suitable way. As shown in Figs. 1 and 2, each roll is provided at each end with a trunnion 13 which is supported in a suitable bearing 14 carried by the ends of a vat or tank 15 that contains molten tin, each roll being so supported that it is partially submerged in the tin bath. These tanks 15 are properly supported on a suitable frame 16 and the tin bath may be kept at the proper high temperature by means of gas burners 17 in the form of perforated pipes situated beneath the tanks. These gas burners 17 are connected to a suitable supply pipe 18 by which gas is delivered to the burners. Suitable means are provided for rotating the tinning shafts or rolls 10, 11 and 12, and for this purpose, the trunnion at one end of each roll is extended and is provided with a sprocket wheel 19 which is connected by means of a driving sprocket chain 20 to a sprocket wheel 21 on a drive shaft 22. The rolls 10 and 12 which are operating on the outside edges of the sheet 1 will preferably be rotated in opposite directions, the roll 12 rotating in a clockwise direction, and the roll 10 in a counterclockwise direction. The rolls 11 and 12 will be driven from the shaft 22 by means of the sprocket chains 20, as above described, and in order to obtain the counterclockwise rotation of the roll 10, I propose to drive said roll 10 from a countershaft 80 by means of a sprocket chain 20, the said countershaft 80 being geared to the shaft 22 by suitable gearing 81, 82, as shown in Fig. 6. With this arrangement, the countershaft 82 will rotate in an opposite direction from the shaft 22, and thus the roll 10 will be rotated in an opposite direction from the other rolls. The shaft 22 may be operated in any suitable way, as by means of a motor 23.

The machine herein shown is provided with means for feeding the sheet 1 lengthwise of the rolls 10, 11 and 12, and in contact therewith. For this purpose, there is shown a pair of endless sprocket chains 24 operating over supporting sprocket wheels 25, the upper run of the sprocket chains extending between and parallel to the tinning rolls. Each sprocket chain carries a plurality of pusher fingers 26 by which the sheet 1 is fed forward, said pusher fingers being adapted to engage the rear or trailing edge of each sheet. The sprocket chains 24 are somewhat longer than the tinning rolls 10, 11 and 12, thus providing a receiving portion 27 onto which each sheet may be placed preparatory to its being fed forward over the rolls 10, 11 and 12.

In order to obtain a proper application of the tin to the sheet, it is desirable that the sheet should be pressed against the rolls during its travel thereof, and for this purpose, each roll has associated therewith a hold-down, said hold-downs being indicated at 28, 29 and 30. These hold-downs preferably extend the full length of the rolls and are yieldingly pressed against the

sheet by means of backing springs 31. The under face of each hold-down is made slightly concave so that it conforms to the curvature of the roll, and as a result, when the sheet 1 is being fed over the rolls, the sheet will be given a slight curvature at the point where it contacts with the rolls, as shown at 32 in Fig. 2, with the result that the contact between each roll and the sheet will be along a band or zone rather than a line contact.

Means are shown for adjusting the tension of the springs 31, and for this purpose, each spring is illustrated as encircling a stem 33 rising from the hold-down member and as being confined between said hold-down member and a sleeve 34 into which the stem telescopes and which is screw-threaded in a bar 35 that is carried by the frame and extends transversely across the rolls. By turning the sleeves 34 up and down, the tension of the springs can be easily adjusted.

As stated above, it is necessary to apply a coating of fluxing medium to the black plate 1 before it is coated with tin in order that there may be proper adhesion between the tin coating and the black plate. While the fluxing medium may be applied in any suitable way, I have shown herein a pair of rolls 36 over which the sheet 1 passes before it contacts with the tinning rolls 10, 11 and 12. These rolls 36 are operating in a bath of fluxing medium contained in a tank 37 and cooperating with the fluxing rolls 36 is a hold-down roll 38 under which the sheet passes. Said hold-down roll serves to press the sheet against the fluxing rolls so as to insure that they have proper contact with the surface of the sheet 1.

These fluxing rolls will be arranged to apply the flux only to the portions of the sheet 1 which are to be tinned, that is, to apply a flux only along the edge 2 and 3 and the center zone 4.

As stated above, the coating of tin is applied to both sides of the sheet 1 along the zones 2, 3 and 4. The movement of the sheet 1 over the rolls 10, 11 and 12 will result in applying the coating of tin to the sheet 1 on one side along the zones 2, 3 and 4, and to tin the other side of the sheet along said zones, I have provided a second set of tinning rolls similar in all respects to the tinning rolls 10, 11 and 12, and one of which, 10a, is shown in Fig. 1. This second set of tinning rolls is located at a lower level than the first set of tinning rolls, and when the sheet 1 has been fed over the first set of tinning rolls, 10, 11 and 12, and passes off from the end thereof, said sheet, as it passes out from under the hold-downs 28, 29, 30, will drop off the ends of the rolls 10, 11, 12, and fall in an inverted position onto the receiving end 27 of a second endless feed apron 24a that is, in all respects, similar to the feed apron or endless chains 24. This second feed apron 24a comprises endless chains which operate between the tinning rolls of the second or lower set, and said endless chains 24a feed the inverted sheet over the second set of rolls. This second set of rolls, of which the roll 10a is shown in Fig. 1, has the same arrangement as the tinning rolls 10, 11 and 12, and are operated from the drive shaft 22 by means of sprocket chains in the same manner as described with reference to the rolls 10, 11 and 12. Associated with the second set of tinning rolls is a fluxing device comprising rolls 36a which are partially submerged in a bath of fluxing material in receptacles 37a, said rolls operating to apply the fluxing material to the under side of the inverted sheet 1 along the band areas which

are to be tinned by the second set of tinning rolls.

The sheet 1 is held in engagement with the second set of tinning rolls as it is fed thereover by means of hold-downs similar to the hold-downs 28, 29, 30, one of said hold-downs being shown at 28a in Fig. 1. These hold-downs function in the same way as the hold-downs 28, 29, 30 to cause the sheet to be bent slightly where it engages the tinning rolls, whereby each roll will apply tin to a band area.

Any suitable means may be provided for driving the feed aprons 24, 24a. As illustrated in Fig. 1, the motor shaft is provided with an extension 71 carrying the bevel gear 72 which meshes with a bevel gear 73 on a vertical shaft 74, said shaft 74 being connected by bevel gears 75 with a shaft carrying the sprocket wheels 25 at one end of the endless chain carrier. The sprocket chain 24a may be driven from the sprocket chain 24 by means of a sprocket chain connection 77.

40 indicates scraping elements which cooperate with the rolls 10, 11 and 12, and which serve to gauge or determine the thickness of the film of molten tin which is carried by each roll into contact with the under surface of the sheet 1. By properly adjusting these scraper members, the thickness of the coating of tin which is to be applied to the sheet may be regulated.

The width of the band area on the sheet 1 which will be tinned depends upon the extent to which the sheet is made to conform to the contour of the tinning roll or rolls. If it is only desired to apply the tin to a narrow band area, then it will only be necessary to provide for having a narrow portion of the sheet 1 bent to conform to the tinning roll, but if it is desired to apply the tin to a wider band area, then a greater portion of the sheet 1 will have to be bent to conform to the tinning rolls. In the illustrated embodiment of the invention, the center band area 4 is wider than the two edge band areas, and this is accomplished by making the hold-down 29 of sufficient width to cause a wider portion of the sheet 1 to be bent around the center tinning roll 11.

While I have shown a plurality of tinning rolls, yet it will be understood that the number and relative location of the tinning rolls will depend upon the number and relative location of the band areas of the sheet 1 which it is desired to coat with tin. In fact, it would be within my invention to provide a tinning roll and its corresponding hold-down so that the entire surface

of the sheet would be made to conform to a single roll, in which case the entire surface of the sheet would be coated with tin.

I have referred above to the invention as applied to applying a coating of tin to black plate, but I wish it to be understood that the invention is equally applicable for applying a coating of metal other than tin, and while the invention will find an important use in applying to sheet metal a solder-receptive coating metal, such as tin, yet the invention is not limited in its use to the tinning of black plate.

I claim:

1. An apparatus for applying a coating of tin to sheet metal comprising an elongated roll partially submerged in a bath of molten tin, means to rotate the roll, and means to feed the sheet to be tinned longitudinally of the roll and in contact therewith.
2. An apparatus for applying a coating of tin to sheet metal comprising an elongated roll partially submerged in a bath of molten tin, means to rotate the roll, means to feed the sheet to be tinned longitudinally of the roll, and means to cause the portion of the sheet to which the tin coating is to be applied to conform to the contour of the roll.
3. An apparatus for applying a coating of solder-receptive metal to sheet metal comprising a plurality of parallel elongated rolls, each partially submerged in a molten bath of solder-receptive metal, means to rotate the rolls, and means to feed the sheet to be coated longitudinally of the rolls and in contact therewith.
4. An apparatus for applying a coating of solder-receptive metal to sheet metal comprising a plurality of parallel elongated rolls each partially submerged in a molten bath of solder-receptive metal, means to rotate the rolls, means to feed the sheet to be coated longitudinally of the rolls and in contact therewith, and means to cause the portions of the sheet which contact with the rolls to conform to the contour thereof.
5. An apparatus for providing sheet metal with a coating of solder-receptive metal along specified zone bands comprising a plurality of elongated rolls, each partially submerged in a molten bath of solder-receptive metal, means to rotate the rolls about their axes, means to feed the sheet metal to be coated longitudinally of said rolls and in contact therewith, and shoes acting on said plate and conforming the latter to the contour of the rolls along the band zones which are to be coated with the solder-receptive metal.

HARRY SEBELL.