Sept. 29, 1953 S. J. BRUNANSKY ET AL 2,653,697

HANDLING SHEETS DELIVERED FROM A DIPPING TANK

Filed May 17, 1949 3 Sheets-Sheet 1

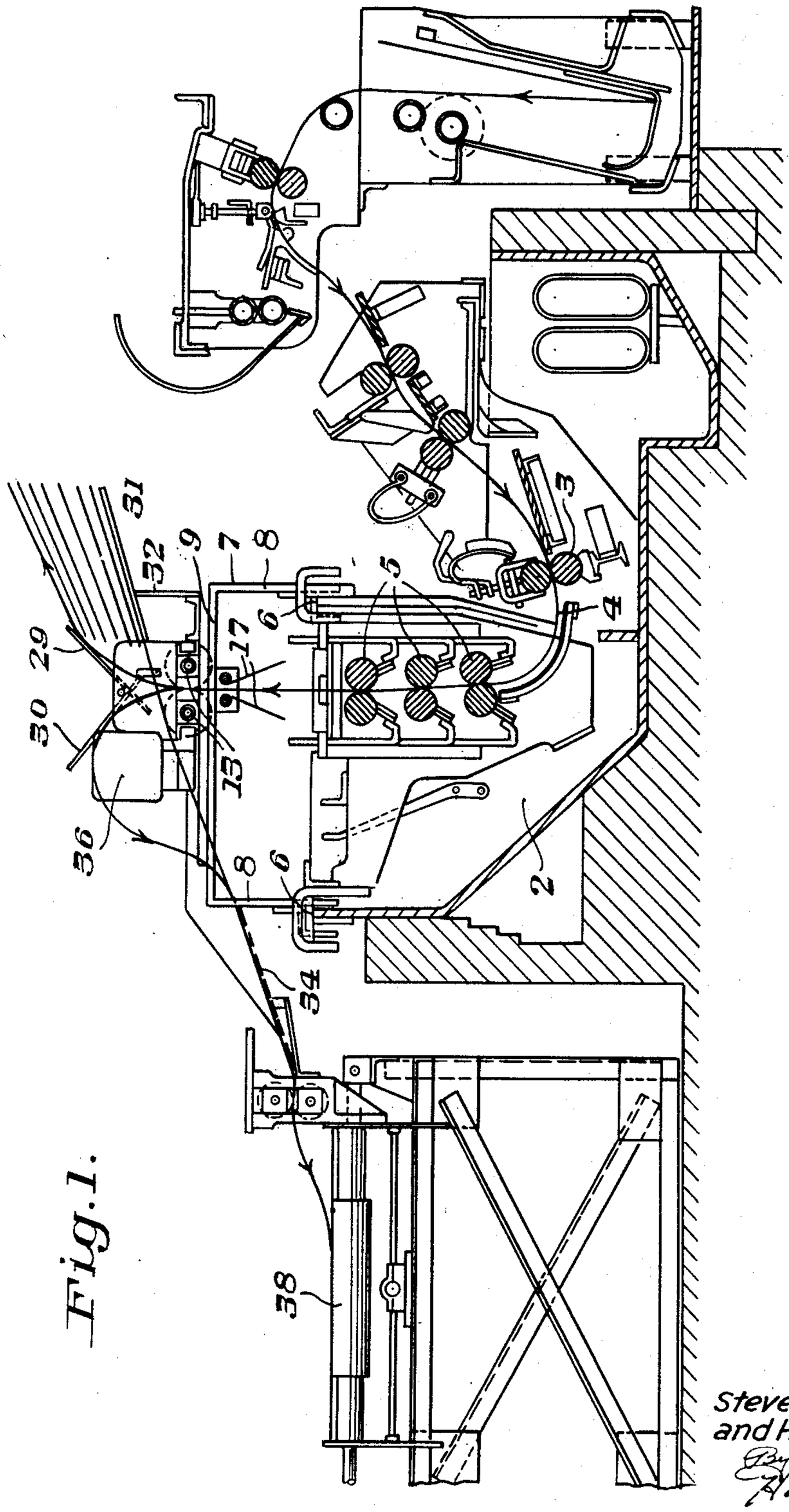

Fig. 1.

INVENTORS
Steve J. Brunansky
and Harold Forsythe
By Hopper Leonard & Glenn
Attorneys

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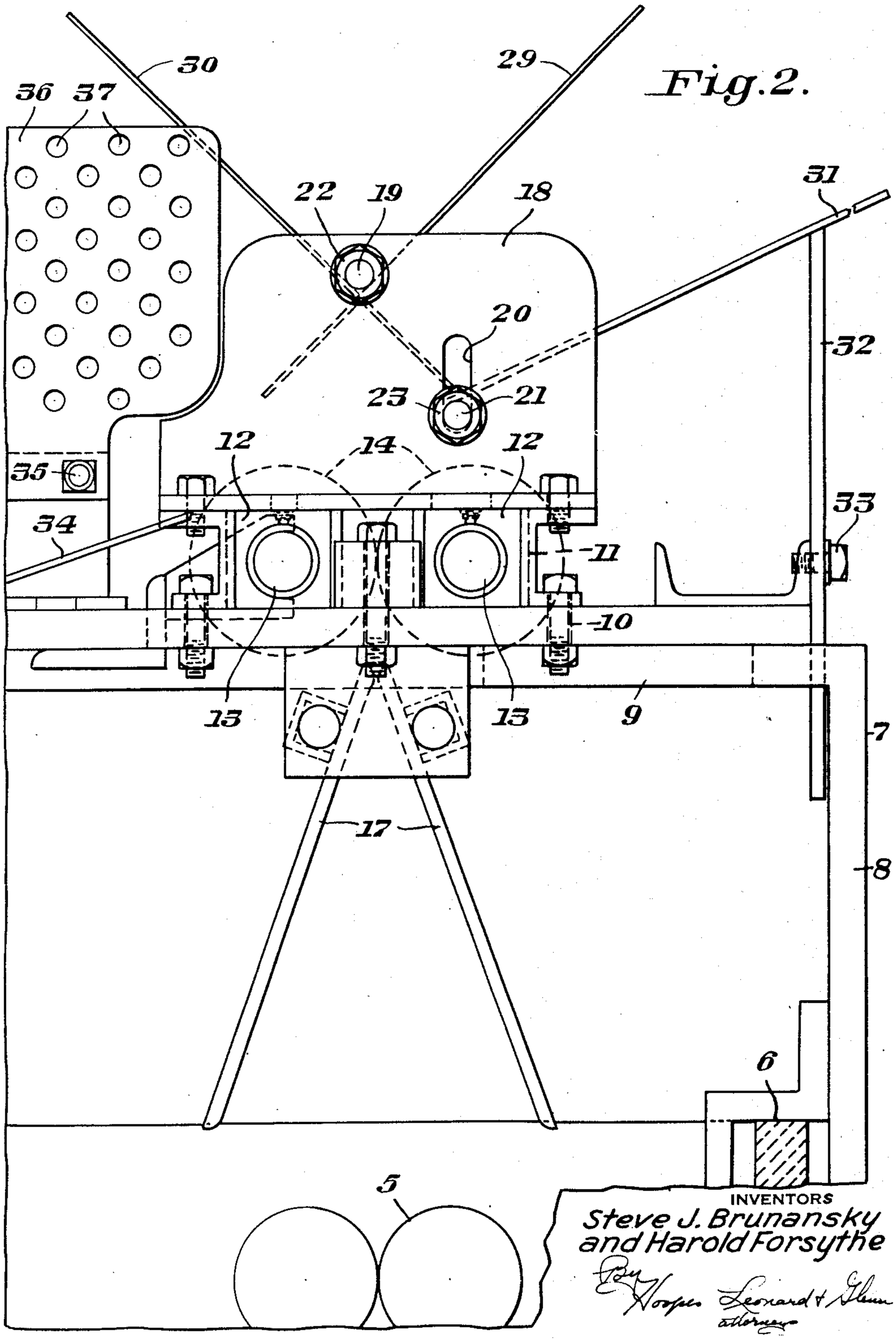
Fig. 2.



INVENTORS
Steve J. Brunansky
and Harold Forsythe
By Hooper Leonard & Glenn
attorneys

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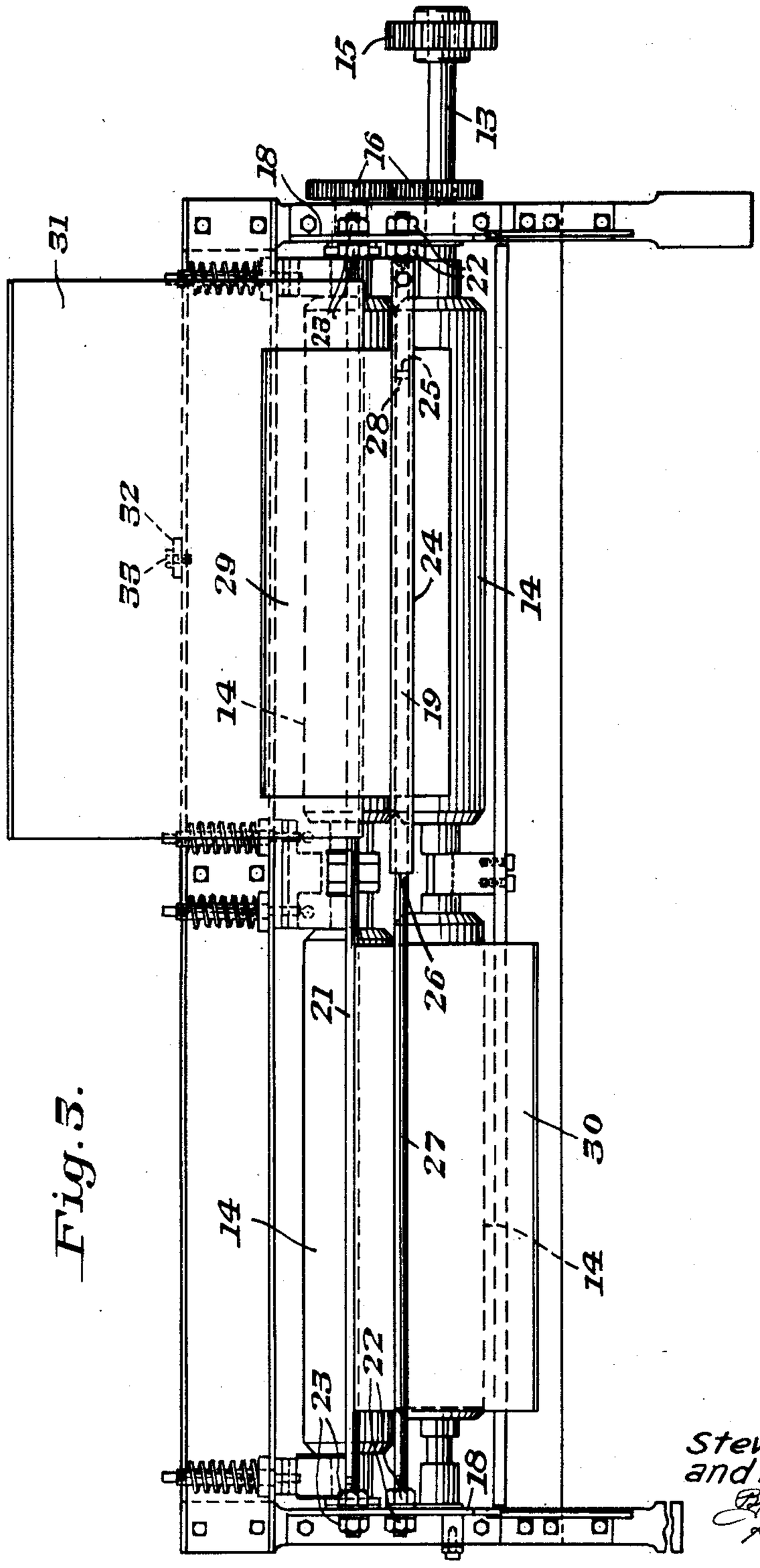

Fig. 3.

INVENTORS
Steve J. Brunansky
and Harold Forsythe
By Hoopes Leonard & Glenn
attorneys

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HANDLING SHEETS DELIVERED FROM A DIPPING TANK

Steve J. Brunansky and Harold Forsythe,
Gary, Ind.

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8 Claims. (Cl. 198—33)

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This invention relates to handling sheets delivered from a dipping tank. It has to do with the arranging of dipped sheets for piling so that the so-called drip edges of the sheets (i. e., the trailing edges as the sheets are delivered from the bath) are not all similarly oriented.

In various processes sheets are passed into and through a bath for treatment or coating, some of the material of the bath solidifying on the sheets and being carried away therewith. The sheets emerge from the bath in a generally upward direction and there is a natural tendency for some of the material adhering to the sheets to run downwardly on the sheets and accumulate to some extent at the trailing edge. Some of that material solidifies on the sheet adjacent the trailing edge thereof with the result that the trailing edge is relatively thick or of heavier gauge than the remainder of the sheet. If sheets thus treated are stacked for shipment with their trailing or drip edges similarly oriented in the stack, the stack will be lopsided, i. e., it will be of greater height at one edge than elsewhere.

Examples of processes in which the phenomenon above referred to occurs are the coating of metal sheets as with tin, terne or spelter. Purely for purposes of explanation and illustration we shall describe the invention in connection with the timing of sheets in the making of tinplate. Steel sheets are passed generally endwise into and through a bath of molten tin, some of the tin adhering to the surface of the sheets as they are withdrawn upwardly from the bath. Some of the molten tin runs down toward the trailing or drip edges of the sheets as they are withdrawn from the bath and solidifies thereon as above described.

Various provisions have heretofore been made for arranging sheets which are coated by dipping so that when they are stacked for shipment the trailing or drip edges are not all similarly oriented. This has involved the turning of some of the sheets at some time after they leave the bath so that when they are stacked the drip edges of different sheets in the same stack will be disposed at different edges of the stack. The turning or reversing of some of the sheets to accomplish the result referred to has been done manually; also, mechanism for reversing certain of the coated sheets has been proposed but that mechanism has been unsatisfactory due to its complexity and the employment of moving parts.

We accomplish the reversal of certain dipped sheets automatically as the sheets are delivered from the dipping tank and without the employment of any moving parts. We employ a dipping tank with mechanism for conveying the sheets therethrough endwise in two lines side by side. Thus sheets of the respective lines emerge from the bath in generally coplanar side-by-side relation. We turn the sheets emerging from the bath in the respective lines in opposite directions and dispose them in position at an angle to the vertical with the drip edges oppositely oriented. The sheets are then delivered in the same direction and are automatically brought together in a stack so that in the stack the drip edges of the sheets from the respective lines are oppositely oriented. No moving parts are necessary, stationary deflecting means being employed for the respective lines. All of the sheets in one line are turned laterally in one direction and all of the sheets in the other line are turned laterally in the opposite direction. Since the number of sheets passing through the tank in the respective lines is approximately the same the result is that when the thus oppositely oriented sheets in the respective lines are brought together in a stack approximately half of the sheets of the stack have their drip edges oriented in one direction and the other half of the sheets of the stack have their drip edges oriented in the opposite direction.

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We may employ a tin pot and means for conveying the sheets through the pot in two lines all of which mechanism is conventional. Our sheet turning or deflecting mechanism may be superimposed upon the tin pot to insure proper turning of the sheets as above described as they emerge from the pot, being delivered upwardly from the bath by conventional means. The sheets may be delivered in a substantially exactly vertical direction and that will normally be the case. When the sheets are delivered in a substantially exactly vertical direction the sheets of both lines should be engaged by deflecting means to positively insure the turning of each sheet in the desired predetermined direction. It would be possible to deliver the sheets generally upwardly at small angle to the vertical so that undeflected sheets would always fall laterally in the same direction and in such case only the sheets to be turned in the opposite direction would have to be engaged by deflecting means. In either case the delivered sheets are removed in the same general transverse direction. We preferably provide an inclined table on which the sheets are laterally removed to the stacker.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment

thereof and a present preferred method of practicing the same proceeds.

In the accompanying drawings we have shown a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same; in which

Figure 1 is a somewhat diagrammatic view partly in elevation and partly in vertical cross section of a tin pot showing the means for conveying sheets therethrough and on which our sheet deflecting or reversing mechanism is superimposed;

Figure 2 is a fragmentary detail view to enlarged scale partly in elevation and partly in vertical cross section showing a portion of the structure of Figure 1; and

Figure 3 is a plan view of the sheet reversing apparatus.

Referring now more particularly to the drawings, the tin pot is designated generally by reference numeral 2 and the mechanism for conveying sheets through the tin pot is designated generally by reference numeral 3. The tin pot and the mechanism for conveying sheets through the tin pot may be conventional, the tin pot and conveying mechanism being of the double line type in which sheets are conveyed through the pot in two lines side by side. The path of the sheets through the pot is indicated by the line 4 in Figure 1. The line 4 in Figure 1 shows the path of the sheets in both of the two parallel conveying lines since the lines are in side-by-side relation and Figure 1 is taken looking transversely of the machine. Since the tin pot 2 and the conveying mechanism 3 are conventional they will not be described in detail. It is sufficient to say that the sheets pass through the bath of molten tin in the pot and are delivered upwardly from the bath by successive sets of driven pinch rolls 5. The top set of pinch rolls 5 is shown at the bottom of Figure 2 and the top of the tin pot is shown at 6.

Mounted atop the tin pot is a supporting frame 7 having opposed uprights 8 and a transverse generally horizontal top member 9. Bolted to the member 9 by bolts 10 is a frame 11 carrying bearings 12 in which are journaled a pair of shafts 13, each of the shafts 13 carrying two pinch rolls 14 which cooperate to receive the sheets delivered upwardly by the pinch rolls 5. One of the shafts 13 is driven by any suitable means, as, for example, through a sprocket 15 driven by a sprocket chain which in turn is driven by any suitable source of power such as a motor and reduction gearing (not shown). The shafts 13 are geared together by gears 16 so that they are driven at the same speed, the right-hand shaft, viewing Figure 2, turning in the clockwise direction and the left-hand shaft, viewing Figure 2, turning in the counter-clockwise direction. The frame 11 carries guide plates 17 which extend downwardly and diverge from a position below the throat by the pinch rolls 14 so that sheets delivered upwardly by the pinch rolls 5 are guided into the throat of the pinch rolls 14 by the guide plates 17. The guide plates 17 guide the sheets in both of the two lines so that sheets in both lines in generally coplanar side-by-side relationship are delivered upwardly by the pinch rolls 14.

Frame 11 carries at opposite ends upright supporting plates 18. Each plate 18 has an upper circular opening receiving a shaft 19 and a lower slot 20 receiving a shaft 21. The shaft 19 is adapted to be held in desired position against rotation by nuts 22 cooperating with the supporting plates 18. Likewise the shaft 21 is adapted to be positioned by nuts 23 cooperating with the supporting plates 18, the shaft 21 also being adjustably positionable along the slots 20.

The shaft 19 is in two parts as shown in Figure 3. One part is designated 24, being solid from its right-hand end to the point 25 and being hollow from the point 25 to its left-hand end 26. The other part of the shaft 19 is designated 27 and is solid and of smaller diameter than the part 24, extending telescopically into the part 24 to the point 28. Thus the parts 24 and 27 of the shaft 19 are separately angularly adjustable and each part is adapted to be held in its angular adjustment by the nuts 22 cooperating therewith.

The shaft part 24 carries a deflector 29 and the shaft part 27 carries a deflector 30. The deflectors are in the form of plates and may be fastened to the respective shaft parts by welding or otherwise. The deflector 29 is disposed above the line of sheets which is nearest the eye viewing Figure 2 and to the right viewing Figure 3. The deflector 30 is disposed above the line of sheets which is farthest from the eye viewing Figure 2 and to the left viewing Figure 3. Both of the deflectors 29 and 30 cross the vertical plane in which the sheets are delivered upwardly by the pinch rolls 14. Since the deflector 29 is in the path of the upwardly delivered sheets of one line it engages and deflects the sheets of that line and since the deflector 30 is in the path of the upwardly delivered sheets of the other line it engages and deflects the sheets of that line. Viewing Figure 2, the deflector 29 is inclined upwardly and to the right while the deflector 30 is inclined upwardly and to the left. Consequently the leading edges of the sheets in the nearer line, viewing Figure 2, are caused to engage the deflector 29 and are by that deflector forced to the right while the leading edges in the more remote line viewing Figure 2 are caused to engage the deflector 30 and are by that deflector forced to the left. Thus the sheets of the respective lines are turned in opposite directions as they are delivered upwardly out of the tin pot.

We provide means for catching the sheets turned in opposite directions as above explained and delivering them away in generally side-by-side relation in the same direction at an angle to the vertical. A plate or table 31 has one end connected with and supported by the shaft 21 and is supported intermediate its ends by a supporting member 32 connected with the frame at 33. The plate or table 31 is positioned to catch sheets turned to the right, viewing Figure 2, on the nearer conveyor and such sheets are adapted to be delivered downwardly and toward the left thereon. Carried by the frame is a plate or table 34 which is positioned to catch sheets turned to the left viewing Figure 2 on the remote conveyor and such sheets are adapted to be delivered downwardly and toward the left thereon. The plate or table 34 or a similar plate or table also extends across the nearer line so that sheets on the plate or table 31 moving downwardly and toward the left viewing Figure 2 will be conveyed away on the plate or table 34 or the similar plate or table positioned beside it. Thus the sheets in the respective lines are delivered downwardly and toward the left in generally side-by-side relationship but with the sheets in the nearer line viewing Figure 2 having their drip edges leading and those in the remote line having their drip edges

trailing. The sheets are delivered by the plate or table **34** or by that plate or table and a similar plate or table positioned beside it onto a cross conveyor **38**, the oppositely oriented sheets being delivered onto the cross conveyor alternately. The cross conveyor **38** delivers the sheets to an automatic stacker, the successive sheets being delivered onto the stack so the sheets in the stack are arranged alternately with their drip edges oppositely oriented.

Bolted to the frame at **35** are opposed plates **36** having correspondingly positioned holes **37** adapted to receive guide rods to facilitate turning and delivery of the sheets on the remote conveyor viewing Figure 2. The guide rods will be positioned in selected holes for the particular size and gauge sheets being turned.

Thus we provide in an extremely simple manner and without any moving parts for reversing alternate sheets being fed to the stack so that the stack will not be lopsided.

Our apparatus has an indefinite life, there being no moving parts to wear out. No adjustments are necessary except when changing over from one size and/or gauge of sheets to another.

As well known in the art palm oil is floated on top of the molten tin in the pot and covers the tin-coated sheet as it emerges from the pot to protect the tin coating from the oxidizing effect of the air during solidification of the coating. It is desirable to carry out as little oil as possible with the coated sheets. When our sheet handling device is used a minimum of oil—less than in ordinary operation—is carried out on the tinned sheets. The result is higher quality tinplate and material reduction in bran consumption. Use of our method and apparatus facilitates inspection of the sheets emerging from the tin pot. An inspector positioned on either side of the apparatus can see three of the four sheet faces; he can see the two sheet faces on his side as the sheets move upwardly and the top face of the sheet which is turned toward him.

While we have shown and described a present preferred embodiment of the invention and a present preferred method of practicing the same, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

We claim:

1. A method of handling sheets delivered from a dipping tank comprising delivering in a direction generally parallel to the adjacent edges of the sheets two sheets in generally coplanar side-by-side relation, turning the sheets in opposite directions transversely of the plane of the sheets, delivering the thus turned sheets in generally coplanar relation in the same direction transversely of said first mentioned direction, changing the direction of movement of the sheets so that they follow one another in a direction transversely of their adjacent edges and moving the sheets in the last mentioned direction onto a pile with the trailing sheet atop the leading sheet.

2. A method of handling sheets delivered from a dipping tank comprising delivering two sheets each having a drip edge generally upwardly in substantially horizontally side-by-side generally coplanar relation with their drip edges trailing, turning the sheets in opposite directions transversely of the plane of the sheets into a common plane extending at an angle to the vertical so that the drip edges of the respective sheets are oppositely oriented, delivering the thus turned sheets in the same direction generally parallel to the adjacent edges of the sheets in said common plane, changing the direction of movement of the sheets so that they follow one another in a direction transversely of their adjacent edges and moving the sheets in the last mentioned direction onto a pile with the trailing sheet atop the leading sheet.

3. A method of handling sheets delivered from a dipping tank comprising delivering two sheets each having a drip edge generally upwardly in substantially horizontally side-by-side generally coplanar relation with their drip edges trailing, engaging the leading portions of the sheets as they move generally upwardly to force the respective leading portions in opposite directions transversely of the plane of the sheets, disposing the sheets in generally coplanar relation at an angle to the vertical with their respective drip edges oppositely oriented, delivering the sheets in the same direction generally parallel to the adjacent edges of the sheets while the sheets are in said generally coplanar relation, changing the direction of movement of the sheets so that they follow one another in a direction transversely of their adjacent edges and moving the sheets in the last mentioned direction onto a pile with the trailing sheet atop the leading sheet.

4. A method of handling sheets delivered from a dipping tank comprising delivering two sheets each having a drip edge generally upwardly in substantially horizontally side-by-side generally coplanar relation with their drip edges trailing, engaging the leading portion of at least one of the sheets as the sheets move generally upwardly to turn at least one of the sheets transversely of the plane of the sheets, disposing the sheets in generally coplanar relation at an angle to the vertical with their respective drip edges oppositely oriented, delivering the sheets in the same direction generally parallel to the adjacent edges of the sheets generally in their common plane, changing the direction of movement of the sheets so that they follow one another in a direction transversely of their adjacent edges and moving the sheets in the last mentioned direction onto a pile with the trailing sheet atop the leading sheet.

5. Apparatus for handling sheets delivered from a dipping tank comprising means for delivering in a direction generally parallel to the adjacent edges of the sheets two sheets in generally coplanar side-by-side relation, means for turning the sheets in opposite directions transversely of the plane of the sheets, means for catching the thus turned sheets and delivering them in generally parallel relation in the same direction transversely of said first mentioned direction and a conveyor receiving the thus delivered sheets and further delivering them one following the other in a direction transversely of their adjacent edges to a pile where the trailing sheet is disposed atop the leading sheet.

6. Apparatus for handling sheets delivered from a dipping tank comprising means for delivering two sheets each having a drip edge generally upwardly in substantially horizontally side-by-side generally coplanar relation with their drip edges trailing, deflecting means positioned to engage the leading portion of at least one of the sheets as the sheets move generally upwardly

to turn at least one of the sheets transversely of the plane of the sheets, means for catching the sheets and delivering them in generally side-by-side relation in the same direction generally parallel to the adjacent edges of the sheets at an angle to the vertical with the drip edges of the respective sheets oppositely oriented and a conveyor receiving the thus delivered sheets and further delivering them one following the other in a direction transversely of their adjacent edges to a pile where the trailing sheet is disposed atop the leading sheet.

7. Apparatus for handling sheets delivered from a dipping tank comprising means for delivering two sheets each having a drip edge generally upwardly in substantially horizontally side-by-side generally coplanar relation with their drip edges trailing, two deflectors positioned at different angles to the vertical, one in the path of each sheet, for engaging the leading portions of the sheets as the sheets move generally upwardly to turn the respective sheets transversely of the plane of the sheets in opposite directions, means for catching the thus turned sheets and delivering them in generally coplanar relation in the same direction generally parallel to the adjacent edges of the sheets at an angle to the vertical with the drip edges of the respective sheets oppositely oriented and a conveyor receiving the thus delivered sheets and further delivering them one following the other in a direction transversely of their adjacent edges to a

pile where the trailing sheet is disposed atop the leading sheet.

8. Apparatus for handling sheets delivered from a dipping tank comprising means for delivering two sheets each having a drip edge generally upwardly in substantially horizontally side-by-side generally coplanar relation with their drip edges trailing, two deflectors positioned at different angles to the vertical, one in the path of each sheet, for engaging the leading portions of the sheets as the sheets move generally upwardly to turn the respective sheets transversely of the plane of the sheets in opposite directions, supporting means at an angle to the vertical for catching the thus turned sheets and on which the sheets are adapted to be delivered in the same general direction generally parallel to the adjacent edges of the sheets with the drip edges of the respective sheets oppositely oriented and a conveyor receiving the thus delivered sheets and further delivering them one following the other in a direction transversely of their adjacent edges to a pile where the trailing sheet is disposed atop the leading sheet.

STEVE J. BRUNANSKY.
HAROLD FORSYTHE.

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