Aug. 11, 1942. J. E. ERHARDT, JR., ET AL 2,292,781

SHEET HANDLING AND TREATING MECHANISM

Filed Sept. 25, 1940 8 Sheets-Sheet 1

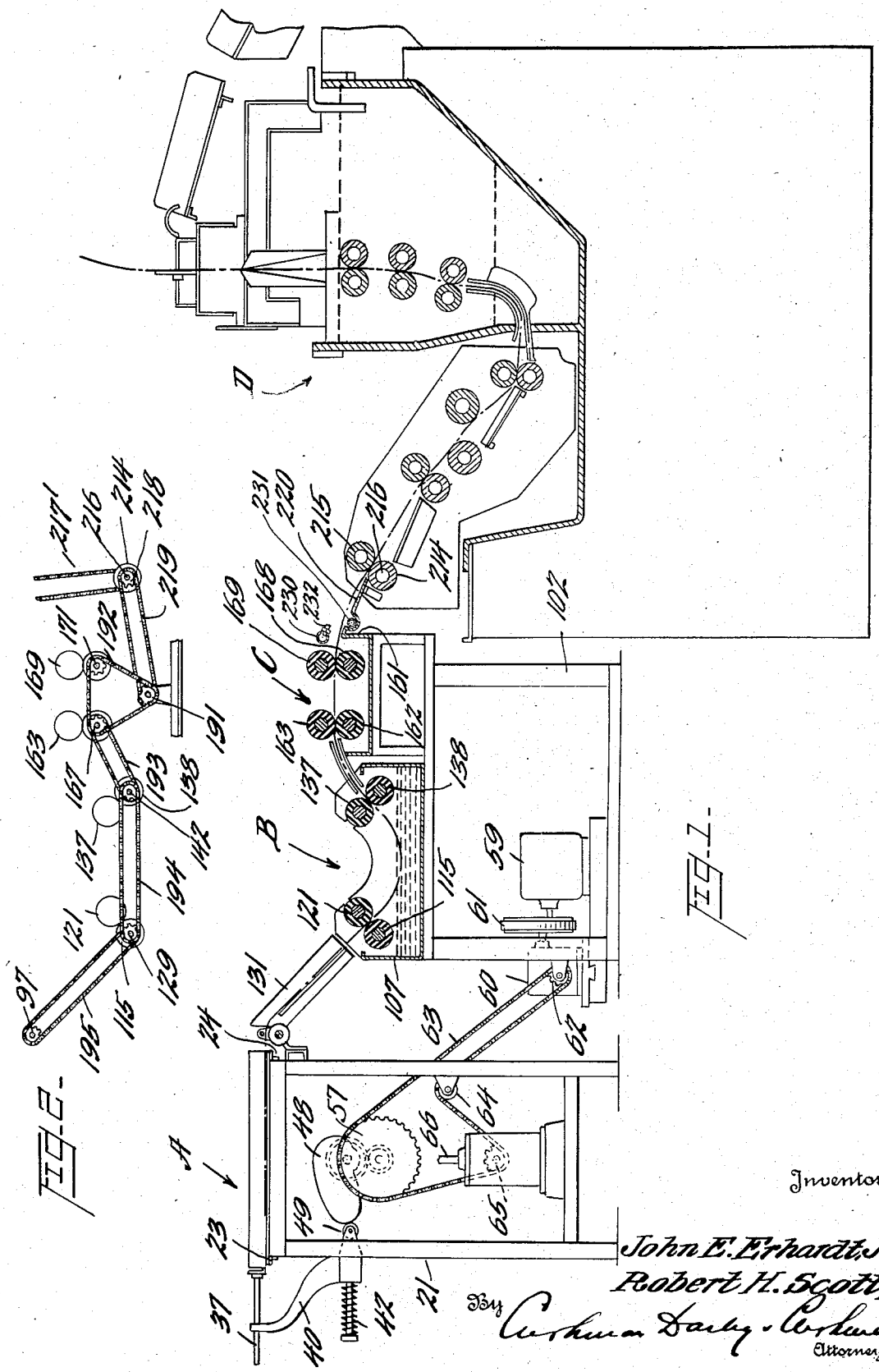


FIG. 1.

FIG. 2.

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SHEET HANDLING AND TREATING MECHANISM

Filed Sept. 25, 1940 8 Sheets-Sheet 2

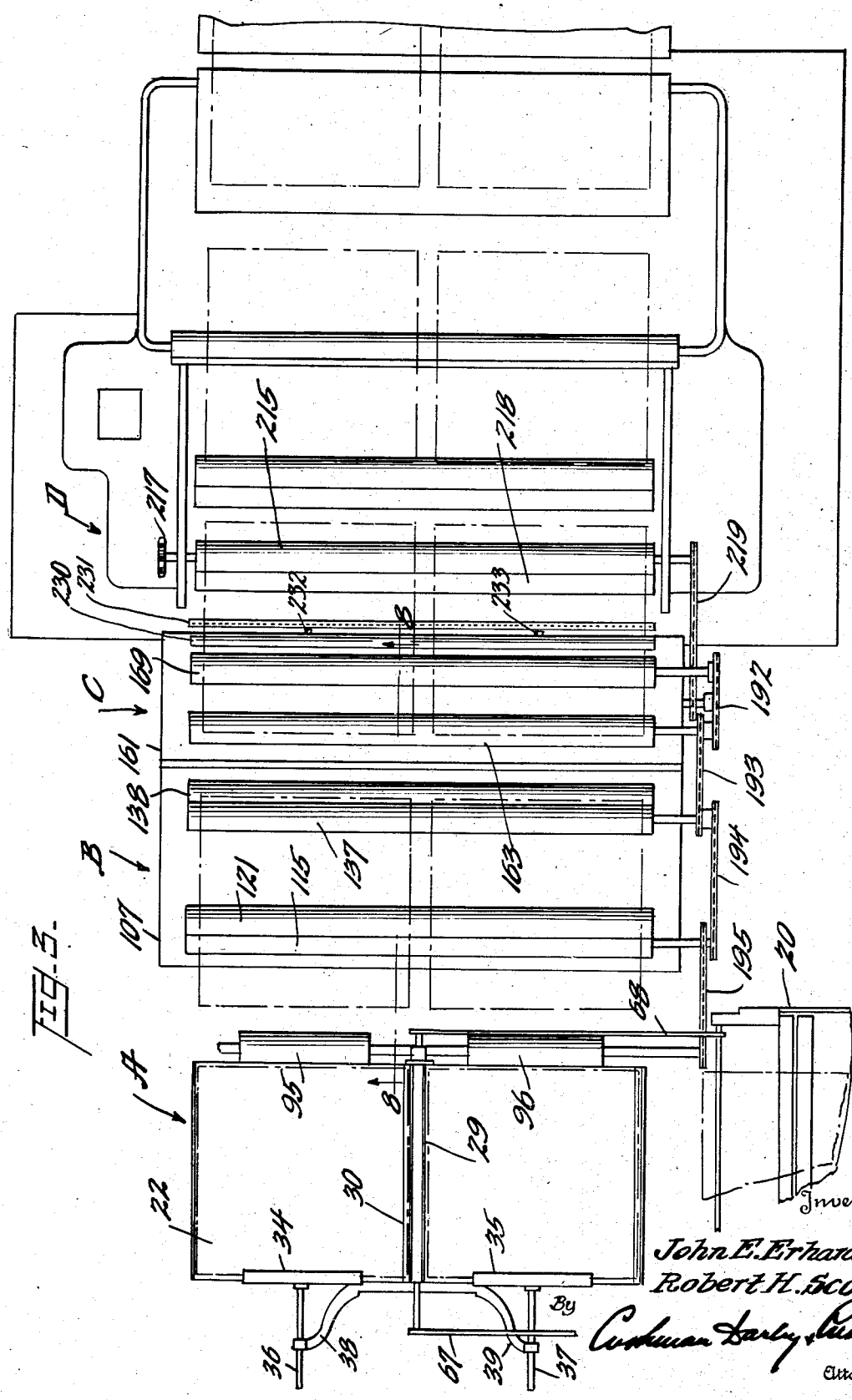


FIG. 3.

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SHEET HANDLING AND TREATING MECHANISM

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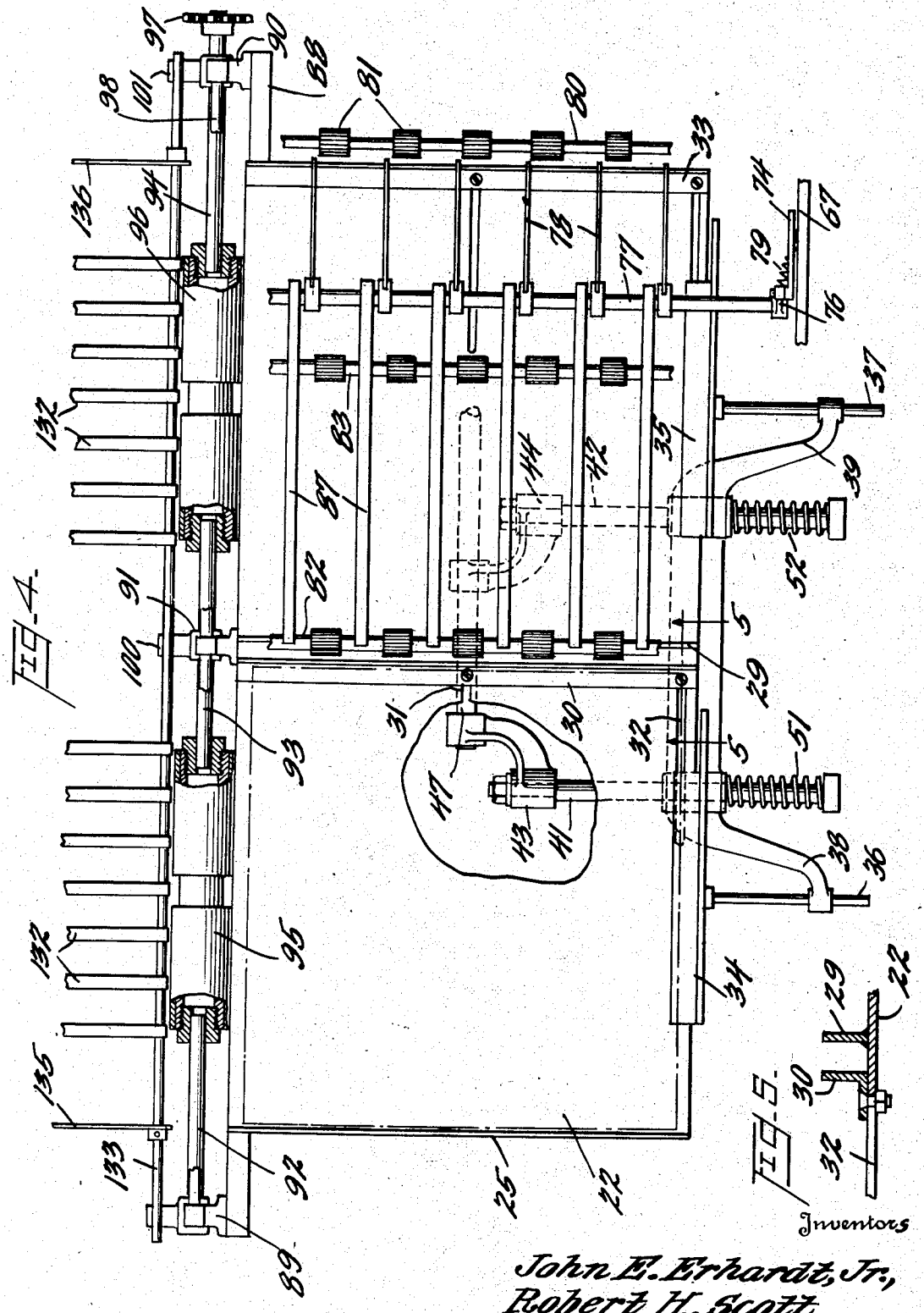


FIG-4.

FIG-5.

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SHEET HANDLING AND TREATING MECHANISM

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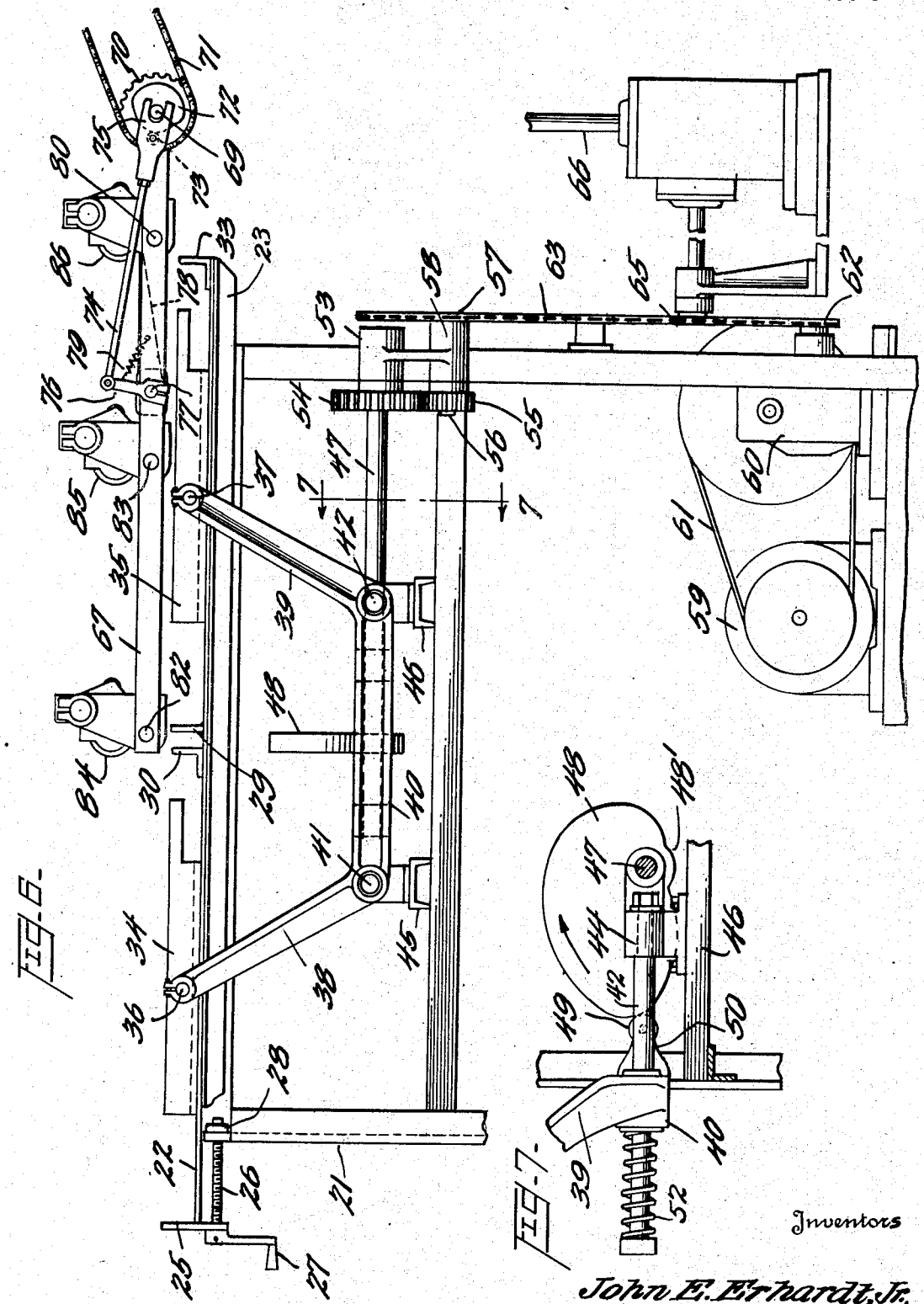


FIG. 6.

FIG. 7.

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SHEET HANDLING AND TREATING MECHANISM

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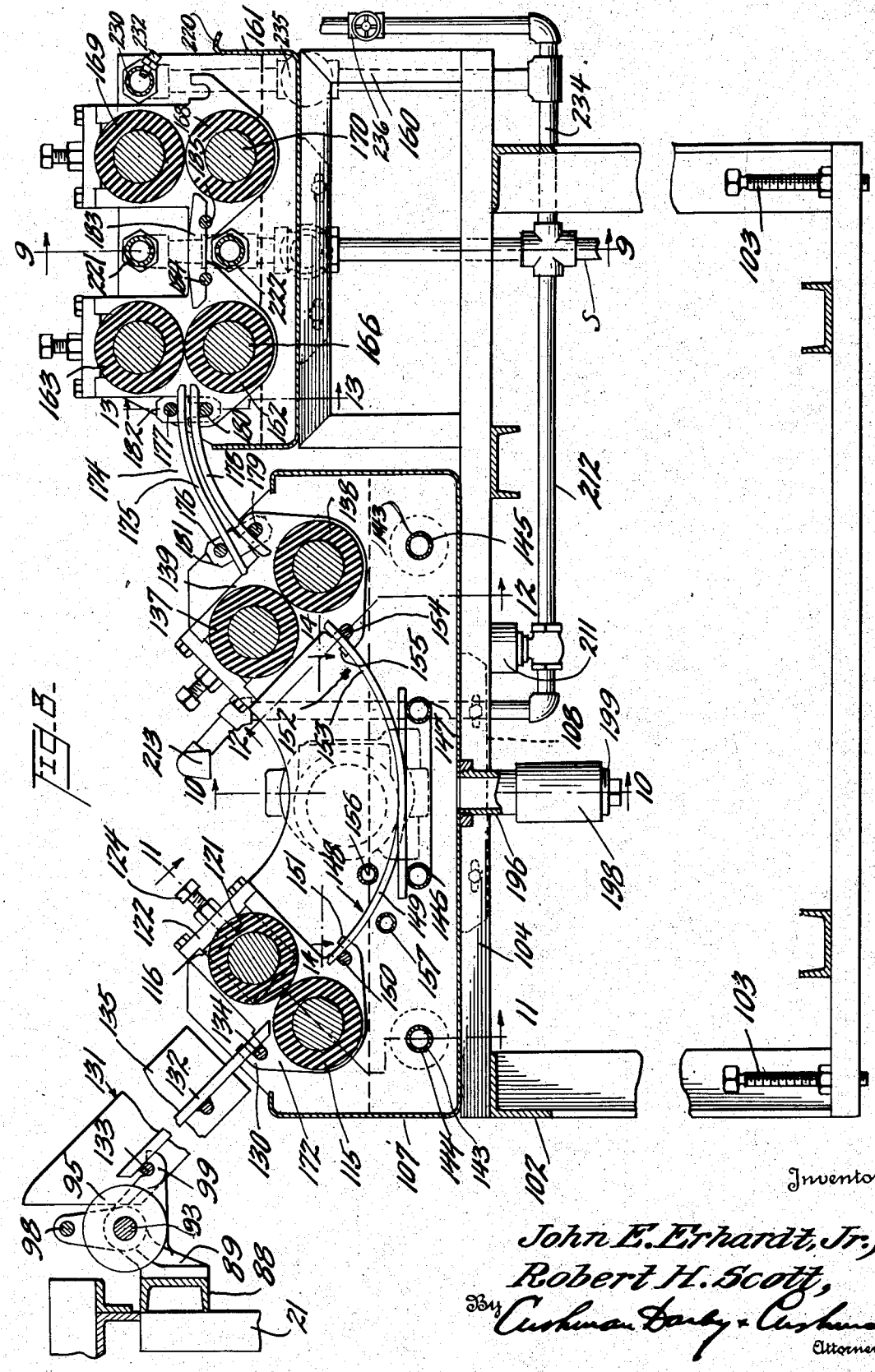


FIG. 8.

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SHEET HANDLING AND TREATING MECHANISM

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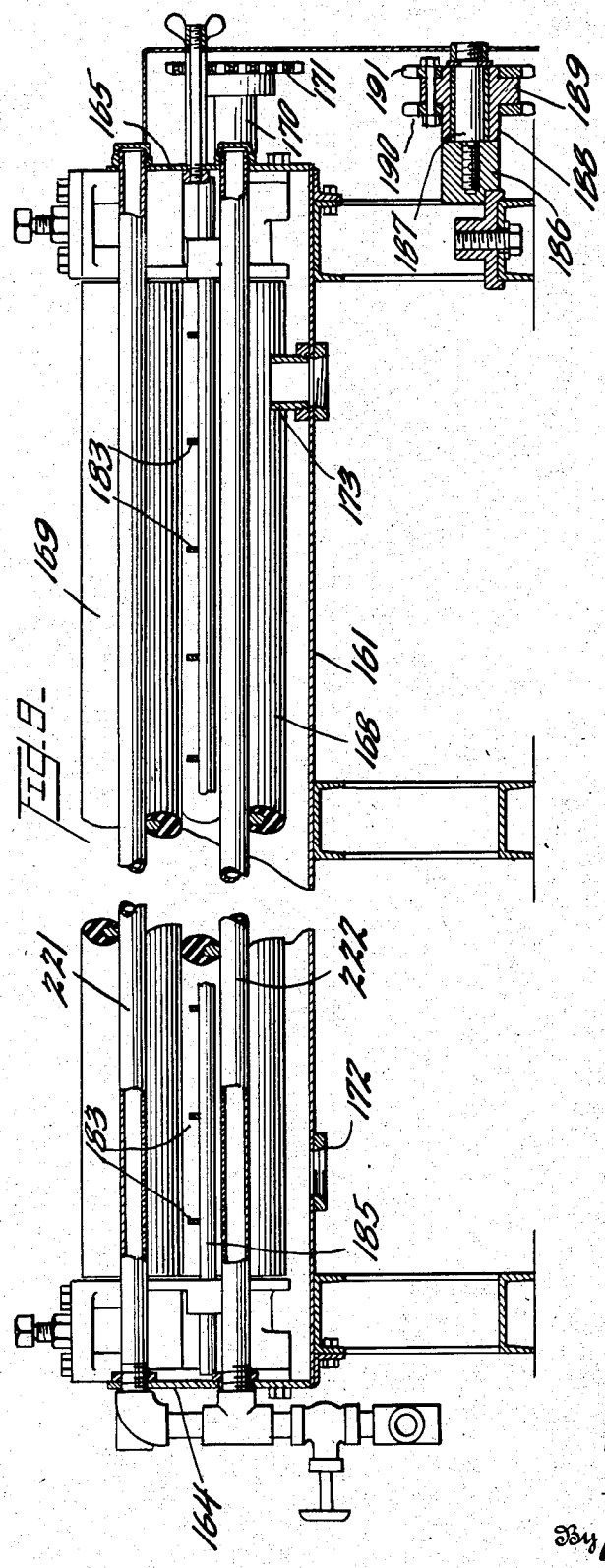


FIG. 9.

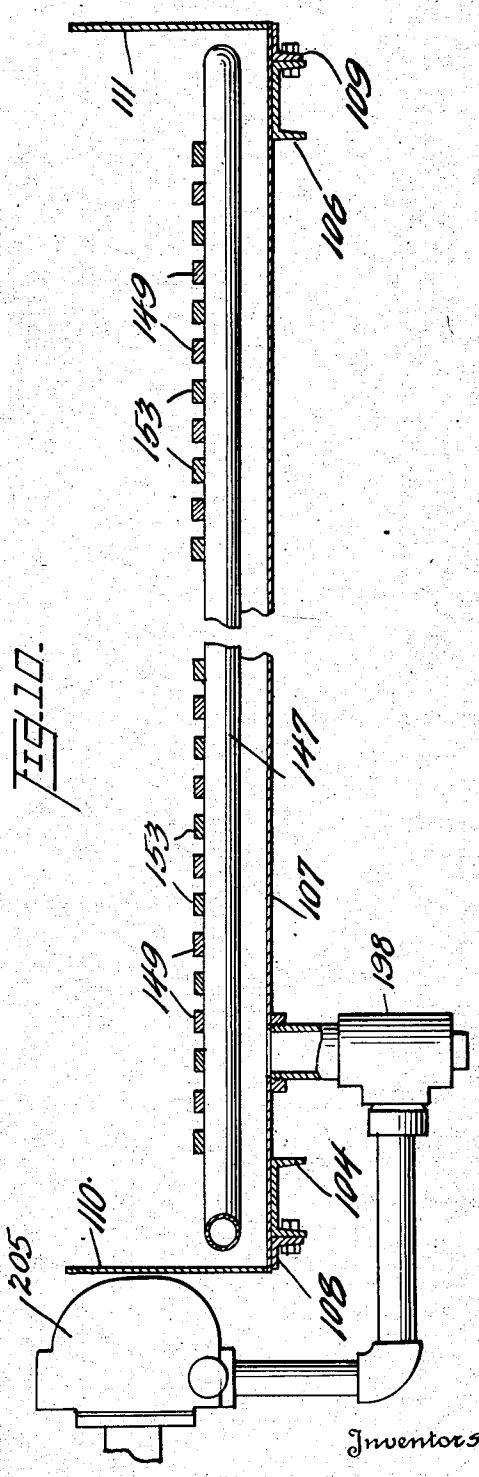


FIG. 10.

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SHEET HANDLING AND TREATING MECHANISM

Filed Sept. 25, 1940 8 Sheets-Sheet 7

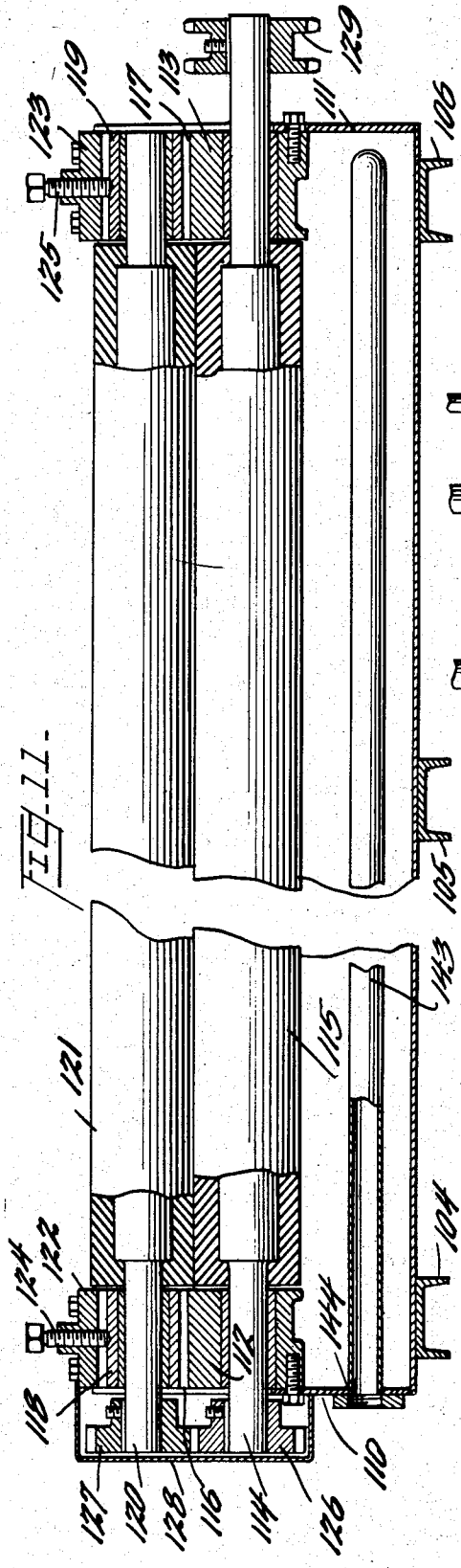


FIG. 11.

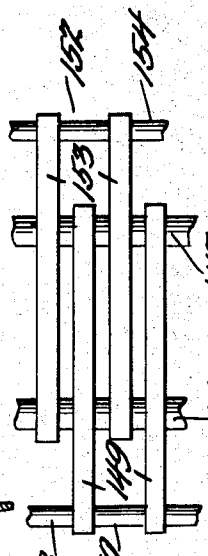


FIG. 14.

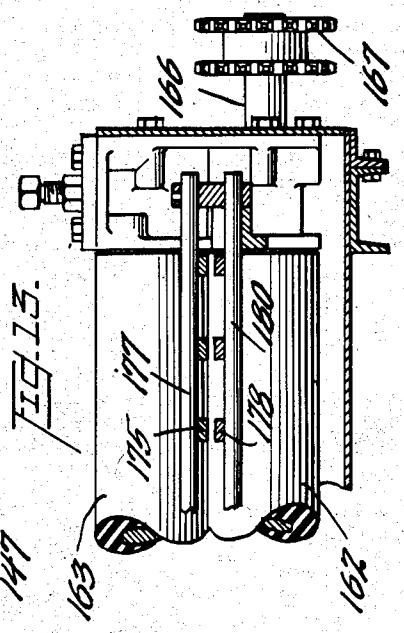


FIG. 13.

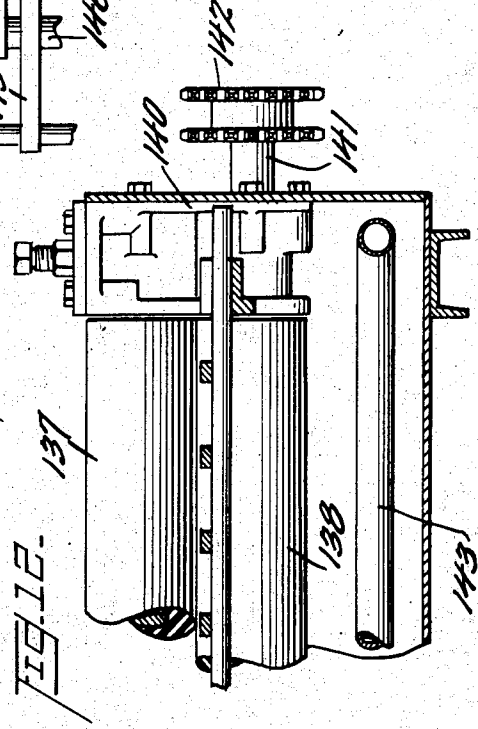


FIG. 12.

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SHEET HANDLING AND TREATING MECHANISM

Filed Sept. 25, 1940 8 Sheets-Sheet 8

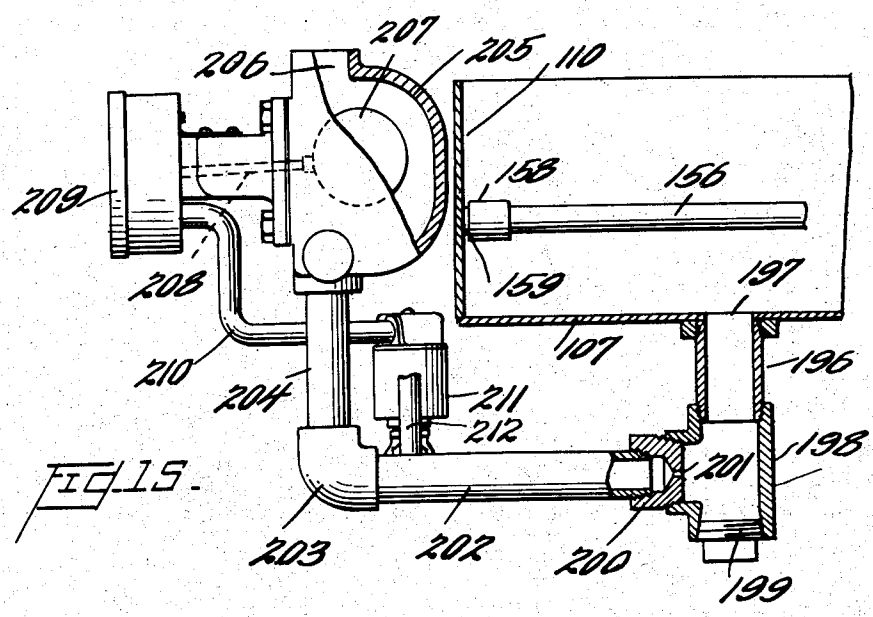
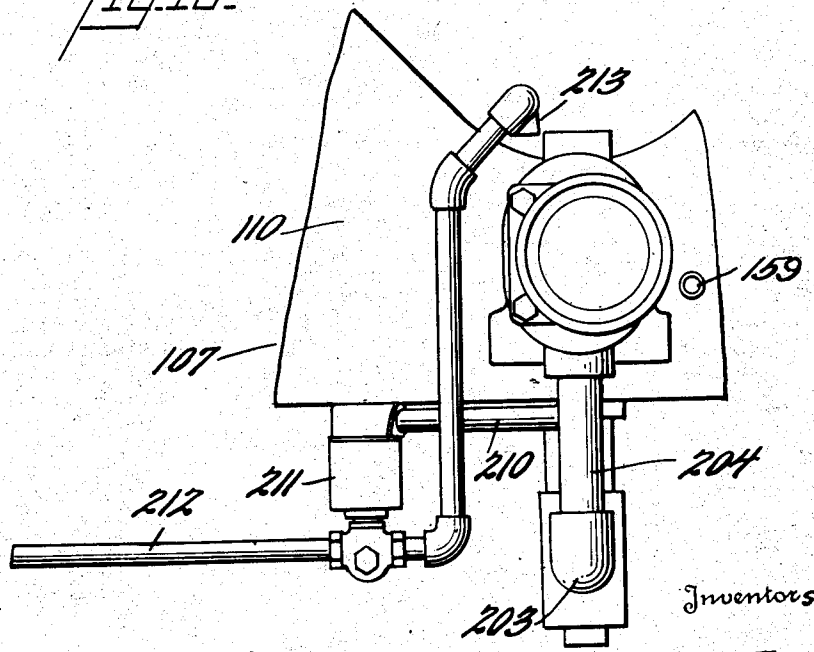


FIG. 15.

FIG. 16.



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Patented Aug. 11, 1942

2,292,781

UNITED STATES PATENT OFFICE

2,292,781

SHEET HANDLING AND TREATING MECHANISM

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Application September 25, 1940, Serial No. 358,358

11 Claims. (Cl. 271—8)

This invention is concerned with sheet handling mechanism, particularly as associated with pickling apparatus in a plating line, or as forming part of the line. A general object of the invention is to provide for the smooth and accurate handling of the sheets entirely mechanically from an original stack through a pickler and a washer and up to the plating apparatus, for example, a tin pot, and to assure effective pickling and washing operations. In the interest of increased output, the invention contemplates a preferred system through which sheets may be passed abreast, and in this connection an object of the invention is to provide means for accurately starting through the system a plurality of sheets in abreast relation.

Typical apparatus in accordance with the invention, is shown by way of example in the accompanying drawings with reference to which description will be made.

In the drawings:

Figure 1 is an elevation, with parts in section, of a system embodying the invention.

Figure 2 shows diagrammatically a part of the drive arrangement for the system in Figure 1.

Figure 3 is a plan view, with parts omitted, of the system of Figure 1.

Figure 4 is a plan view, enlarged, and with details supplied, of sheet dividing and feeding mechanism included in the system.

Figure 5 is a section substantially on line 5—5 of Figure 4.

Figure 6 is an elevation of the apparatus of Figure 4.

Figure 7 is a section substantially on line 7—7 of Figure 6.

Figure 8 is a section substantially on line 8—8 of Figure 3, with details added.

Figure 9 is a section substantially on line 9—9 of Figure 8.

Figure 10 is a section substantially on line 10—10 of Figure 8.

Figure 11 is a section substantially on line 11—11 of Figure 8.

Figure 12 is a section substantially on line 12—12 of Figure 8.

Figure 13 is a section substantially on line 13—13 of Figure 8.

Figure 14 is a section substantially on line 14—14 of Figure 8.

Figure 15 is a partial section on line 10—10 of Figure 8 showing liquid level maintaining apparatus, and

Figure 16 is an elevation of the apparatus of Figure 15.

Referring to the drawings, reference character A, Figure 1, designates generally a sheet divider and feeder, reference character B a pickler, reference character C a washer or rinser, and reference character D a tin pot, the latter being of any conventional construction.

In Figure 3, reference numeral 20 designates conventional mechanism for feeding sheets singly from a stack and as a matter of reference this feeder will herein be assumed to be that of Patent 2,184,296, granted December 26, 1939, to Goebel and Chantland. The feeder 20 is disposed at the side of the divider and feeder A.

The latter comprises an upright frame 21 which may be conveniently built up of angles, the frame supporting a top plate 22 slidably guided on the top of the frame 21 by angles 23 and 24, Figure 1, for movement toward and away from the stack feeder. At its far side, plate 22 has secured to its edge a strip 25 in a downwardly projecting portion of which is rotatably engaged a screw 26 which has fixed thereto outwardly of plate 22 a crank 27, the other end portion of the screw being engaged in a nut 28 fixed against a top cross member of frame 21, Figure 6. Plate 22 follows the screw as the latter is threaded in and out of nut 28. Substantially centrally of plate 22, a strip 29 is welded thereon in parallel relation to strip 25. To the left of strip 29 an angle 30 is adjustably secured on the top plate by means of bolts passed through the horizontal flange of the angle and through slots 31 and 32 in the plate. To the right of strip 29 and adjacent the edge of plate 22, an angle 33 is adjustably mounted on the plate in the same manner as the angle 30. Members 25 and 30 constitute parallel sheet guides as do also members 29 and 33, members 30 and 33 being adjustable in accordance with the width of the sheet and all of the guides being adjustable with plate 22 relative to frame 21 for properly disposing the guideways as a whole.

Pushers 34 and 35 are slidable on top of plate 22 between guides 25 and 30, and 29 and 33 respectively. Each pusher, as here shown, is constituted by an angle with one flange resting flatly on the plate, the right hand ends of the pushers being undercut, as shown in Figure 6, so as to clear the bottom flanges of angles 30 and 33 when the latter are adjusted to the left. The pushers have secured thereto rearwardly extending rods 36 and 37 which are clamped in the upper ends of arms 38 and 39 of a frame 40,

the latter being slidable on parallel rods 41 and 42 whose forward ends are supported in brackets 43 and 44 fixed on cross members 45 and 46 of the frame 21. Brackets 43 and 44 rotatably support a shaft 47 on which is fixed a cam 48 having a follower in the form of a roller 49 carried by an extension 50 of frame 40. Compression springs 51 and 52 engaged between frame 40 and abutments on the ends of rods 41 and 42 hold follower 49 against cam 48.

One end of shaft 47 is journaled in a bearing 53 on a part of frame 21, Figure 6, and adjacent the bearing the shaft has fixed thereon a gear 54 which engages a gear 55 fixed on one end of a shaft 56 to whose other end is fixed a sprocket 57, the shaft 56 being journaled in a bearing 58 below bearing 53.

A motor 59, Figures 1 and 6, is connected into a speed reducer 60 through change speed mechanism such as Reeves gearing 61. The reducer 60 has an output sprocket 62 connected with sprocket 57 by a chain 63, the latter passing over an idler 64 on frame 21 and having a bight engaging a sprocket 65 of a gear box which has an upright output shaft 66 for the drive of the stack feeder 20, the drive going to the main timing shaft of the latter.

The pushers 34 and 35 are shown in rearmost position in the drawings, wherein they overlie the rear margin of plate 22. This limit position is, however, adjustable through adjustment of rods 36 and 37 relative to arms 38 and 39. As shaft 47 is driven, cam 48 is rotated in the direction of the arrow, Figure 7, and the pushers are moved forward by springs 51 and 52 until a short dwell 48' of the cam is encountered, the pushers being then returned during continued rotation of the cam. The forward movement of the pushers is utilized to simultaneously advance sheets which have been deposited on the table between the guides, by any suitable mechanism of which an example will now be described.

Extending from the stack feeder 20 above, and partially across the table, is a frame which includes horizontal side bars 67 and 68, Figures 3, 4 and 6, this frame replacing the table shown in the above mentioned patent, or, if desired, being a continuation of the latter. The free end of the frame may be supported above the table in any convenient manner. Journaled between bars 67 and 68, adjacent the stack feeder, is a shaft 69 having fixed thereon a sprocket 70 for drive through a chain 71 from the timing shaft of the stack feeder. Fixed against one face of sprocket 70 is a cam 72 engaged by a follower roller 73 on a pitman 74 which has a bifurcated end 75 straddling shaft 69 so as to properly position the follower. The other end of pitman 74 is pivoted to an upwardly extending arm 76 on a shaft 77 journaled in bars 67 and 68, the shaft 77 having fixed thereon a series of fingers 78 projecting toward shaft 69, the upper edges of the fingers being normally substantially horizontally disposed as shown in Figure 6. A tension spring 79, secured between arm 76 and bar 67, holds roller 73 against cam 72.

At the extremities of fingers 78, a shaft 80 is journaled between bars 67 and 68 and has fixed thereon feed rollers 81. A similar shaft 82 is journaled in the side bars adjacent their extremities, and a further similar shaft 83 is journaled in the side bars between shafts 77 and 82 and adjacent the former, shafts 80, 82 and 83 being all driven in the manner disclosed in the above mentioned patent. Also, as disclosed in the said patent hold-down rollers 84, 85 and 86 cooperate with the feed rollers, and skid strips 87 extend between shafts 77 and 82.

With the deflector, constituted by shaft 77 and finger 78, in the position of Figure 6, a sheet coming from the stack feeder will pass over the deflector and over the end of the conveyor or propelling means on to the table between guide elements 25 and 30 which are adjusted to receive the sheet between them with sliding clearance. As this sheet left the extremities of fingers 78, shaft 77 was rocked in a counter-clockwise direction, Figure 6, from cam 72, so that as the next sheet reaches the fingers it is deflected downwardly onto the table between guide elements 29 and 33. At this point the pushers 34 and 35 are moved forwardly as above described, so that the two sheets are simultaneously advanced and are fully withdrawn from the table by means which will be later described. The next sheet will be discharged from the end of the conveyor before pusher 34 has returned completely to its outer position, the pusher moving out from underneath the sheet and the adjacent margin of the latter eventually dropping onto the horizontal flange of the pusher. The same applies to pusher 35. It will thus be seen that sheets fed in a line, i. e., in tandem, are divided, alternate ones being deflected, and that the sheets are advanced simultaneously abreast in pairs, one sheet deep. While as here shown the advanced groups consist of pairs of sheets, it will be understood that the invention is not limited in this respect and that additional guideways and deflectors can be provided, if desired, so that the groups can consist of any reasonable number of sheets.

Secured to the rear side of frame 21 adjacent its upper end is a horizontal channel 88 to the ends of which are fixed a pair of brackets 89 and 90, a further bracket 91 being secured to the channel centrally thereof. The brackets rotatably support shaft sections 92, 93 and 94 which are fixed in the ends of a pair of magnetic rolls 95 and 96, these rolls being of known construction. Fixed on the right hand end of shaft 94, Figure 4, is a sprocket 97. The brackets have upward extensions in which is engaged a tie rod 98 which is spaced a slight distance above the rolls, as indicated in Figure 8. Also, the brackets have rearward extensions 99, 100 and 101 which are downwardly recessed to provide catch or hanger portions as particularly shown in Figure 8.

To the right of frame 21, Figures 1 and 8, is a frame 102 supported on vertically adjustable feet 103. Frame 102 includes three parallel horizontal channels 104, 105 and 106, Figure 11, in perpendicular relation to the vertical plane of the axis of rolls 95 and 96, these channels supporting a rectangular tank 107. The tank has fixed to its bottom wall a pair of angles 108 and 109 which lie against the outer flanges of channels 104 and 106 and are secured to the latter through bolts which pass through horizontal slots in the vertical angle flanges, Figure 8. In this manner the tank is secured in position on frame 102 with the possibility of adjustment along the latter.

Secured to the side walls 110 and 111 of the tank within the latter are bearing blocks 112 and 113 in the lower portions of which are journaled the ends of a shaft 114 carrying a rubber roll 115. Upper guideways 116 and 117 of the bearing blocks slidably receive bearings 118 and 119. Bearings 118 and 119 support the ends of a shaft 120 which carries a rubber roll 121. The upper

ends of the guideways are bridged by plates 122 and 123 in which are threaded screws 124 and 125 which bear against bearings 118 and 119 respectively for the purpose of holding roll 121 in proper contact with roll 115. The rolls are of the same diameter and the roll shafts are connected together through gears 126 and 127, of the same size, in a housing 128 removably secured to the outer face of side wall 110. Shaft 114 has secured to its right hand end, Figure 11, a double sprocket 129. Bearing blocks 112 and 113 are formed with catch or hanger portions as at 130, Figure 8.

A chute 131, Figures 1, 4 and 8, comprises bars 132 secured to transversely extending rods 133 and 134 whose ends are respectively engageable in catches 99 and 101 and the catches as at 130 of the bearing blocks. The central portion of rod 133 is also supported in the catch 100. As shown in Figure 4, there are two groups of bars 132, one in association with each of rolls 95 and 96. Outwardly of the bars 132, rods 133 and 134 support guide wings 135 and 136.

As particularly shown in Figure 8, the tops of the bars 132 are substantially tangential to the magnetic rolls, and the plane of rolls 115 and 121, which constitute infeed rolls for the pickler, is substantially perpendicular to the bars 132, the top plane of the latter being at the bite of the infeed rolls.

At the other end of the tank from the infeed rolls 115 and 121 is mounted a pair of outfeed rolls 137 and 138, these being exactly the same as the infeed rolls and similarly mounted in bearing blocks 139 and 140, Figures 8 and 12, the shaft 141 of roll 138 having fixed thereon a double sprocket 142 like sprocket 129. The plane of the outfeed roll axes is inclined to the same extent but oppositely to the plane of the infeed roll axes.

Reference numeral 143 designates a steam pipe which is brought through the side wall 110 at 144 and 145, Figures 8 and 11. The pipe is looped back and forth across the tank and includes cross portions 146 and 147, Figures 8, 10, 11 and 12, which are horizontally disposed in parallelism and are equally spaced from the infeed and outfeed rolls respectively.

A cage 148 comprises arcuate bars 149 in parallel relation fixed to a cross rod 150 whose ends are engaged in catches as at 151, Figure 8, in bearing blocks 112 and 113. With the cage 148 in the operative position shown, the free ends of its bars are supported freely on the pipe section 147. A similar cage 152 includes arcuate bars 153 secured to a cross rod 154 whose ends are supported in catches as at 155 of bearing blocks 139 and 140, the free ends of bars 153 resting freely on the pipe section 146 and the bars 153 being alternated with the bars 149. The lower interengaged portions of the cages 148 and 152 are below the indicated liquid level in tank 107, Figure 8. As shown in this figure, a pipe 156 extends crosswise of the tank above the interengaged cage ends and has downwardly directed perforations, the perforations being below the liquid level. A pipe 157 extends crosswise of the tank below cage 148 and beneath the liquid level, the pipe 157 having upwardly directed perforations. As indicated in Figure 15, the pipe 156, is engaged through a threaded coupling sleeve 158 with an inlet nipple 159 set in side wall 110 and consequently pipe 156 is readily removable. Pipe 157 may extend fixedly from side wall 110. The ends of these pipes adjacent tank wall 111 are closed so that when steam or other gaseous medium is supplied thereto agitating jets will be directed upwardly and downwardly toward cage 148.

It is desirable that the level of the pickling liquid in tank 107 be maintained at a substantially constant level and for this purpose the tank is preferably equipped with the level maintaining means particularly shown in Figures 15 and 16. In these figures reference numeral 196 designates a nipple secured to the tank bottom beneath an opening 197, the nipple being engaged with one end of a T 198 whose opposite lower end is ordinarily closed by a drain plug 199. Engaged in the side opening of the T is a fitting 200 which communicates with the T through an orifice 201. A horizontal pipe section 202 engaged in fitting 200 is connected through an elbow 203 with an upright pipe section 204 whose upper end is connected into a float chamber 205 having a top opening 206. The arrangement is such that the level in tank 107 is maintained also in the float chamber 205, but abrupt fluctuations in the tank are not communicated to the float chamber due to the provision of the restricted orifice 201 which serves as a damping means. A float 207 in chamber 205 has an arm 208 in connection with a switch, such as a mercury switch, in housing 209, the switch being adapted to close an energizing circuit, disposed in a conduit 210, up to a normally closed solenoid valve 211 arranged in a supply line 212 for water or pickling solution, the supply line terminating in a spout 213 above tank 107. When the fluid level drops sufficiently in the tank and float chamber the switch is closed and the consequent operation of the solenoid valve permits the supply of liquid to the tank until the normal level is restored, the float then opening the switch so that the valve 211 closes.

A frame 160 on frame 102 supports a washer tank 161 in exactly the same manner in which tank 107 is supported on frame 102. At the entering end of the tank infeed rolls 162 and 163, exactly like rolls 115 and 121, are supported in bearing blocks on the side walls 164 and 165 of tank 161. However, the common plane of the axes of rolls 162 and 163 is vertical. The shaft 166 of roll 162 has fixed thereon a double sprocket 167. Spaced from rolls 162 and 163 are outfeed rolls 168 and 169 arranged similarly in bearing blocks on the tank side walls. The axis of roll 168 is in the same horizontal plane as the axis of roll 162 and the axes of rolls 163 and 169 are in a common horizontal plane. The axes of rolls 168 and 169 are in a common vertical plane. The shaft 170 of roll 168 has fixed thereon a sprocket 171. The bottom wall of tank 161 is provided with a drain opening 172 and with an overflow opening 173, the latter being adapted to maintain liquid in the tank at a level above the lower portions of rolls 162 and 168.

A chute or guideway 174 comprises an upper series of arcuate bars 175 secured to cross rods 176 and 177 and a lower series of arcuate bars 178 secured to cross rods 179 and 180. The ends of cross rods 176 and 179 are secured in spacer blocks as at 181 and the ends of rods 177 and 180 are secured in spacer blocks as at 182, Figure 8. End portions of rods 179 and 180 are receivable in catches provided in the bearing blocks of the pickler outfeed rolls and of the washer infeed rolls as indicated in Figures 8 and 13. The left hand opening of the guide 174, Figure 8,

is flared toward the bite of outfeed rolls 137 and 138, while the right hand opening is directed toward the bite between the infeed washer rolls 162 and 163. Bars 183 fixed on cross rods 184 and 185 constitute guide means between the infeed and outfeed rolls of the washer, the cross rods being supported in catches provided on adjacent portions of the bearing blocks for the said rolls. Perforated transverse pipes 221 and 222 direct jets of water toward the top and bottom of the guide means.

Mounted on frame 102 below sprockets 167 and 171 is a bracket 186, Figure 9, into which is threaded a jack shaft 187 on which is rotatable a sleeve 188. The sleeve 188 has a radial flange 189 against the opposite faces of which are bolted sprockets 190 and 191. Referring to Figure 2, the sprocket 191 is connected with sprocket 171 and the outer sprocket of the double sprocket 167 by a chain 192. The inner sprocket of the unit 167 is connected by a chain 193 with the inner sprocket of the sprocket unit 142 of which the outer sprocket is connected through a chain 194 with the outer sprocket of unit 129. The inner sprocket of the latter is connected through a chain 195 with sprocket 97 on the magnetic roll shaft. All the rolls are of the same size as are also the sprockets, and consequently the peripheral roll speed is the same throughout. We have shown the infeed rolls for the pickler as being in driven connection with each other through gears 126 and 127 and the output rolls 137 and 138 are assumed to be similarly geared together. However, in some cases drive to a single roll of each of the infeed and outfeed pairs will suffice. While no gear connection has been shown between the rolls of each pair of washer rolls, such connection may be provided if desired.

The tin pot D has the conventional feed rolls, those of the initial pair being designated by the reference numerals 214 and 215, Figure 1. It is here assumed that drive from any suitable source of power comes to a sprocket 217 on shaft 216 of roll 214 through a chain 217'. According to the present invention a sprocket 218 fixed on shaft 216 is connected through a chain 219 with the sprocket 190 on the jack shaft 187. Thus, the drive for the magnetic roll and for the rolls of the pickler and washer unit comes from the tin pot drive so that proper synchronization is readily securable. Tin pot feed rolls become pitted in service and require machining from time to time, thus reducing their diameter. On the other hand, the rolls of the pickler and washer, which are here considered to be of rubber, show little wear in use and, consequently, if there were no compensating means, the peripheral speed of the tin pot rolls would fall below that of the pickler and washer rolls with consequent loss of synchronization. It is therefore, most desirable that synchronization be restorable through suitable adjusting means. In order that this readjustment may be accomplished I have provided the readily removable jack shaft sprockets and, for example, by replacing sprocket 190 with a sprocket having one or more additional teeth, synchronization can be readily restored. Other ratio changing means may be utilized but I have found the replaceable sprocket to be simple and satisfactory in use. An adjustable idler may be provided for chain 219 in order that the chain may be properly tensioned for sprockets of different sizes.

With the apparatus driven, the magnetically attractable sheets are advanced abreast by the pushers 34 and 35 to the magnetic rolls 95 and 96 which deliver the sheets to the chute 131, whipping of the sheets as they overbalance beyond the roll being restrained by the tie rod 98. The sheets slide from chute 131 into the bite of the pickler infeed rolls 115 and 121, and are advanced by the latter in bowed relation along cages 148 and 153, through the pickling solution, to the outfeed rolls 137 and 138. The flexing of the sheets at this point tends to loosen scale or other matter so that the jets of fluid directed from the orifices of pipes 156 and 157 through the pickling liquid are particularly effective in removing these accretions. Due to the fact that bars 153 are staggered relative to bars 149, it is assured that the pickling solution will effectively reach all bottom surface portions of the sheets. The solution is preferably heated by means of the steam pipe 143, and the jets directed from pipes 156 and 157 against the top and bottom of the sheets bring about a beneficial agitation and scouring effect.

From the outfeed rolls 137 and 138, the sheets pass through the guide 174 to the infeed rolls 162 and 163 of the washer and across guide 183 to the outfeed rolls 168 and 169. As the sheets traverse the guide 183, they are washed on both sides by jets from pipes 221 and 222, excess water being squeezed from the sheets by the outfeed rolls. From the outfeed rolls the sheets pass down a chute 220 to the infeed rolls 214 and 215 of the tin pot.

As an important feature of the invention, there is provided sheet moistening means, here shown as a pair of pipes 230 and 231, Figures 1, 3 and 8, between the outfeed rolls of the washer and the tin pot. As particularly shown in Figure 3, pipe 230 has a pair of nozzles 232 and 233 disposed centrally of the lines of sheets. Pipe 231, Figure 1, is disposed in a trough of chute 220 in a manner not to interfere with the passage of sheets over the latter and is provided with upwardly directed perforations. A branch 234 from the water supply pipe S, Figure 8, is led to pipe 230 through a valve 235 and to pipe 231 through a valve 236. The nozzles 232 and 233 are designed to apply a spray throughout the top surfaces of the sheets, and jets from pipe 231 are arranged to apply moisture throughout the bottom surfaces of the sheets. As the sheets pass through the stratum of flux in the tin pot, the moisture is caused to boil, setting up violent agitation directly at and throughout the surfaces of the sheets and thus enabling the flux to come into intimate and uniform contact with the sheet surfaces. In practice we find that the pipe 231 may be shut off or omitted, it being only strictly essential to supply the moisture to the tops of the sheets. Natural agitation of the flux beneath the sheets is conducive to a thorough contact under ordinary conditions.

While we have shown the jet creating devices as connected to the water supply, they may, instead, be connected to the steam supply. Steam directed against the sheets condenses and the condensate boils as the sheets enter the hot flux. The application of a heated fluid has the advantage of raising the temperature of the sheets so that their cooling effect on the flux is reduced.

It will be observed that instead of letting the washing fluid through, the sheets are substantially dried as a result of the squeegee effect of the outfeed rolls, clean fluid being thereafter applied. To avoid contamination of the flux, the

acid-laden washing fluid is removed as far as possible and clean fluid is then applied in such proximity to the tin pot that the sheets will enter the flux with their top surface, or both surfaces, in moistened condition.

The linear speed of the pickling and tinning units is identical and constant regardless of the length of the sheets being run. The feeding mechanism, however, has independent and variable drive and, consequently, the space between succeeding sheets can be reduced and controlled to a fine degree, thus increasing production.

It will be evident that the apparatus of the present invention is readily arrangeable in proper relation to the tin pot. The chutes and guides can be readily mounted in position or removed, due to the described arrangement of supporting catches or hangers. This applies equally well to the guide means between the infeed and outfeed rolls of the pickler, this means being constituted by the independent cages 148 and 152. In removing cage 148 it will be necessary to remove pipe 156 also, and for this reason the latter is readily disconnectible as described.

Obviously, the invention is susceptible of varied embodiment as regards form and arrangement of parts, and, consequently, we do not limit ourselves in these respects except as in the following claims.

We claim:

1. The combination with apparatus adapted to feed sheets in tandem in the same direction, of means for receiving the fed sheets, and means for intermittently moving a plurality thereof abreast simultaneously.

2. The combination with apparatus adapted to feed sheets in tandem in the same direction, of a table in the line of feed onto which the fed sheets are delivered in a manner to be dischargeable from the table in abreast relation, and intermittently operated means for simultaneously discharging the sheets in abreast relation from the table.

3. The combination with apparatus adapted to feed sheets in the same direction in a single line, of means for simultaneously moving a plurality feed sheets in the same direction in a single line,

4. The combination with apparatus adapted to feed sheets in the same direction in a single line, of a table in the line of feed, means for depositing a plurality of fed sheets on the table in alignment in the feeding direction, and means for simultaneously discharging said plurality of sheets from the table transversely of the feeding direction.

5. The combination with sheet feeding means adapted to feed sheets in the same direction in a single line, of a table, means for receiving the fed sheets and successively distributing them by groups in side by side relation on the table in a single layer, and means operated each time a group has been deposited on the table to discharge the group in abreast relation.

6. The combination with sheet feeding means adapted to feed sheets in the same direction in a single line, of a table, a horizontal conveyor positioned to receive the fed sheets and successively distribute them by groups in side by side relation on the table in a single layer, and means operated each time a group has been deposited on the table to discharge the group in abreast relation.

7. Apparatus of the class described comprising a table, a horizontal frame extending above the table, sheet propelling mechanism carried by said frame, a deflector carried by said frame, means for intermittently operating said deflector to deflect alternate sheets downwardly from said frame onto the table, the other sheets being propelled over the end of said frame onto the table beside the deflected sheets, and means operated each time a pair of sheets has been deposited side by side on the table to discharge the said pair in abreast relation.

8. Apparatus of the class described comprising sheet feeding means adapted to feed sheets in the same direction in a single line, a table, means for receiving the fed sheets and depositing said sheets side by side on said table in successive groups of single sheet thickness, and means operated to discharge the sheets of individual groups in abreast relation.

9. Apparatus according to claim 4 wherein the table includes a supporting frame and a top plate, wherein pairs of parallel guide strips for the sheets are provided on said plate, wherein one guide strip of each pair is laterally adjustable relative to said plate, the adjustable guide strips being the corresponding ones of the pairs, and wherein means is provided for adjusting said plate relative to said frame perpendicularly to the longitudinal direction of said strips.

10. Apparatus according to claim 4 wherein the discharging means is constituted by reciprocable pushing means working over the table between limit positons, and wherein adjustable means is provided for determining said limit positions.

11. Apparatus of the class described comprising a table, means for depositing a magnetically attractable sheet on said table, a magnetic roll at one side of said table, a member reciprocable on top of the table and adapted to move a sheet into contact with said roll, means for rotating said roll in a direction to continue the movement of the sheet, and a chute arranged to receive the sheet from said roll.

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