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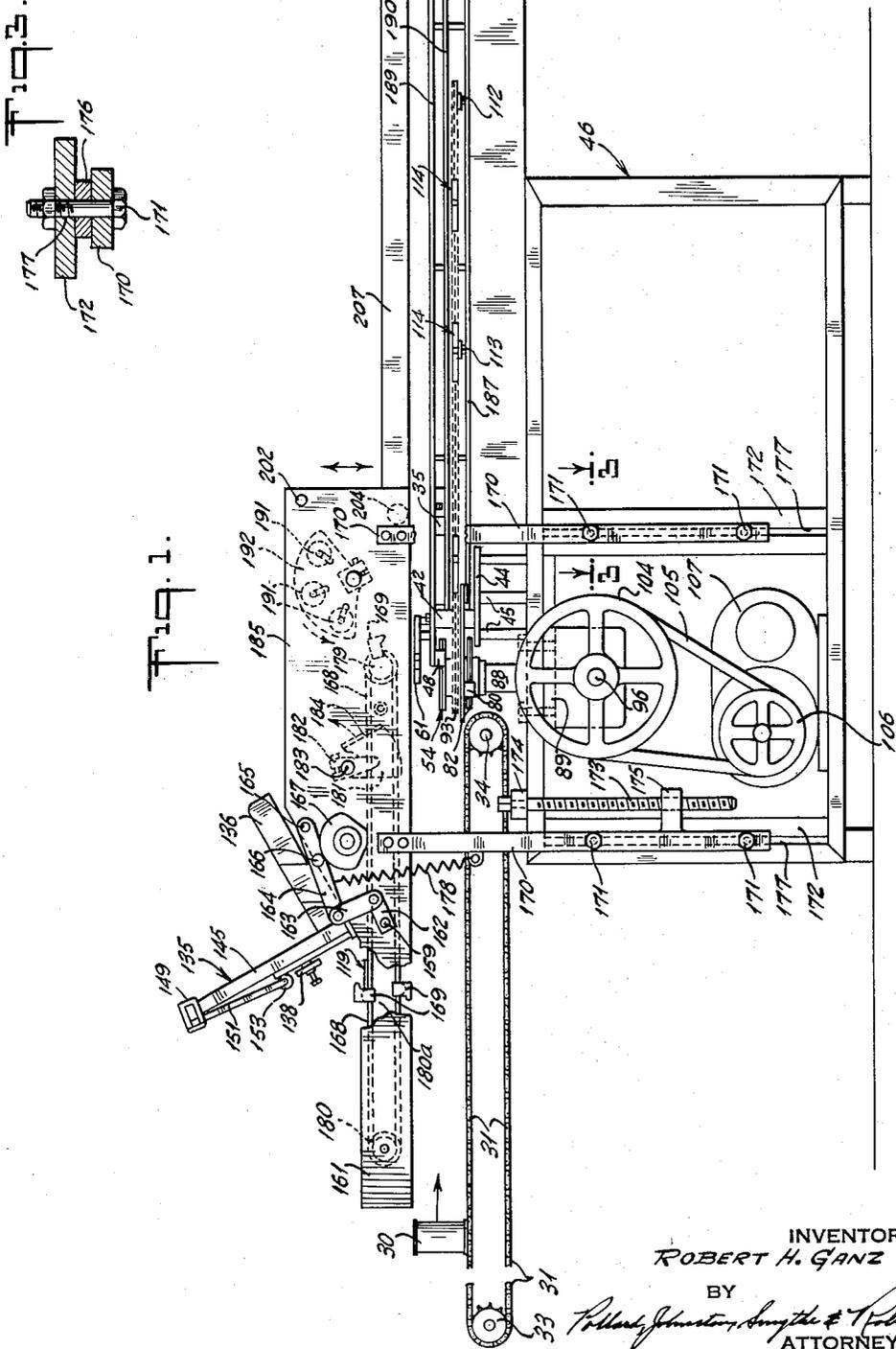
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METHOD AND MACHINE FOR PACKAGING ARTICLES

Filed Nov. 20, 1958

12 Sheets-Sheet 1



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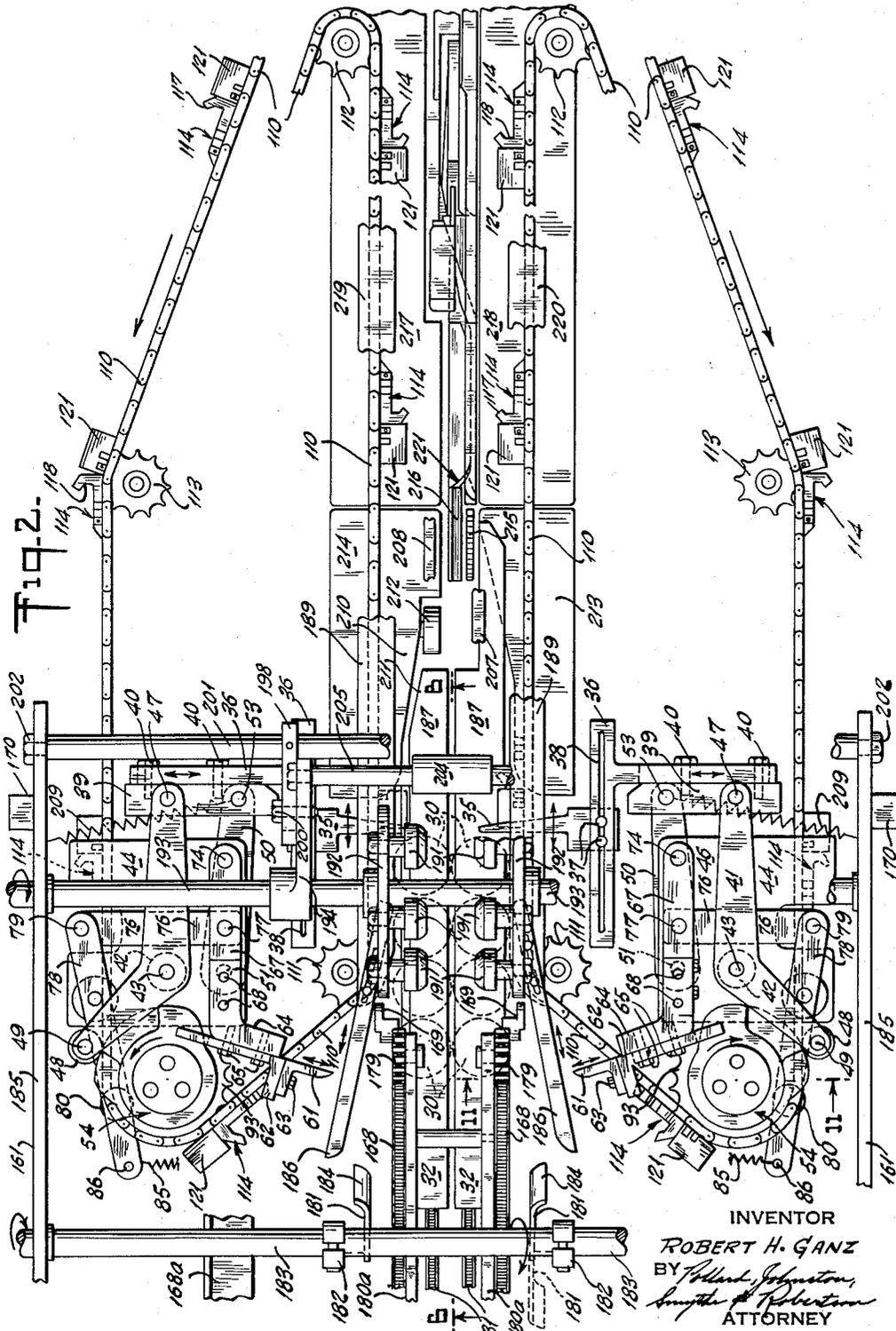
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 2



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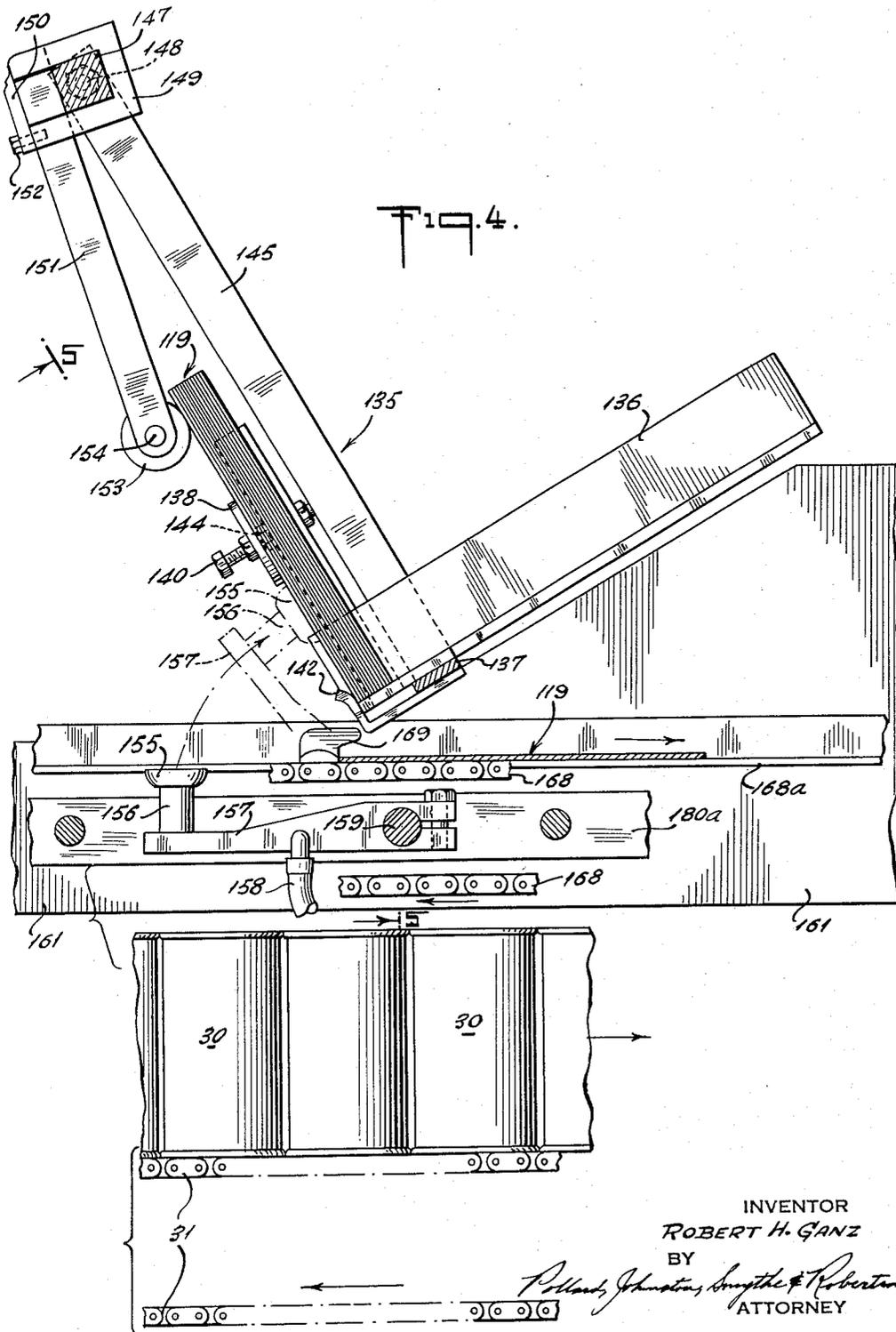
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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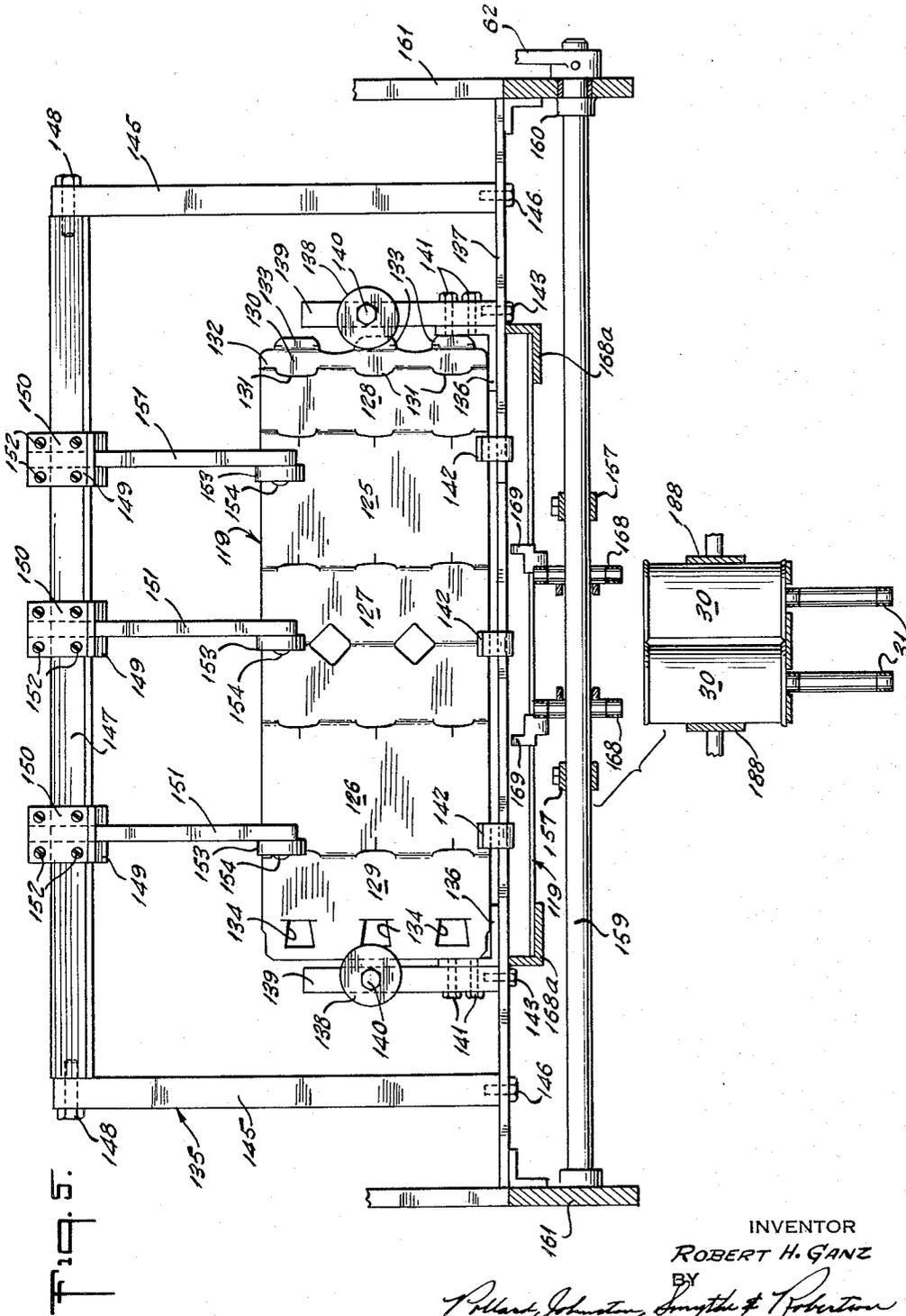
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 4



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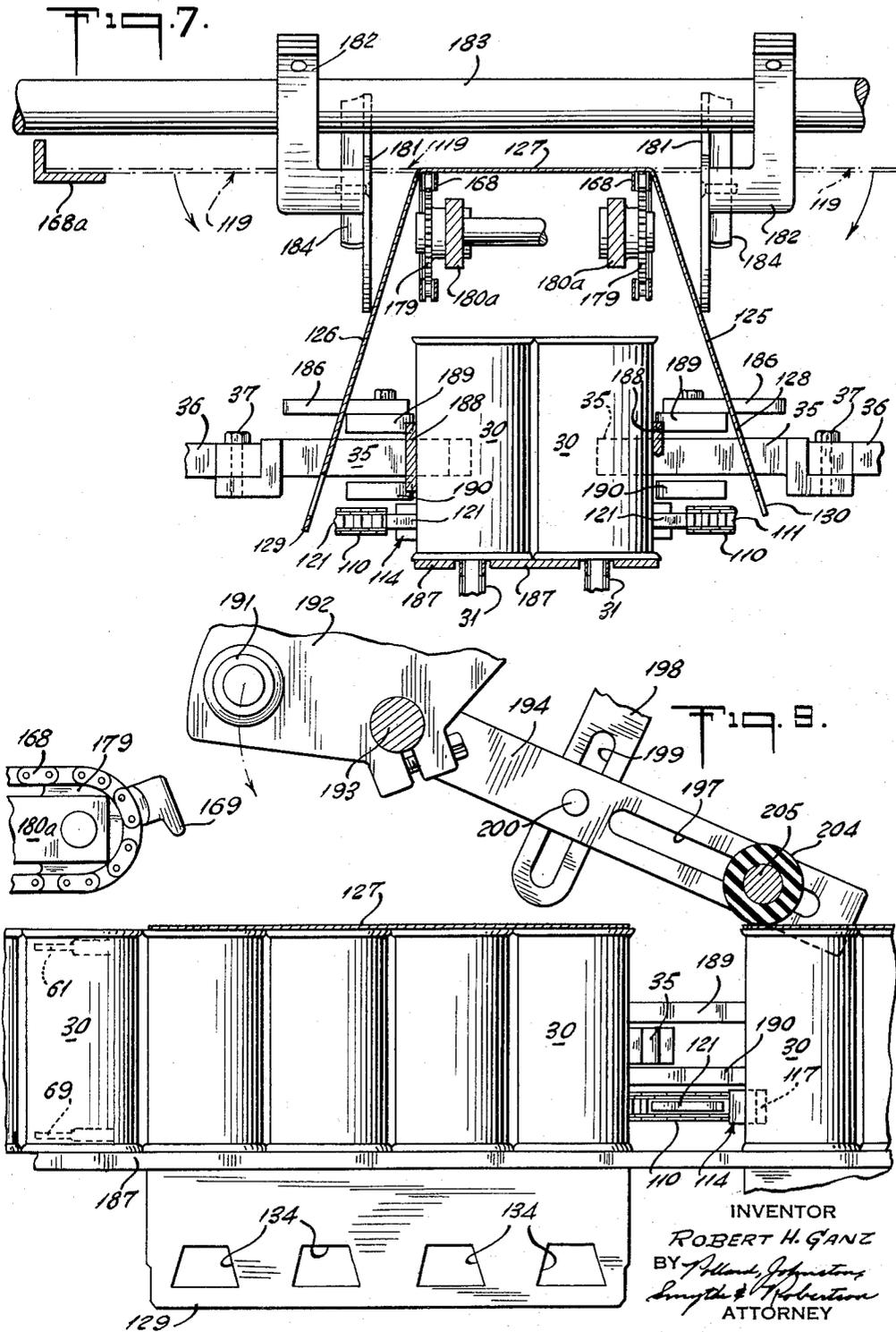
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 6



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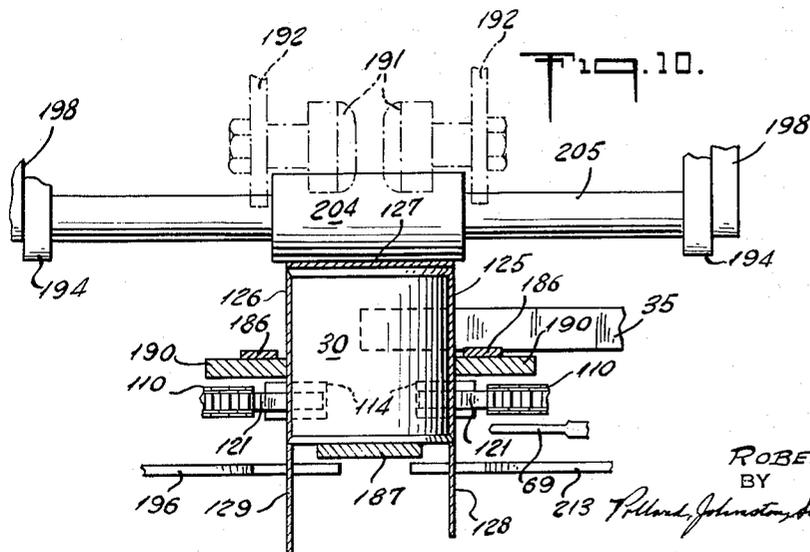
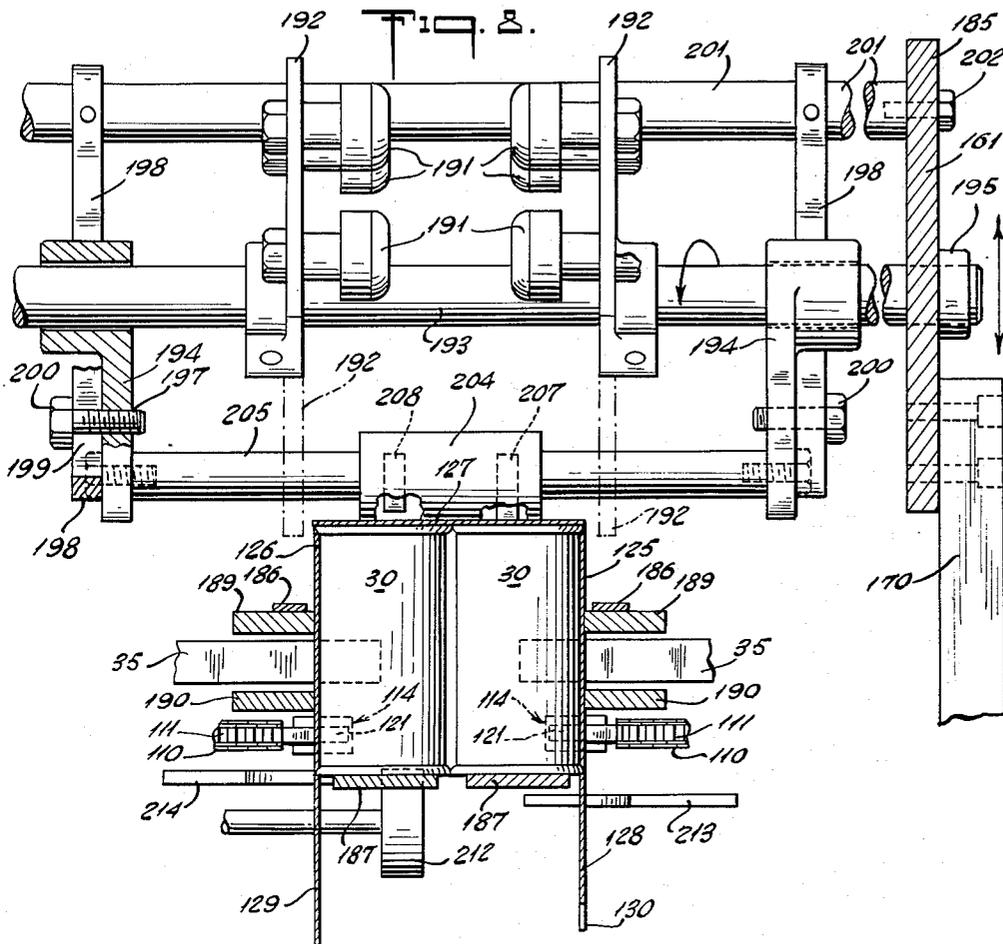
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 7



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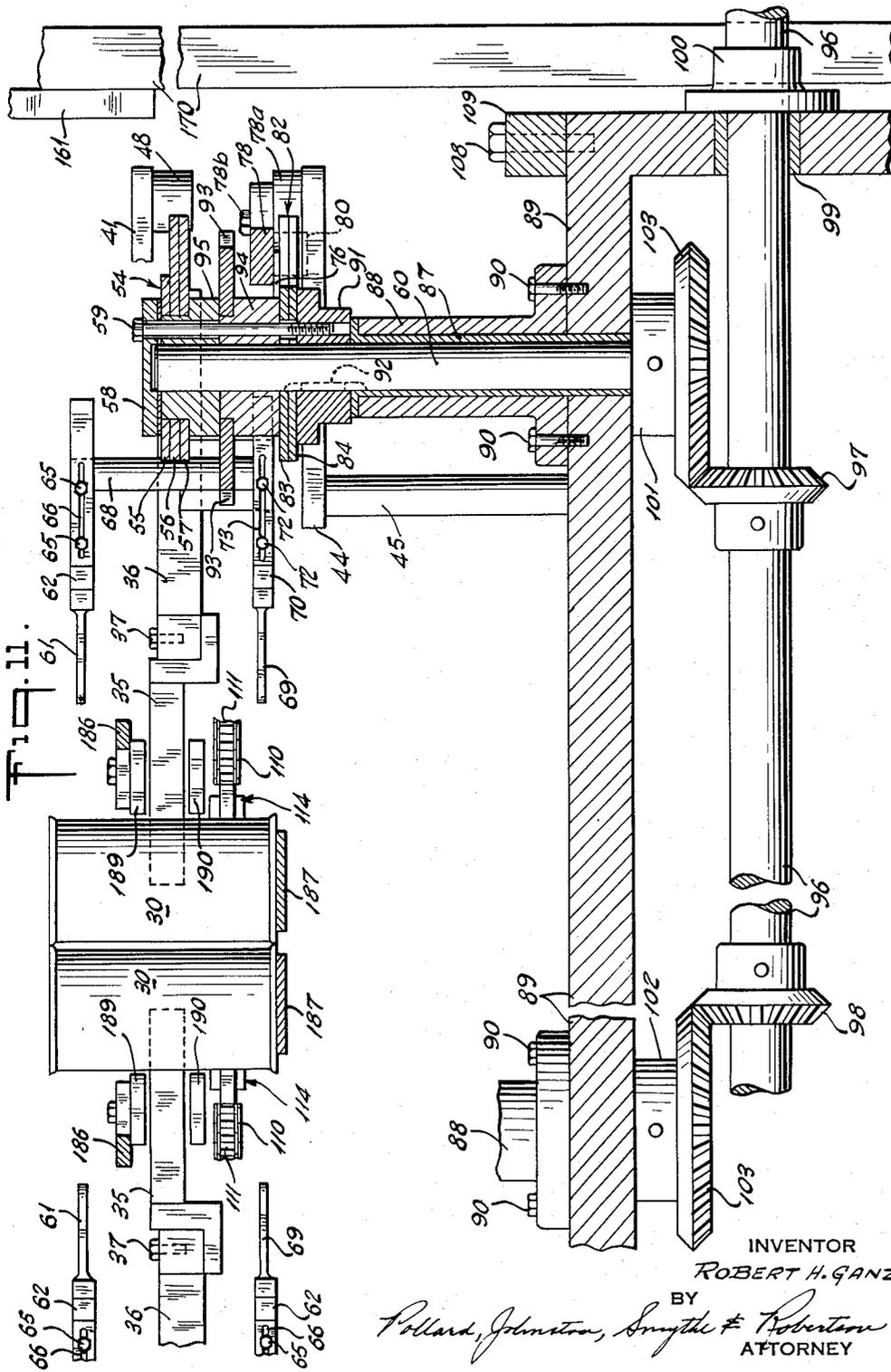
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12 Sheets-Sheet 8



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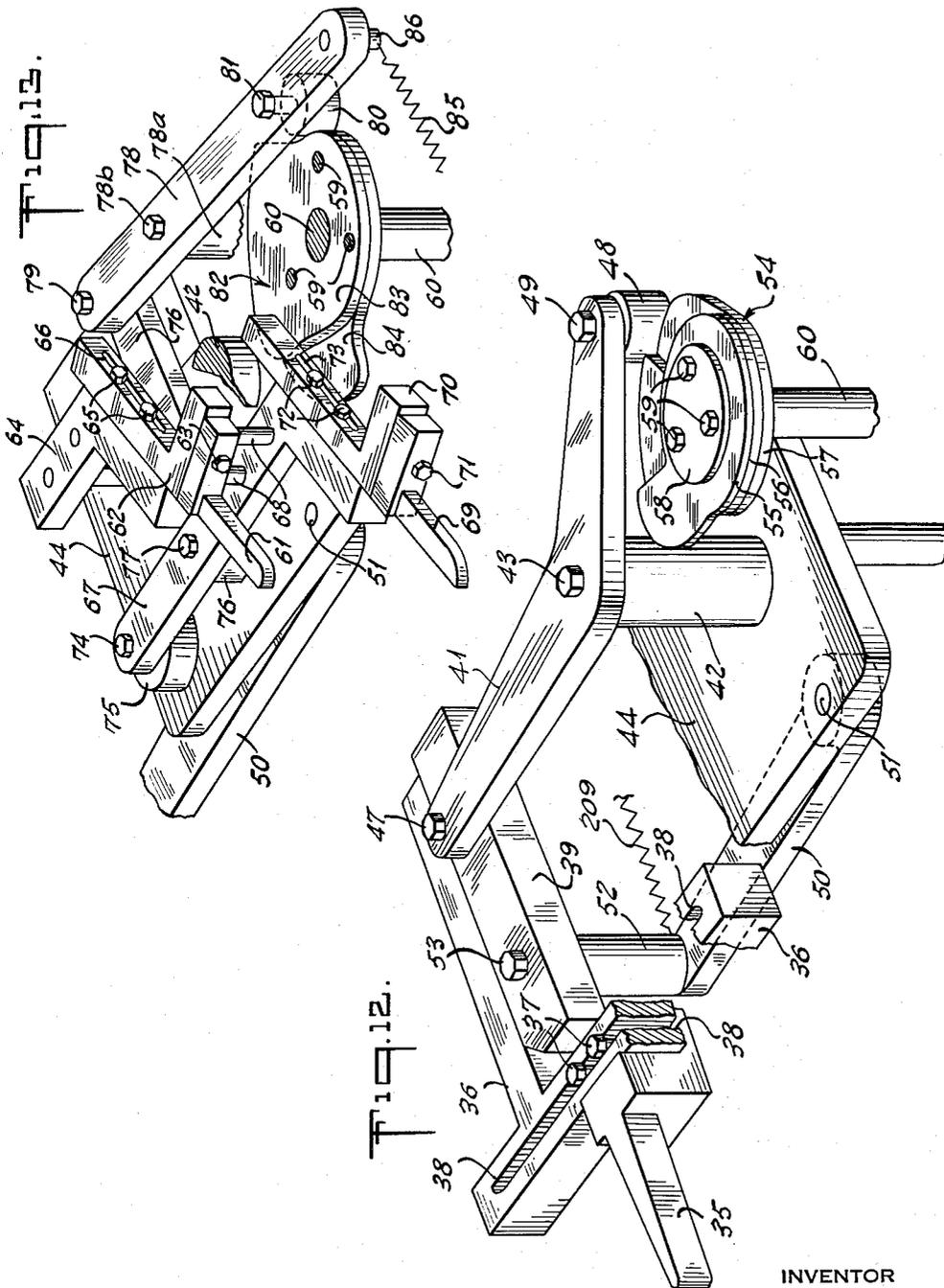
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 9



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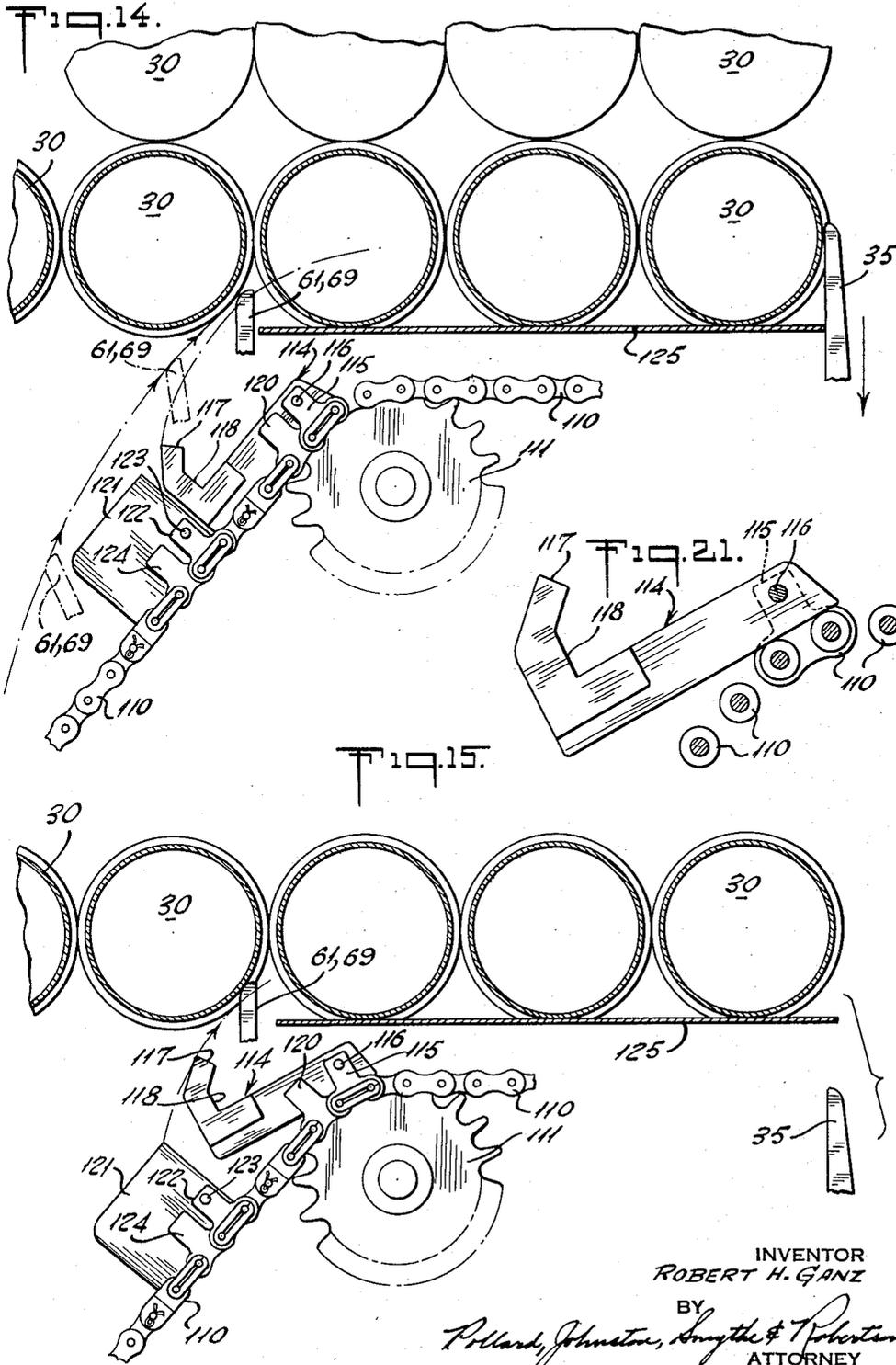
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 10



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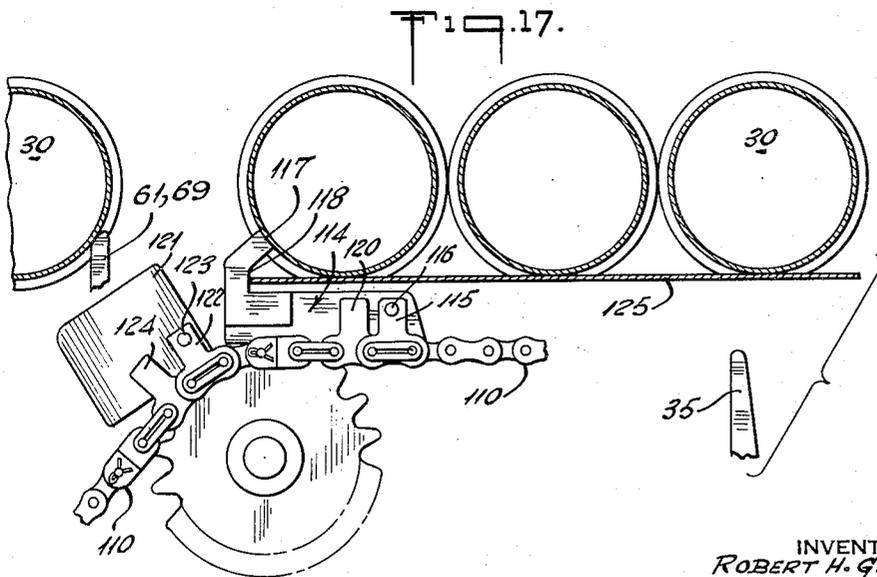
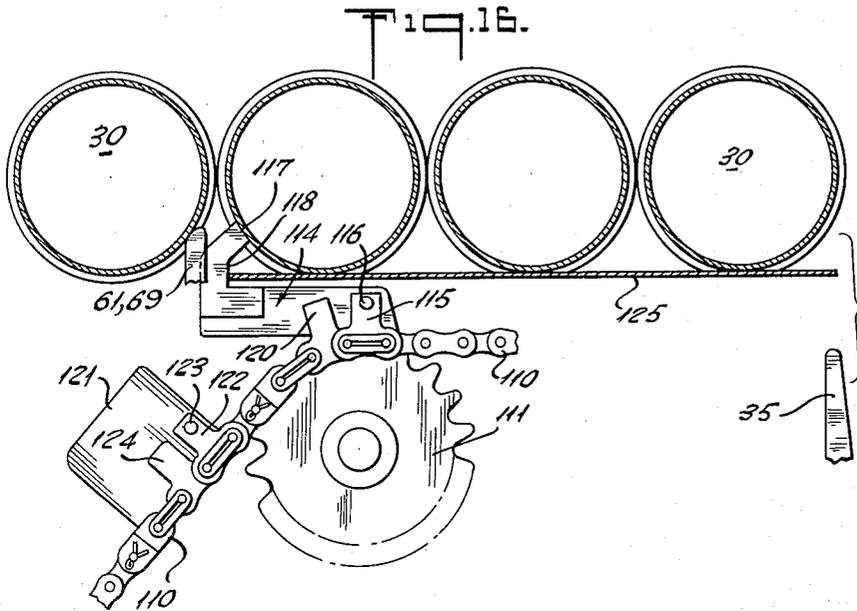
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METHOD AND MACHINE FOR PACKAGING ARTICLES

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12 Sheets-Sheet 11



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**METHOD AND MACHINE FOR
PACKAGING ARTICLES**

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Filed Nov. 20, 1958, Ser. No. 775,243

18 Claims. (Cl. 53—32)

The invention relates to the packaging of cans and the like in wrap-around paperboard carriers.

My invention has special application for use with paperboard cartons of the type disclosed in the copending application of Arthur J. Weiss, Serial No. 748,728, filed July 15, 1958. Such cartons have overlapping closure panels, one of which has a latch opening and the other of which includes a rotary catch for engagement with such latch opening. To close and lock the carton, my invention makes use of the closing and locking means of the machine disclosed in the copending application of Henry Ganz, Serial No. 744,634, filed June 26, 1958.

Summary

In accordance with my invention, the paperboard carton blanks are delivered onto a separate conveyor where their side panels are folded. The cans arranged in rows are delivered to the machine by a conveyor which carries the cans beneath the incoming carton blanks. As the carton side panels are folded, the cans to be packaged in one carton are segregated from the incoming cans. A folded carton blank is then dropped onto the segregated cans and rolled down into place. The segregated cans and folded carton blank are then conveyed forward through the remainder of the machine where the carton is closed and locked around the cans.

The carton blanks in flat form are stored in a feeding means above the separate conveyor. Vacuum cups mounted on swinging arms strip the carton blanks one at a time from the stack of stored blanks and place them on the separate conveyor. Pushers on the separate conveyor carry the carton blanks forward into the machine.

The incoming cans carried on a conveyor are segregated into groups for packaging. The incoming cans are held by primary stops which interrupt the path of travel of the cans while secondary stops are inserted into the rows of incoming cans behind the cans which will be at the rear of the rows in a given carton. The primary stops are then withdrawn thereby permitting the removal of the cans segregated between the primary and secondary stops and the movement of the incoming cans forward against the secondary stops.

The carton blanks in flat form are carried by the separate conveyor beneath rotating folding discs which fold down the carton blank side panels. The separate conveyor which is above and overlying the incoming cans terminates at the point where the cans are segregated so that when the folder carton blank is carried beyond the termination of the carton conveyor it drops upon the segregated cans below. Rollers mounted on rotating discs assist the downward motion of the carton onto the cans and then roll the carton in close contact with the tops of the cans.

Chain conveyors advance the segregated cans and carton from the area between the primary and secondary stops. As this removal action is initiated, blocks on the conveyor chains come into line with the path of travel of the incoming cans. The secondary stops are then withdrawn and the incoming cans advance so as to rest against the blocks. Following the removal of the segregated cans and carton blank, the primary stops are positioned so as to interrupt the path of travel of the incoming cans. The

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blocks on the conveyor chains restrain the incoming cans as they approach and come to rest against the primary stops.

The segregated cans and the folded carton blank then pass over an idler wheel which completes the folding of one of the closure flaps of the carton while at the same time offsetting the chines of the cans. During the remaining travel of the carton and cans, the closing and locking of the carton are completed.

In one form of machine heretofore employed, the side panels of the carton blanks have been folded while the blanks are resting on the incoming cans. Whenever the can size is changed, the apparatus for placing the carton blanks onto the cans and for folding the blanks must be accurately repositioned to conform to the new size.

In my invention, the delivery and folding of the cartons is performed on a separate conveyor. The folded cartons are then dropped onto a group of cans below which have been segregated for packaging. Whenever the can size is changed, the entire assembly including the separate conveyor, and the means for delivering and folding the carton blanks is simply repositioned as a unit to conform to the new size. Since the folded cartons are dropped onto the segregated cans, no precise adjustment is required in repositioning this assembly. Folding the carton blanks on a separate conveyor is of special advantage whenever the top of the can has a different width than the body. In previous machines of the type referred to above, the tops of such cans do not furnish a satisfactory supporting form for folding of the carton side panels.

Also in such previous machines, the incoming cans have been segregated into groups for packaging by the action of pusher members mounted on moving chains. These pusher members would intersect the rows of incoming cans at intervals corresponding to the length of a carton and thereby segregate the cans for a carton. In order to accommodate a change in the size or number of cans to be packaged, it would be necessary to change the pusher and chain equipment.

In my invention, the cans are segregated by primary and secondary stops. These stops are readily adjusted toward or away from the cans whenever the can width or number of rows of cans in a package is changed. The primary stop can also be adjusted along the path of travel of the incoming cans whenever the length of the package is to be changed. The drives to the stops are provided with adjustable cams so that optimum timing of the stops is available for all settings of the stop adjustments. The stops provide a rugged positive holding means for the incoming cans during cycles of segregation thereby making the machine compatible to the long rows of incoming cans being steadily pushed toward the machine.

Other features and advantages of my invention will appear as the description proceeds.

Description

In the drawings, I have illustrated a machine to show the best mode contemplated by me of carrying out my invention as to the feeding of carton blanks and cans into a machine for packaging the cans in a wrap-around carton.

FIG. 1 is a front elevation view of the machine.

FIG. 2 is a plan view of the machine.

FIG. 3 is an enlarged sectional view of the attachment for the adjustable legs of the machine.

FIG. 4 is an enlarged sectional view of the carton blank feed.

FIG. 5 is an enlarged sectional view taken along the line 5—5 of FIG. 4, illustrating the carton blanks resting in the carton blank feed.

FIG. 6 is an enlarged sectional view taken along the line 6—6 of FIG. 2, illustrating the placing of the folded carton blank on the cans.

FIG. 7 is an enlarged sectional view taken along the line 7—7 of FIG. 6, illustrating the folding of the carton side panels.

FIG. 8 is an enlarged sectional view taken along the line 8—8 of FIG. 6, illustrating the rollers for pressing the folded carton blank on to the cans.

FIG. 9 is an enlarged side elevational view illustrating the folded carton placed on a larger size group of cans.

FIG. 10 is an enlarged sectional view illustrating the folded carton being placed upon a single row of cans.

FIG. 11 is an enlarged sectional view taken along the line 11—11 of FIG. 2 and illustrating the drives for the segregating means of the machine.

FIG. 12 is an enlarged perspective view illustrating the primary stop.

FIG. 13 is an enlarged perspective view illustrating the secondary stop.

FIG. 14 is an enlarged plan view illustrating the entry of the secondary stop into the row of cans and withdrawal of the primary stop.

FIG. 15 is an enlarged plan view illustrating the approach of the pusher with respect to the cans and the withdrawn primary stop.

FIG. 16 is an enlarged plan view illustrating the secondary stop holding the cans, the pusher in contact with the cans and the withdrawn primary stop.

FIG. 17 is an enlarged plan view illustrating the removal of a group of cans by the pusher and the entry of the block.

FIG. 18 is an enlarged plan view illustrating the block restraining the incoming cans.

FIG. 19 is an enlarged plan view illustrating the withdrawal of the secondary stop and the cans restrained by the block approaching the primary stop.

FIG. 20 is an enlarged plan view of the pusher and block members.

FIG. 21 is an enlarged plan view of the pusher and the conveyor chain.

FIG. 22 is an enlarged sectional view taken along the line 22—22 of FIG. 20, illustrating the attachment of the pusher to the conveyor chain.

FIG. 23 is an enlarged sectional view taken along the line 23—23 of FIG. 20, illustrating the attachment of the block to the conveyor chain.

In FIGS. 1 and 2, the flow of the cans 30 is from the left to the right through the machine. The cans 30 are delivered by conveyor means not shown to conveyor chains 31 and conducted into the entrance of the machine along support plates 32. Conveyor chains 31 are driven and supported by sprockets 33 and 34. As shown in FIG. 2, the cans 30 have been advanced by conveyor chains 31 until the cans are held by primary stops 35.

A primary stop 35 and its driving mechanism is shown in FIGS. 2 and 12. Primary stop 35 is attached to support 36 by screws 37. Slot 38 in support 36 permits adjustment of the primary stop as indicated by the arrow in FIG. 2. Support 36 is attached to link 39 by screws 40. A slot (not shown) in link 39 permits it to be adjusted toward and away from the machine so that primary stop 35 properly engages the cans. Swinging arm 41 is pivotally attached to stud 42 by means of pivot screw 43. Stud 42 is mounted upon support plate 44. Legs 45 serve to attach support plate 44 to the frame 46 of the machine. One end of swinging arm 41 is pivotally connected to link 39 by pivot screw 47 while the other end carries cam follower 48 which is pivotally attached by pivot screw 49. Swinging link 50 is pivotally attached to support plate 44 at pivot 51 and the free end of link 50 is pivotally attached to link 39 by spacer 52 and pivot screw 53. It may be seen that support plate 44 serves as a fixed link while swinging arm 41 and swinging link 50 serve as the moving links for the system which operates primary stop 35. Follower 48 is driven by cam 54 which is made up from separate plate cams 55, 56 and 57. Plate 58 and screws 59 hold cam 54 on to cam shaft 60.

The secondary stops and their driving mechanism are shown in FIGS. 2 and 13. Upper secondary stop 61 is attached to upper support 62 by screw 63. Upper support 62 is attached to arm 64 by means of screws 65 which fit into slot 66 thereby permitting adjustment of the upper support 62. Arm 64 is attached to swinging arm 67 by support rods 68. The lower secondary stop 69 is attached to the lower support 70 by screw 71. Lower support 70 is adjustably attached to swinging arm 67 by screws 72 which pass through slot 73 in the lower support 70. Swinging arm 67 is pivotally attached to support plate 44 by pivot screw 74 and spacer 75. Floating link 76 is pivotally attached at one end to swinging arm 67 by pivot screw 77 and at the other end is pivotally attached to swinging link 78 by pivot screw 79. Floating link 78 is pivotally mounted on stud 78a of support plate 44 by means of pivot screw 78. Cam follower 80 is pivotally attached to swinging link 78 by pivot screw 81. Cam 82, comprising plate cams 83 and 84, is mounted on cam shaft 60. Spring 85 is pivotally attached to swinging link 78 by pin 86 and is also attached to the frame 46 of the machine so as to force cam follower in contact with the surface of cam 82.

FIGS. 11, 12 and 13 show the spacial relationship of the linkage for the primary and secondary stops and the drives to these systems. As shown in FIG. 11, cams 54 and 82 are driven by cam shaft 60. Cam shaft 60 is pivoted in bushing 87 in shaft support 88 which is attached to frame member 89 by screws 90. Cam 82 is located on cam shaft 60 by spacer 91, which is secured to the cam shaft by key 92. Conveyor chain sprocket 93 is located from cam 82 by spacer 94. Spacer 95 positions cam 54 along cam shaft 60. The assembly of cams, sprocket and spacers is held together by screws 59 which pass through clearance holes in the cams, sprockets and spacers and engage into spacer 91.

As shown in FIG. 2, both sides of the machine are provided with primary and secondary stop means in a symmetrical fashion. FIG. 11 shows the power drive to the primary and secondary stops. Drive shaft 96 carrying bevel gears 97 and 98 is supported in frame member 89 by bushing 99. Collar 100 controls the axial positioning of drive shaft 96. Bevel gears 103 attached to collars 101 and 102 transmit the drive to their respective cam shafts 60.

As shown in FIG. 1, drive shaft 96 is provided with pulley 104 which is driven by belt 105 passing over pulley 106 of motor 107. In FIG. 11, frame member 89, which carries drive shaft 96 in bushing 99, is mounted on frame 46 by screws 108 and spacers 109.

In FIG. 2, the conveyor chains 110 are shown. These chains serve to push the carton blanks and cans through the machine during the closing and locking of the carton flaps. Sprockets 111, 112 and 113 serve to position the chain and to maintain its tension. As shown in FIG. 11, sprocket 93 on shaft 60 drives chain 110.

FIGS. 19 through 23, inclusively, shows the details of pushers 114 which are attached to chains 110 for pushing the cans and carton blanks simultaneously. Chain 110 is provided with anchor links 115 to which the pushers 114 are fixedly attached by pins 116. Surface 117 of pusher 114 contacts the outside of the cans 30 while surface 118 in the recess of pusher 114 contacts the edge of the carton blank 119. Lugs 120 contact the side of pusher 114 supporting it. Blocks 121 are fixedly attached to anchor link 122 of the conveyor chain 110 by pins 123. Lugs 124 support the blocks 121.

FIG. 5 shows the carton blank 119 which is to be applied to the cans 30 in the machine. The carton blank is disclosed in the copending application of Arthur J. Weiss, Serial No. 748,728, filed July 15, 1958. The carton blank includes side panels 125 and 126, bottom panel 127, and closure panels 128 and 129. Closure panel 128 has a latching flap 130, rotary catches 131 along the fold line 132, and tongues 133 attached to

the latching flap 130. Latch openings 134 are located on closure panel 129. Fold lines are provided between the various panels.

Feeding means 135 for the carton blanks 119 is shown in FIGS. 1, 4 and 5. The carton blanks 119 are stored on supports 136 which are attached to frame member 137. Additional support to the carton blanks 119 is provided by discs 138 which are attached to arms 139 by screws 140. The arms 139 are attached by screws 141 to support 136 which is mounted on frame member 137. Stops 142 hold the carton blanks resting on supports 136. Screws 143 attach the arms 139 to frame member 137. Jam nuts 144 permit the disc 138 to be positioned along screw 140.

Brackets 145 attached to support member 137 by screws 146 support bar 147 which is held by screws 148. Clamping members 149 are placed at intervals along bar 147 and are locked in place by plates 150 which hold arms 151 against bar 147. The plates 150 are attached by screws 152. Arms 151 carry rollers 153 which are pivotally supported by pins 154 so as to support the upper edge of the carton blanks in the feeding means.

In order to pull the outer carton blank from the stack of blanks 119 in the feeding means 135, vacuum suction cups 155 are provided. The cups are mounted on tubes 156 which are attached to arms 157 containing internal passages (not shown) leading to the tubes 156. Hoses 158 connected to a vacuum source (not shown) are attached to each of the arms 157. Arms 157 are pivotally mounted on shaft 159 which is supported in bushings 160 in frame member 161 of the machine.

Link 162, fixedly attached to shaft 159, is pivotally connected to floating link 163, as shown in FIG. 1. Swinging link 164, mounted on pivot 165, is pivotally attached to floating link 163. Roller follower 166, attached to swinging link 164, transmits the motion from the vacuum cup cam 167 so as to impart a cyclic swinging motion to arms 157. In this manner, the vacuum cups 155 are caused to pull down carton blanks on to the carton blank conveyor chains 168 passing below the feeding means 135. Pushers 169, attached to the conveyor chains 168, serve to move the carton blanks 119 into the machine.

Frame members 161 are supported by legs 170 which are slideably attached by bolts 171 to the upright members 172 of the machine frame. The vertical positioning of the carton blank conveyor chains and feeding means is determined by the adjustment of screw shaft 173 acting on frame member 46 through collar 174. Screw shaft 173 is threadedly engaged to lug 175 of leg 170. FIG. 3 shows the details of the fastening of legs 170 to upright members 172. Spacer 176 keeps the legs 170 at a fixed distance from the upright members 172. Slot 177 in the upright members 172 permits the adjustment.

As shown in FIG. 1, spring 178, which is attached to swinging link 164 and leg 170, serves to hold roller 166 in constant contact with the surface of vacuum cup cam 167. Carton blanks 119, having been deposited on conveyor chains 168, guided by rails 168a and are conveyed by the action of pushers 169. Conveyor chains 168 pass over sprockets 179 and 180 mounted in support plate 180a. Folding discs 181 are attached to arms 182 which rotate around shaft 183, as shown in FIGS. 6 and 7. The edges of folding discs 181 contact side panels 125 and 126 of carton blank 119 which is supported by conveyor chains 168 and urge the side panels in a downward direction so as to fold them along the fold lines of bottom panel 127 which are adjacent to the side edge portions of the conveyor chains. The curved edge 184 of folding disc 181 facilitates the folding operation. As shown in FIG. 2, shaft 183 is supported in support extension 185 of support member 161 and is driven by means (not shown) so as to be synchronized with the advancing carton blanks 119.

In FIGS. 2 and 7, the partially folded carton blank 119

passes beyond the folding discs 181 and the leading edges of the closure panels 125 and 126 pass within the extending folding bars 186.

The cans 30 are carried by conveyor chains 31 beyond the end of support plates 32 and on to support plates 187. Guides 188 maintain the cans aligned with support plates 32, as shown in FIGS. 6 and 7. The cans then pass from beneath conveyor chains 168 and along support plates 187 to where the cans are segregated for application of the carton blanks 119. Side guide rails 189 and 190 serve to keep the cans in alignment for the remainder of their passage through the machine.

In FIG. 6, the folded carton blank 119 is carried by conveyor chains 168 beyond the termination of the conveyor at sprockets 179 so that the folded carton blank 119 drops upon the rows of cans resting upon support plates 187. As shown in FIGS. 6 and 8, the folded carton blank 119 is forced to descend down over the cans 30 by contact with folders 191 which are mounted in the rotating discs 192. Discs 192 are clamped to shaft 193 which is free to rotate in bushings within supporting arms 194. Slot 197 in the arms 194 permits adjustment of the rollers and rotating discs with respect to the cans. Brackets 198, having slots 199, are attached to the supporting arms 194 by screws 200 so as to maintain the supporting arms 194 in their selected position. Fixed shaft 201, secured to support extension 185 by screws 202, serves to hold the brackets 198. In FIG. 6, it is apparent that by means of the adjustments of supporting arms 194 and brackets 198, the axis of shaft 193 may be positioned so that the path of rollers 191 will be such as to force the bottom panel 127 in firm contact with the tops of cans 30. As seen in FIG. 2, during the descent of the folded carton blank 119 from conveyor chain 179, slide guide rails 189 and 190 serve to hold the carton side panels 125 and 126 in a vertical direction along the sides of the cans 30.

In FIG. 9, supporting arms 194 and brackets 198 are shown adjusted so as to accommodate a carton containing rows of four cans each rather than rows of three cans each as shown in FIG. 6.

As the cans pass along support plates 187 beyond the rotating discs 192, the carton blank and cans pass beneath rubber roller 204 which serves to maintain the carton blank 119 in contact with the tops of the cans. As seen in FIG. 8, roller 204 rotates on shaft 205 which is attached to arms 194. Beyond roller 204, the carton blank is maintained against the can tops by the pressure exerted by hold down bars 207 and 208.

In FIG. 10, the carton and cans are seen passing beyond roller 204 and on through the machine. Here, the package contains a single row of cans rather than the double row previously discussed. Adjustment of the folding discs 192 along shaft 193 permits the rollers 191 to press the carton down over the narrower package. When a single row of cans is to be packaged, folding plate 196 is used in lieu of the idler 212.

The primary and secondary stop means serve to segregate and hold the cans 30 during the placement of the folded carton upon the cans after it is dropped from conveyor chains 179 and forced downward by the action of rollers 191 in rotating discs 192. The cyclic operation of the primary and secondary stops is shown in FIGS. 14 through 19, inclusive.

In FIG. 14, the cans 30 are resting upon support plates 187 and are held by the primary stop 35. By the action of cam 82 and the linkage associated with it, the secondary stops 61 and 69 are advanced behind the last can of the row held by primary stop 35. The path of advance of the secondary stops 61 and 69 is shown in FIG. 14. When the secondary stops are fully advanced between the cans, the withdrawal of primary stop 35 is initiated by the action of follower 48 in contact with cam 54 under the urging of spring 209, which is connected between swinging link 50 and frame 185. As primary stop 35 is withdrawn, conveyor chain 110 passes over sprocket 111 and moves

pusher 114 so that its surface 117 approaches the side of the rear cans of the rows held by primary stop 35. The incoming cans move against secondary stops 61 and 69 as primary stop is withdrawn.

In FIG. 15, the primary stop 35 is fully withdrawn from against the forward cans. With the cans no longer resting against primary stop 35, the pushing action of conveyors 31 moves the incoming cans so that they come to rest against secondary stops 61 and 69.

In FIG. 16, conveyor chain 110 has sufficiently advanced the pusher 114 so that it is ready to remove the rows of cans 30 and the folded carton 119 into the machine. Surface 117 of pusher 114 is shown in contact with the rear can of the row and surface 118 is bearing on the rearward edge of side panel 125 of the carton 119. Secondary stops 61 and 69 are shown holding the incoming cans.

In FIG. 17, the cans and carton, under the action of pusher 114, are being conveyed forward and block 121 is shown passing in front of the can held by secondary stops 61 and 69. Primary stop 35 remains retracted.

In FIG. 18, block 121 has passed around sprocket 111 so that it is in line with the path of travel of cans 30 through the machine. At this point, secondary stops 61 and 69 begin to withdraw from contact with the incoming cans while at the same time primary stop 35 begins to advance toward the cans.

In FIG. 19, the incoming cans, following the withdrawal of secondary stops 61 and 69, have been moved forward under the urging of conveyor chains 31 so as to come into contact with the rearward side of block 121. Following the exit of pusher 114 with its related cans and carton, primary stop 35 is advanced so as to project into the line of travel of the cans. As shown in FIG. 19, the block 121 restrains the cans being urged forward by chains 31 until they come to rest against primary stop 35. The cycle of operation of the stop means is completed by the re-entry of secondary stops 61 and 69 between the last can being segregated and the incoming cans.

After passing beyond primary stops 35 and beneath roller 204, the cans and carton advance along support plates 187 to the portion of the machine wherein the carton 119 is closed and locked. The closing and locking of the carton around the cans is performed by means disclosed in the copending application of Henry Ganz, Serial No. 744,634, filed June 26, 1958. Guide 210 initiates the upward folding of closure panel 129 beneath the tapered portion 211 of support plate 187. Idler wheel 212 serves to complete the upward folding of closure panel 129 against the bottoms of the cans while at the same time elevating one row of cans passing over the idler wheel with respect to the adjacent row so as to effect an overlapping of the chimes of the cans.

Convergent guide 213 initiates the upward folding of closure panel 128. Tapered folding blade 215 completes the upward folding and vertical plate 216 serves to fold latching flap 130 so as to align the rotary catches 131 with latch openings 134. The carton and cans then pass on to support plates 217 and 218. Side guides 219 and 220 exert force on the outside of side panels 125 and 126 so as to maintain the overlap relationship of the chimes of the cans. Beginning at arrow 221, the tongues 133 of latching flap 130 are folded and locked through latch openings 134 so as to complete the packaging.

In order to facilitate the passage of the cans and cartons through the portion of the machine where the folding and locking of the carton takes place, additional conveyor means may be provided to augment the action of conveyor chains 110. Such additional conveyor means would be located in the direction of and overlying the path of travel of the cans through the machine. A conveyor means such as that disclosed as the upper conveyor in the copending application of Henry Ganz, Serial

No. 744,634, filed June 26, 1958, may be used. This conveyor contains pusher blocks which simultaneously push both the cans and the carton blanks.

Operation

As a further aid to the understanding of my invention, I shall now describe the preferred sequence of operating steps.

The cans 30 are delivered into the machine by conveyor chains 31 to a point where the cans are segregated for subsequent placing of carton blanks upon them. Primary stops 35 and secondary stops 61 and 69 are the means of segregating the cans.

During one cycle of operation of the segregating means, the incoming cans are initially stopped by primary stop 35. The secondary stops 61 and 69 are advanced behind the last can in the row to be packaged without touching the last can on the one following it. Primary stop 35 is then withdrawn permitting the incoming cans to move up against the advanced secondary stops 61 and 69. The cans to be packaged, at this point, are segregated and rest in front of the advanced secondary stops 61 and 69 with primary stop 35 withdrawn. Pusher blocks 144, attached to conveyor chains 110, are then moved into contact with the last cans in the rows to be packaged with the primary stops withdrawn. With surface 117 of pusher 114 in contact with the rearward can and surface 118 in contact with the carton blank, the cans and carton are moved forward into the machine.

The removal of the cans and carton permits the incoming cans to rest against secondary stops 61 and 69. Blocks 121, attached to conveyor chains 110, then are brought into line with the incoming cans. The withdrawal of secondary stops 61 and 69 releases the incoming cans into contact with blocks 121. Blocks 121 restrain the cans as they approach the primary stop 35 which has been advanced into the line of travel of the cans. With the cans at rest against primary stop 35, the secondary stops are again advanced behind the last cans of the rows to be packaged, thereby completing the cycle of operation.

The carton blanks 119 are removed from the feeding means 135 by the action of the swinging vacuum cups 155 so as to place the carton blanks upon conveyor chains 168. Pusher members 169, attached to conveyor chain 168, advance the carton blanks beneath the rotating folding discs 181 so that side panels 125 and 126 are folded in a downward direction. Folding bars 186 continue this folding action.

The folded carton 119 then is conveyed beyond the end of conveyor chains 168 so that it drops upon the rows of cans which have been segregated. The rollers 191, attached to the rotating discs 192, force the folded carton 119 in firm contact with the tops of the cans 30.

Conveyor chains 110 then advance the carton and cans beneath roller 204 and along support plates 187 to the region where the closure panels 128 and 129 are folded. Closure panel 129 is folded beneath the row of cans adjacent to it by the action of idler wheel 212 which at the same time offsets the chimes of the cans in one row with respect to those of the other.

The cans and folded carton are then conveyed through the remaining portion of the machine by conveyor chains 110 so as to complete the closing and locking of the carton.

What is claimed is:

1. In a machine for applying a wrap-around carton to cans and the like arranged in rows, means for delivering the cans into the machine, means for delivering the carton blanks into the machine, means for segregating the delivered cans for application of the carton blanks, means for folding the side panels of the carton blanks while the carton blanks are being conveyed by said means for delivering the carton blanks, means for dropping the folded carton blanks from said means for delivering the carton

blanks onto the segregated cans, means for wrapping the folded carton blanks around the outside of the cans, means for conveying the carton blanks and cans through the machine as a unit, and means for closing the carton blanks around the cans.

2. A machine in accordance with claim 1, in which said means for delivering the carton blanks into the machine includes carton blank conveying means operating in the direction of and above the cans being delivered into the machine, and hopper means depositing carton blanks onto said carton blank conveying means.

3. In a machine for applying a wrap-around carton to cans and the like arranged in rows, means for delivering the cans into the machine, means for delivering the carton blanks into the machine, means for segregating the cans for application of the carton blank including primary and secondary means for alternately stopping said delivered cans, said secondary means stopping said delivered cans at a distance from said primary means substantially equal to the length of the row of cans in a carton, and means for restraining said delivered cans in passing from said secondary means to said primary means, said means for restraining being moved with said conveying means whereby said primary means cyclically releases the cans between said primary and said secondary means for movement by said conveying means, said secondary means stopping said delivered cans upon said movement, and said secondary means cyclically releasing said delivered cans against said means for restraining, which advances said delivered cans against said primary means; means for folding the side panels of the carton blanks while the carton blanks are being conveyed by said means for delivering the carton blanks; means for dropping the folded carton blanks onto the cans; means for wrapping the folded carton blanks around the outside of the cans; means for conveying the carton blanks and cans through the machine as a unit; and means for closing the carton blanks around the cans.

4. In a machine for applying a wrap-around carton to cans and the like arranged in rows, means for delivering the cans into the machine; means for delivering the carton blanks into the machine; means for segregating the delivered cans for application of the carton blanks; means for folding the side panels of the carton blanks while the carton blanks are being conveyed by said means for delivering the carton blanks including rotating folding disc means for initiating the downward folding of the carton blank sides, said folding disc means having its axis of rotation extending above and across said means for delivering the carton blanks into the machine, and folding bar means for continuing the downward folding of the carton blank sides; means for dropping the folded carton blanks on to the cans; means for wrapping the folded carton blanks around the outside of cans; means for conveying the carton blanks and cans through the machine as a unit; and means for closing the carton blanks around the cans.

5. A machine in accordance with claim 1 including means for completing the downward folding of the carton blank side panels and means for forcing the folded carton blank against the top of the cans, in which said means for delivering the carton blanks into the machine includes carton blank conveying means operating in the direction of and located above the cans being delivered into the machine, said means for delivering the carton blanks having a termination in the direction of delivery substantially above the location where said cans are delivered to said means for segregating the cans and in which said means for dropping the folded carton blank onto the cans includes said termination of said means for delivering beyond said termination and dropping onto said cans, said means for completing the downward folding of the carton blank side walls and said forcing means urging said dropping carton blank downwardly, whereby said folded

carton blank is conveyed beyond the termination of said carton blank conveying means, dropped onto the cans within said segregating means, and forced into contact with the tops of the cans.

5 6. In a machine for applying a wrap-around carton to cans and the like arranged in rows, means for delivering the cans into the machine; means for delivering the carton blanks into the machine; means for segregating the delivered cans for application of the carton blank including primary and secondary stop members, said secondary stop members stopping said delivered cans at a distance from said primary stop member substantially equal to the length of the row of cans in a carton, means for cyclically moving said primary stop member and said secondary stop member to intercept said delivered cans and cyclically moving said primary and said secondary stop members to release said delivered cans, and block members being moved by said conveying means, restraining said delivered cans in passing from said secondary stop member to said primary stop member, said primary stop member cyclically releasing the cans between said primary and said secondary stop members for movement by said conveying means, said secondary stop member stopping said delivered cans upon said movement, and said secondary stop member cyclically releasing said delivered cans against said block members, which advances said delivered cans against said primary stop member; means for folding the side panels of the carton blank while the carton blanks are traveling on said means for delivering the carton blanks; means for dropping the folded carton blank onto the cans; means for wrapping the folded carton blanks around the outside of the cans; means for conveying the carton blank and cans through the machine as a unit; and means for closing the carton blanks around the cans.

7. In a machine for applying a wrap-around carton to cans and the like arranged in rows, means for delivering the cans into the machine; means for delivering the carton blanks into the machine; means for segregating the delivered cans for application of the carton blanks including primary and secondary stop members, said secondary stop members stopping said delivered cans at a distance from said primary stop member substantially equal to the length of the row of cans in a carton, means for cyclically moving said primary stop member and said secondary stop member to intercept said delivered cans and cyclically moving said primary and said secondary to release said delivered cans, means for cyclically moving said primary stop member and said secondary stop member including cam means driven in synchronism with said conveying means and block members being moved by said conveying means restraining said delivered cans in passing from said secondary stop member to said primary stop member, said primary stop member cyclically releasing the cans between said primary and said secondary stop members for movement by said conveying means, said secondary stop member stopping said delivered cans upon said movement, and said secondary stop member cyclically releasing said delivered cans against said block members, which advance said delivered cans against said primary stop member; means for folding the side panels of the carton blank; means for dropping the folded carton blank onto the cans; means for wrapping the folded carton blanks around the outside of the cans; means for conveying the carton blank and cans through the machine as a unit; and means for closing the carton blanks around the cans.

8. In a machine for applying a wrap-around carton to cans and the like arranged in rows, means for delivering the cans into the machine, means for segregating the delivered cans for application of the carton blanks, means for delivering the carton blanks into the machine including carton blank conveying means operating in the direction of and overlying the cans being delivered to the machine and terminating substantially above the location

where said cans are delivered to said means for segregating the cans, means for folding the side panels of the carton blank while the carton blanks are being delivered by said carton blank conveying means, means for dropping the folded carton blank onto the cans, means for placing the folded carton blank onto the cans including folding bar means for completing the downward folding of the carton blank side panels and roller means mounted in a rotating disc, the axis of rotation of said disc being beyond the termination of said carton blank conveying means and extending above and across the path of travel of said delivered cans, means for wrapping the folded carton blank around the outside of the cans, means for conveying the carton blanks and cans through the machine as a unit, and means for closing the carton blanks around the cans, whereby said folded cartons are conveyed off the termination of said carton blank conveying means, drop onto the segregated cans, and are pressed down upon said cans by the rolling contact of said rollers.

9. In a machine for applying to cans and the like arranged in rows, a wrap-around carton having side panels, means for delivering the cans into the machine, means for conveying the carton blanks into the machine, said conveying means operating in the direction of and overlying the path of travel of the cans, and means for folding the side panels of the carton blanks on said conveying means, whereby said folded carton blanks upon being carried beyond the end of said conveying means drop over said cans.

10. In a machine for applying to cans and the like arranged in rows, a wrap-around carton having side panels, means for delivering the cans into the machine, means for conveying the carton blanks into the machine, said conveying means being in the direction of and overlying the path of travel of the cans, means for folding the side panels of the carton blanks on said conveying means, and roller means mounted on rotating disc means having an axis of rotation located beyond said end of said conveying means and above and at a right angle to the path of travel of said delivered cans, whereby said folded cartons being dropped from said conveying means onto said cans are forced against the tops of said cans by the rolling contact of said roller means.

11. In a machine for applying to cans and the like arranged in rows, a wrap-around carton having side panels, conveyor means above and overlying the cans, means for feeding carton blanks onto said conveyor means, rotating folding discs overlying said conveyor means and downwardly folding the side panels of the carton blanks on said conveyor, and rotating discs with an axis of rotation beyond the end of said conveyor means and above and at right angles to the rows of cans, rollers mounted on said rotating discs with axes of rotation parallel to that of said rotating discs, whereby the folded carton blanks upon being carried beyond the end of said conveyor means drop onto said cans and are forced against the tops of said cans by said rollers.

12. In a machine for applying a carton to cans and the like arranged in rows, means for delivering cans into the machine, primary and secondary means for alternately stopping the delivered cans, said secondary means stopping said delivered cans at a distance from said primary means substantially equal to the length of the row of cans in a carton, means for conveying the cans released from between said primary and secondary means, and block

means attached to said conveying means restraining the passage of the delivered cans from said secondary means to said primary means, and means for driving said primary and secondary means so as to cyclically interrupt and clear the path of travel of said delivered cans, whereby said delivered cans are segregated for subsequent application of the carton.

13. A machine in accordance with claim 12, in which said means for driving said primary and secondary means includes cam means, follower means and linkage means for each of said primary and secondary means, said cam means being attached to shaft means driving said conveying means, whereby said primary and secondary means and said conveying means are synchronized.

14. The method of feeding to cans and the like arranged in rows, a wrap-around carton having side panels, which comprises the steps of depositing the carton blanks onto a conveyor, folding the side panels of the carton blanks while the carton blanks are being conveyed, dropping the folded carton blanks from the conveyor on to the cans, and rolling the carton blanks into close contact with the tops of the cans.

15. The method of segregating cans and the like arranged in rows for application of a carton which comprises stopping the incoming cans at a first station, dividing off of the cans to be segregated at a second station, said second station being at a distance from the first station substantially equal to the length of the row of cans in a carton, releasing of the cans at the first station, advancing of the incoming cans until stopped at the second station, conveying away of the cans between the first and second stations, releasing of the incoming cans at the second station, restraining of the incoming cans advancing to the first station and stopping of the incoming cans at the first station.

16. A machine in accordance with claim 1, in which said means for folding the side panels of the carton blanks while the carton blanks are being conveyed by said means for delivering the carton blanks includes the side edge portions of said delivering means, said side edge portions underlying and supporting the carton blank adjacent the side panels during the folding of the side panels.

17. A machine in accordance with claim 4, in which said means for folding the side panels of the carton blanks includes the side edge portion of said delivering means, said side edge portions underlying and supporting the carton blank adjacent the side panels during the folding of the side panels.

18. The method of feeding to cans and the like arranged in rows, a wrap-around carton having side panels, which comprises the steps of depositing the carton blanks onto a conveyor, folding the side panels of the carton blanks while the carton blanks are being conveyed and being supported adjacent the side panels by the side edge portions of the conveyor, and dropping the folded carton blanks from the conveyor onto the cans.

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