

Oct. 16, 1962

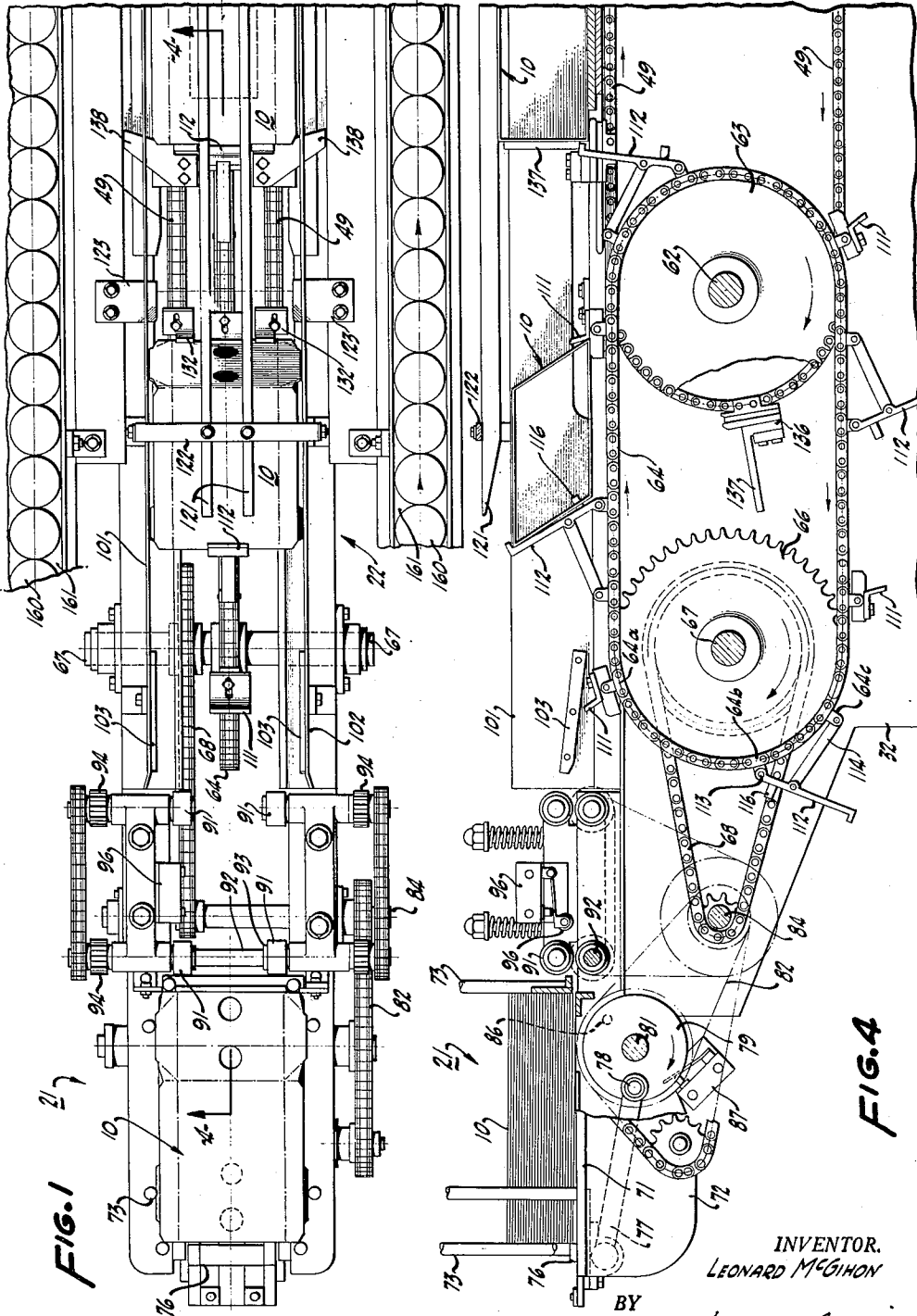
L. McGIHON

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 1



INVENTOR.
LEONARD MCGIHON

BY

Harlan Allen

ATTORNEY

Oct. 16, 1962

L. MCGIHON

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 2

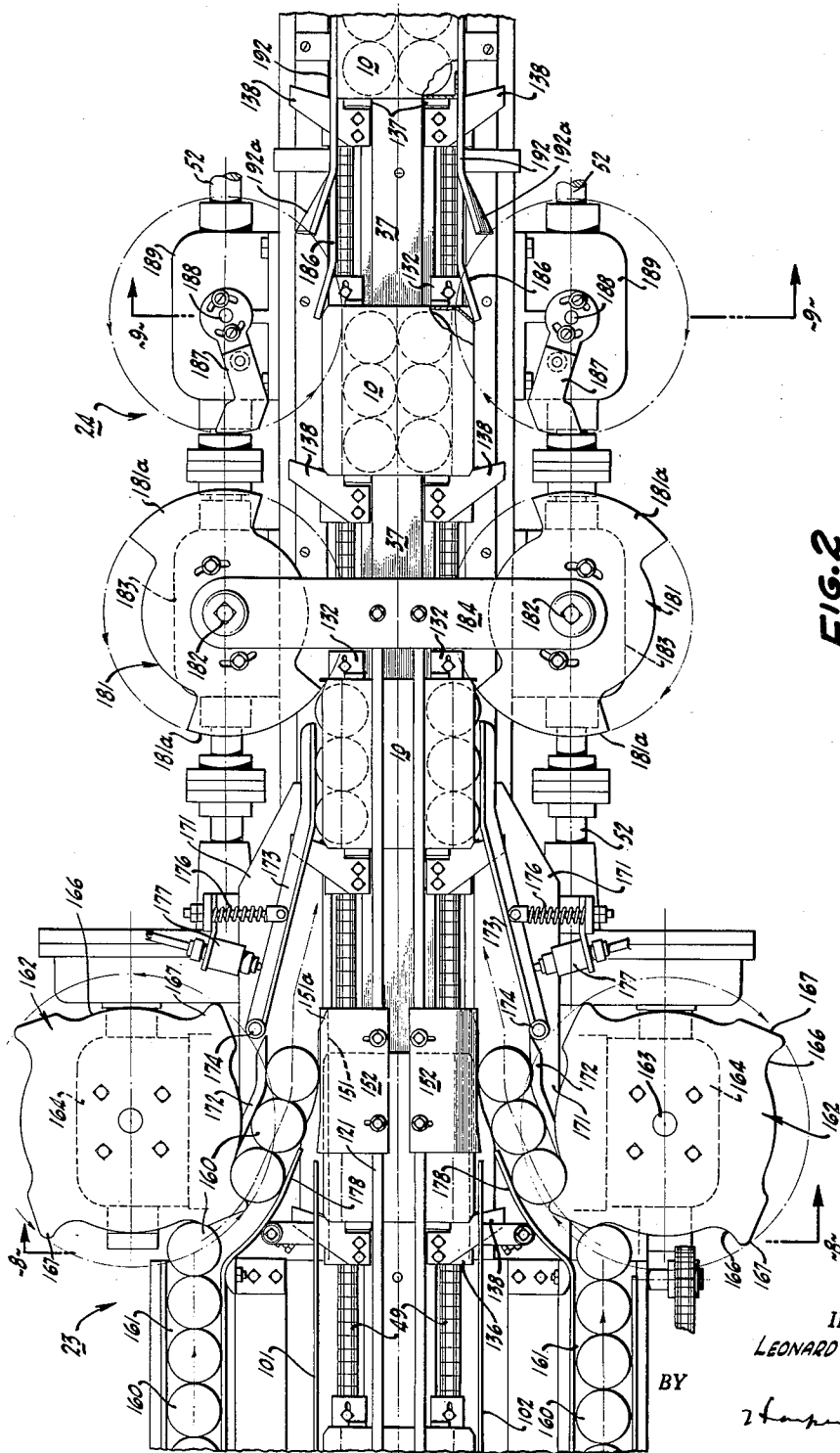


FIG. 2

INVENTOR.
LEONARD MCGIHON
BY
Thomas Allen
ATTORNEY

Oct. 16, 1962

L. MCGIHON

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 3

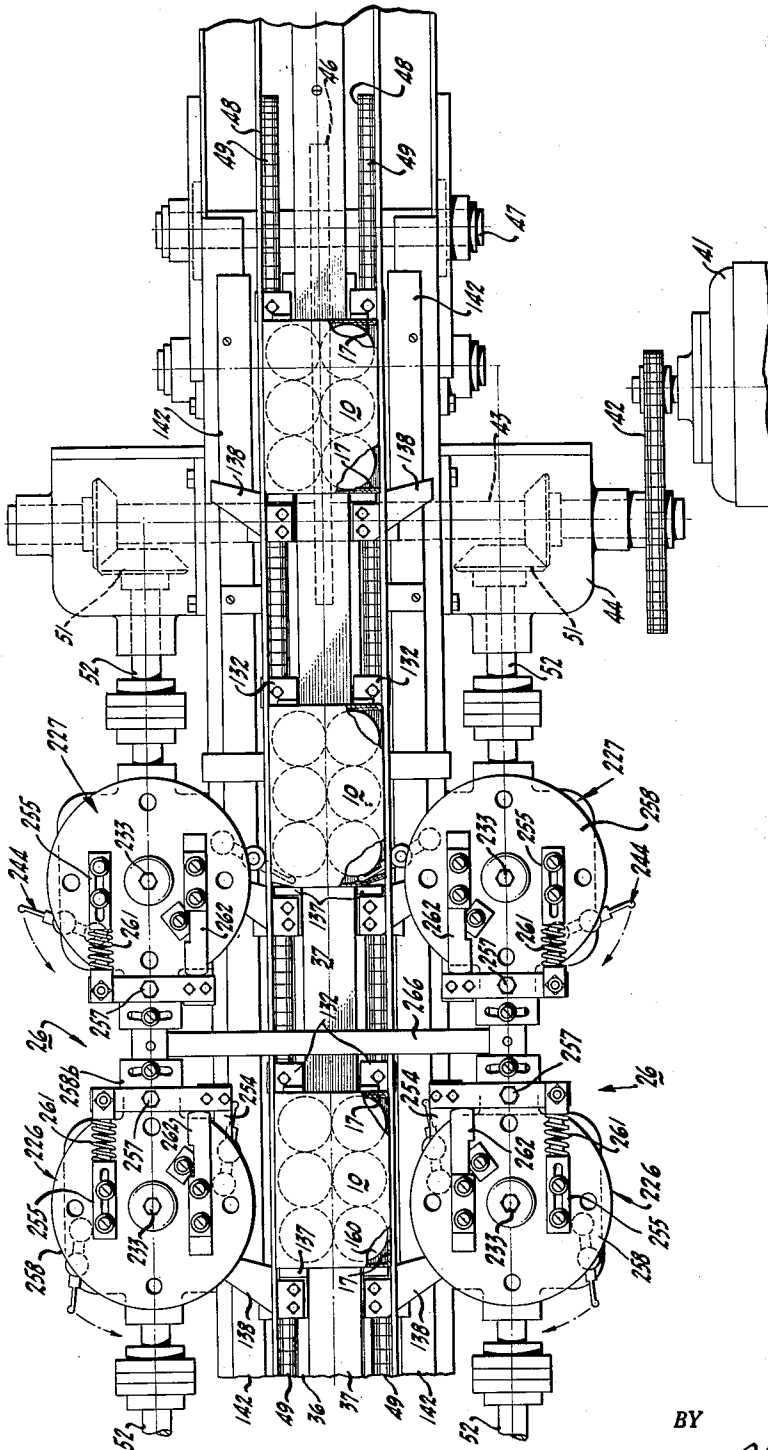


FIG. 3

INVENTOR.
LEONARD MCGIHON

BY

Harper Allen

ATTORNEY

Oct. 16, 1962

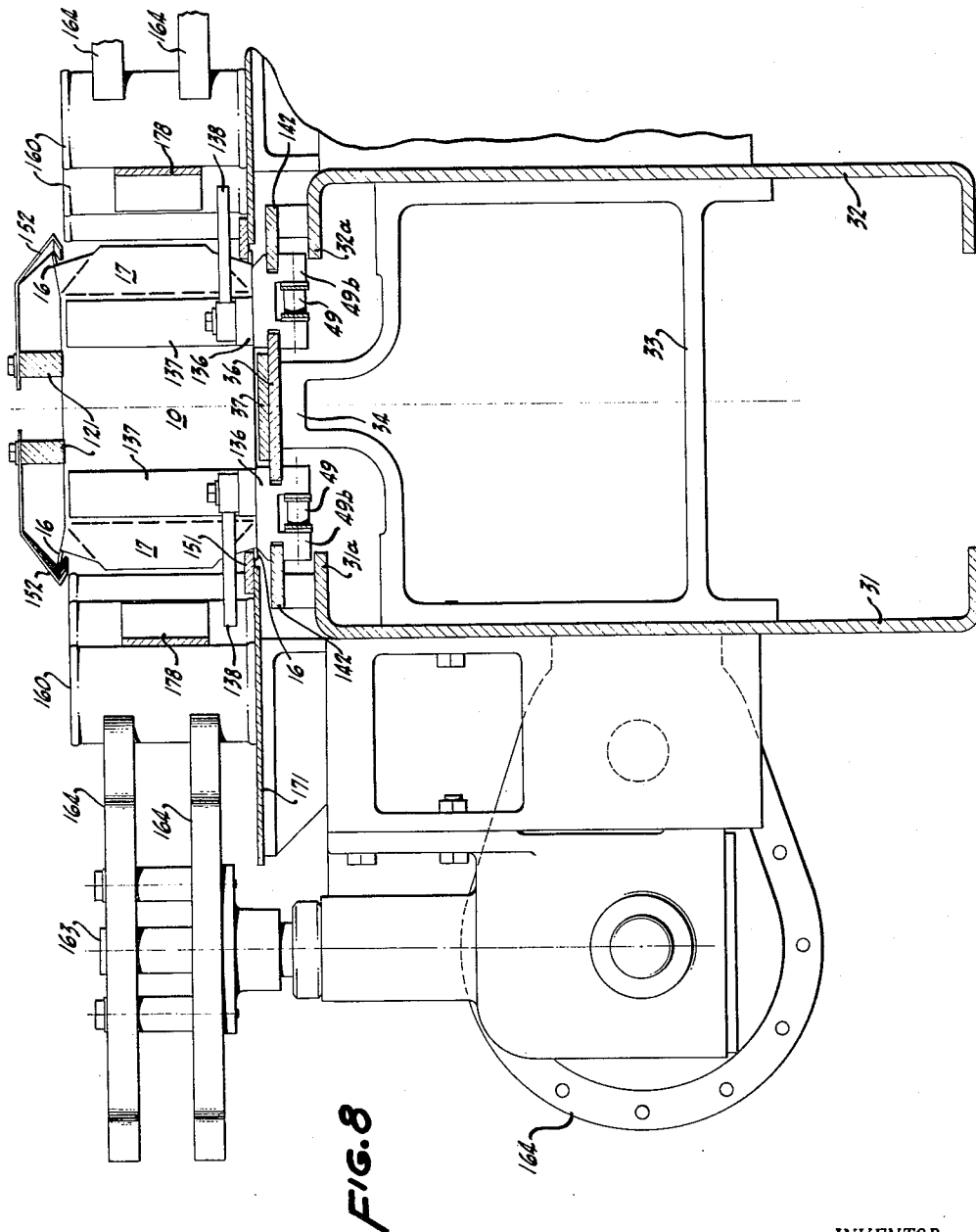
L. MCGIHON

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 5



INVENTOR.
LEONARD MCGIHON
BY
Harper Allen
ATTORNEY

Oct. 16, 1962

L. MCGIHON

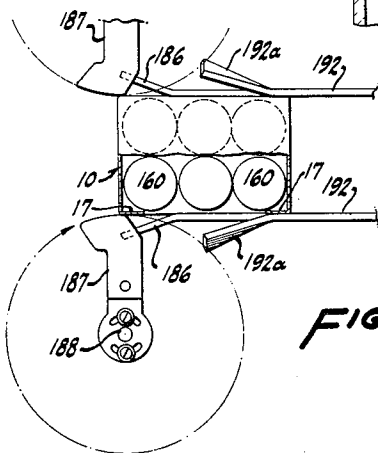
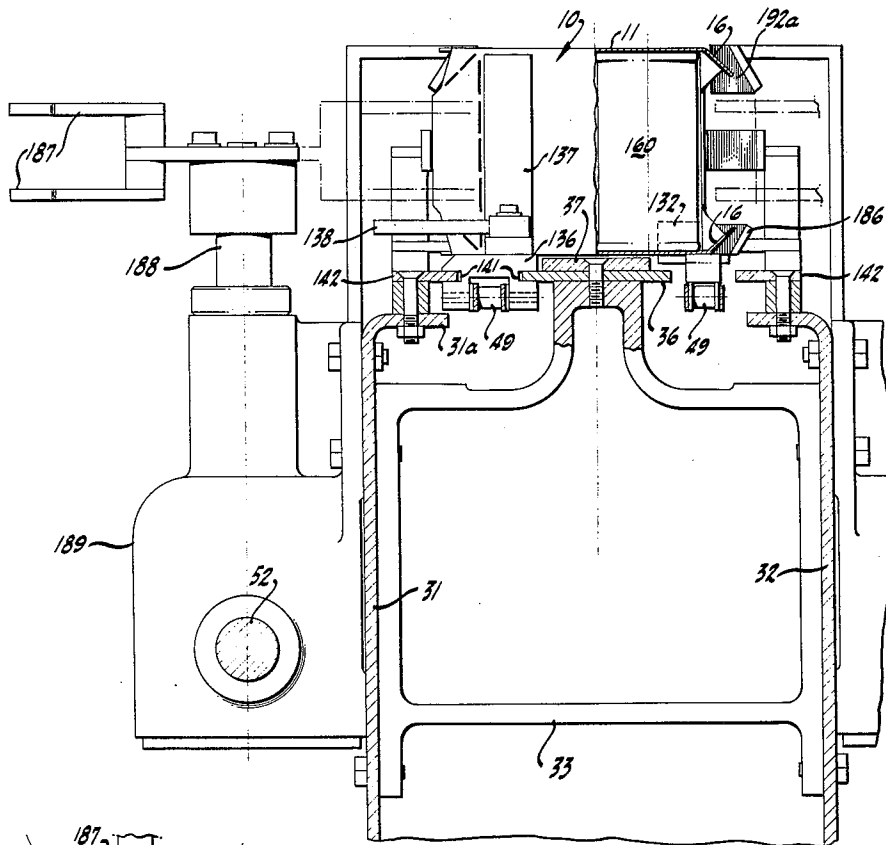
3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 6

FIG. 9



INVENTOR.
LEONARD MCGIHON

BY

Harper Allen
ATTORNEY

Oct. 16, 1962

L. MCGIHON

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 7

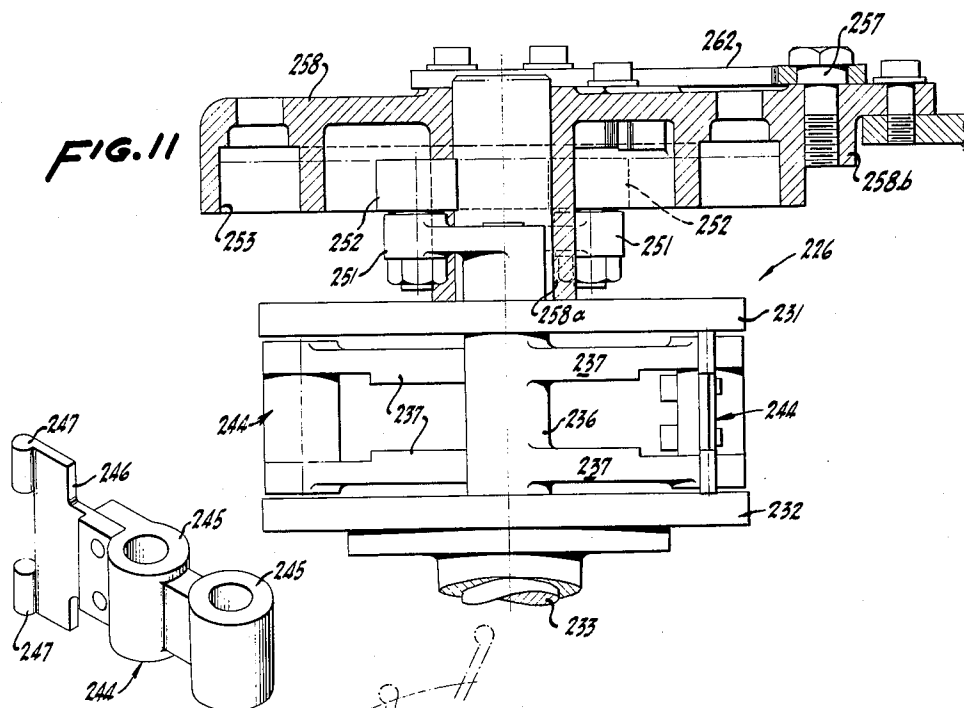


FIG. 13

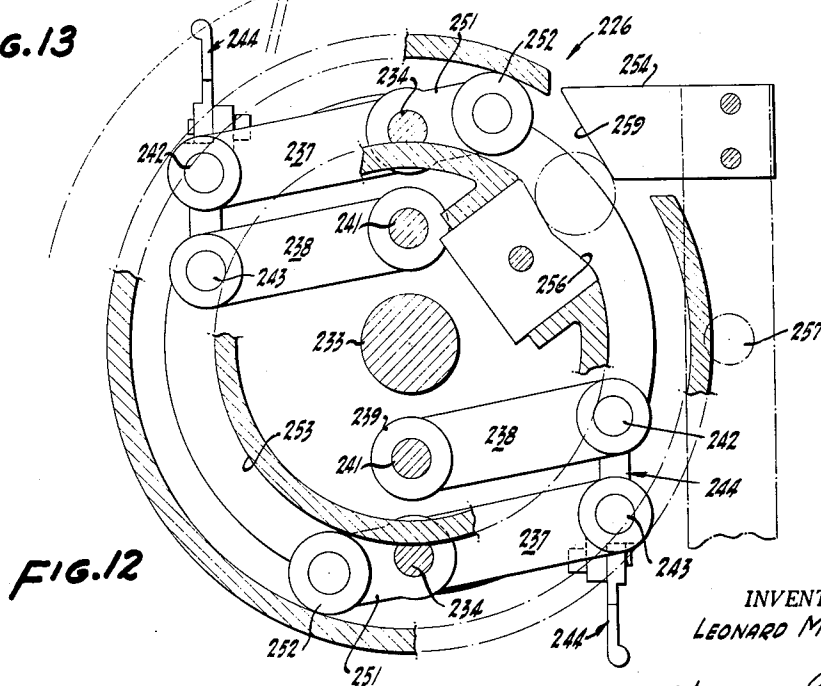


FIG. 12

INVENTOR.
LEONARD MCGIHON

Harper Allen

ATTORNEY

Oct. 16, 1962

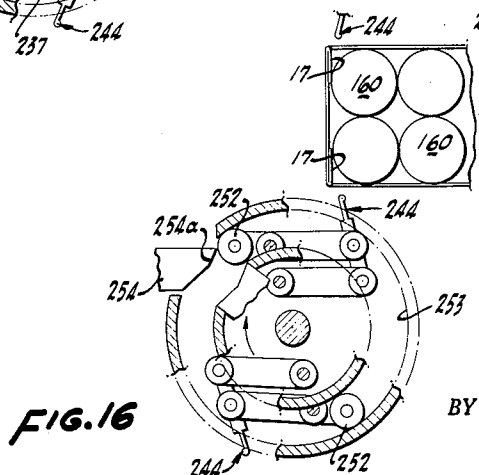
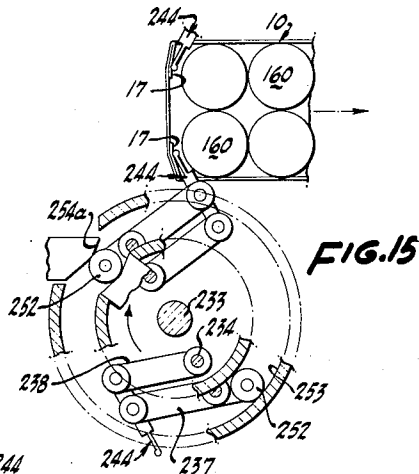
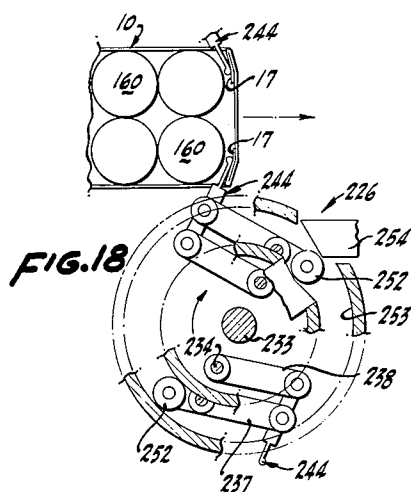
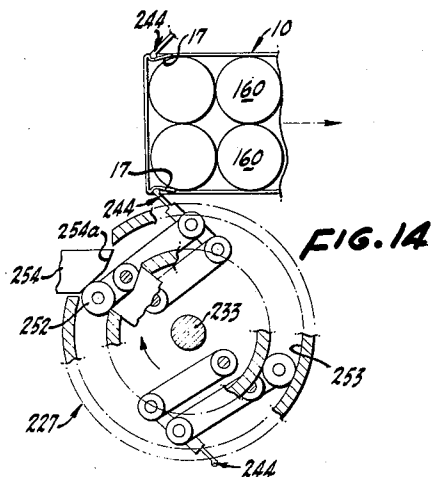
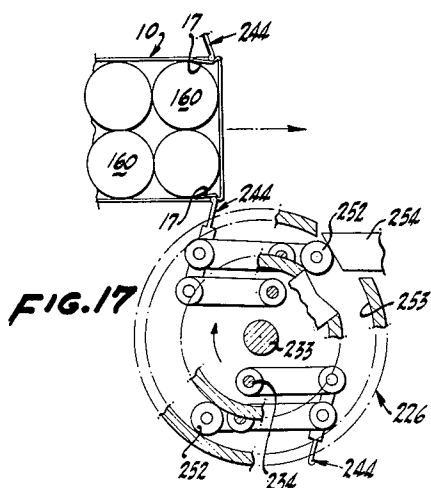
L. MCGIHON

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Filed Feb. 3, 1955

8 Sheets-Sheet 8



INVENTOR.
LEONARD MCGIHON

BY

Harper Allen

ATTORNEY

1

3,058,271

CARTON FEEDING, ERECTING, FILLING AND CLOSING MECHANISM

Leonard McGihon, San Leandro, Calif., assignor, by
mesne assignments, to King-O-Matic Equipment Corp.,
San Francisco, Calif., a corporation of California
Filed Feb. 3, 1955, Ser. No. 485,943
5 Claims. (Cl. 53—37)

The present invention relates to mechanism for taking 10
respective folded cartons, successively from a stack,
opening these cartons to a box-like form with open sides,
feeding cans or other containers in groups into the carton
through the open sides thereof, and then closing the
cartons so as to provide a carry-home pack of the 15
containers in the carton. The various operations take place
in sequence and continuously to provide a rapid and
efficient method of packing containers in cartons, for
example beer cans packed in the familiar six-pack cartons
as now commonly on the market. More particularly, 20
the instant mechanism is designed to operate on a
carton of a character having a closed rectangular shape
with partially open sides, the open sides being provided
with connected or continuous side flap portions, the
respective adjacent side flaps of each corner being 25
connected by a gusset type fold. In this type of carton, the
folding of the flaps attached to the end panels of the
carton tucks these flaps behind the containers or cans in
the carton and effectively holds the carton closed during
shipment and handling, but provides for easy opening
by the user.

The above and other objects of the invention are attained as described in connection with a preferred embodiment of the invention, as illustrated in the accompanying drawings, in which:

FIGURES 1, 2 and 3 represent a composite plan view of the machine.

FIGURE 4 is a longitudinal sectional view partially in elevation, of the mechanism shown in FIGURE 1, the view being taken as indicated by the line 4—4 in FIGURE 1.

FIGURE 5 is a schematic enlarged view of a portion of FIGURE 4, illustrating the operation of the carton erecting mechanism.

FIGURE 6 is a fragmentary plan view taken as indicated by the line 6—6 in FIGURE 5.

FIGURE 7 is a fragmentary sectional view taken as indicated by the line 7—7 in FIGURE 5.

FIGURE 8 is a transverse sectional view taken as indicated by the line 8—8 in FIGURE 2.

FIGURE 9 is a transverse sectional view taken in a plane indicated by the line 9—9 in FIGURE 2.

FIGURE 10 is a fragmentary plan view showing a portion of FIGURE 2 of the preliminary flap closing mechanism, the parts being shown in a different operating position.

FIGURE 11 is an elevational view of one of the carton-tucking or flap-tucking mechanisms, with certain portions broken away and showing sections to illustrate details of construction.

FIGURE 12 is a plan view, partially in section, of the mechanism shown in FIGURE 6.

FIGURE 13 is a perspective view of one of the flap-tucking blades of the machine.

FIGURES 14, 15 and 16, respectively, are schematic plan views showing different phases of the operation of the tucking of the rear or trailing flaps of a carton.

FIGURES 17 and 18 are similar schematic plan views showing successive operations in the tucking of the front or leading flaps of the carton.

This application is a continuation-in-part of my co-

2

pending application Serial No. 392,158, filed November 16, 1953, now U.S. Patent No. 2,849,846.

To enable a better understanding of the invention, a brief description of the carton preferably employed with the machine will be described, this carton being of the type shown in my copending application Serial No. 402,872, filed January 8, 1954, for Carton, now U.S. Patent No. 2,931,490. In general the carton 10, which is symmetrical from side to side, includes (FIGURES 6, 7 and 8) a top panel 11, a bottom panel 12, and respective end panels 13, one of the end panels comprising overlapped and glued portions. These four panels are connected by respective bend lines so that they form a continuous series. Respective top panel 11 has side flaps or panel portions 16 at either side, and the bottom panel 12 has similar side flaps or panel portions 16, and end panels 13 and 14 have respective side tuck-in flaps 17 of similar construction, the respective flaps 16 and 17 being connected at each corner by a gusset type corner or fold joint 18. As seen more particularly in FIGURE 7, the side flaps 17 are cut away as at 17a and are wider than the flap 16 for purposes later described.

In general the machine comprises a carton feed station 21 (FIGURES 1 and 4) which is adapted to receive a stack of folded cartons, and inject these cartons one by one to a carton erecting mechanism 22 which is the next mechanism in the line of operation. From the carton erecting mechanism 22, the erected cartons are fed past a can feed station 23 (FIGURE 2) by means of which a group of three cans are introduced from each side into the carton, and then the carton with the cans therein is carried past a carton flap closing station 24, which performs a preliminary folding of the side flaps to prepare them for the subsequent tucking operation, and then the cartons are fed to a flap tucking station 26 where the tucking of the flaps completes the carton-closing operation.

These various mechanisms will be described in sequence following the description of the frame and the drive mechanism.

Frame and Drive Mechanism

The frame comprises respective similar opposed U-shaped sheet metal frame portions or side members 31 and 32 (FIGURES 4 and 8) which are joined at a plurality of points along their length by similar center frame castings 33 (FIGURE 8). The frame castings 33 in addition to providing a rigid connection for the side frame members 31 and 32, has a raised central pad portion 34 on which respective longitudinal track members or plates 36 and 37 are secured as will be pointed out later in detail.

The drive for the machine includes a motor 41 (FIGURE 3) connected by a suitable chain and sprocket mechanism 42 with a transverse shaft 43 suitably journaled in housing members 44 bolted to the respective side members 31 and 32. At its center the shaft 43 is connected by suitable chain and sprocket mechanism 46 with a drive shaft 47 carrying suitable sprockets 48 thereon to drive the two main conveyer chains 49 for a purpose later described. The shaft 43 is also connected at either side of the frame by a set of bevel gearing 51 with longitudinal shafting 52 which extends through the flap tucking mechanism, the flap folding mechanism, and the can feeding mechanism 23 (FIGURE 2).

Referring to FIGURES 1 and 2, the conveyer chains 49 are trained about respective idler sprockets carried by a shaft 62 suitably journaled on the frame. This shaft 62 also carries a center sprocket 63 which provides a drive for a conveyer chain 64 (FIGURES 1 and 4) of the carton erecting mechanism, this chain being sup-

ported by sprockets 63 and 66. The sprocket 66 is mounted on a shaft 67 which also provides a drive through a suitable chain and sprocket mechanism 68 for the carton feed mechanism 21 in a manner later described.

Carton Feed Mechanism

The carton feed mechanism includes a platform 71 carried by an auxiliary frame member 72 on the main side frame members 31 and 32 and having eight upright rods 73 (FIGURES 1 and 4) and these eight upright rods engage the respective sides and ends of a stack of cartons 10 in folded condition. Suitably guided on the platform 71 in position to engage the lowermost carton 16 of the stack, is a feed slide 76 of conventional construction connected by a connecting rod 77 with a pin or eccentric 78 carried by a disc 79 on a transverse shaft 81. The shaft 81 is connected by suitable sprocket and chain means 82 to a shaft 84, the shaft 84 being driven by a chain and sprocket mechanism 68 previously referred to. The disc 79 carries a pin 86 which once during each cycle opens a normally closed switch 87 for a purpose later described.

From the above description it is believed apparent that the slide 76 once for each revolution of the shaft 81 will eject the lowermost carton 10 from the stack, at least begin the ejection, and bring it into engagement with a set of ejecting or draw out rolls now to be described.

These rubber rolls 91 (FIGURES 1 and 4) carried by respective upper shaft 93 and lower shaft 92 and arranged in opposed pairs so as to move a carton rapidly from underneath the stack once the carton feed is initiated by the feed plate 76. The shaft 92 is a cross shaft and serves to connect the respective sets of rolls 91, and the shafts 92 and 93 have meshing gears 94.

As a carton is being withdrawn from the stack and passing between the respective sets of rolls 92 and 93, it closes a normally open switch 96, to maintain the circuit closed during the interval that the switch 87 is open, these two switches being connected in parallel relation with each other and in series in the circuit of motor 41. As long as there is continuous carton feed the circuit for the motor 41 will be maintained, but if there is no carton fed past the switch 96, it will not be closed, and the opening of the switch 87 will interrupt the motor circuit so that the operation of the machine will stop.

A carton 10 (FIGURES 1, 4 and 5) ejected by the rollers 91 and 92 is fed between a pair of side rails 101 and 102 and beneath respective inclined bars or guides 103 on the rails 101 and 102 to hold the carton down and to direct it into engagement with respective progressing and erecting means carried by the chain 64. The carton erecting means includes a leading element 111 which is secured on a special link 64a of the chain 64 and a trailing or lifting arm 112 which is pivoted at 113 on a link 64b of the chain 64 and is connected by a supporting link 114 to another link 64c of the chain. From the above description it will be seen that when links 64b and 64c are reversely operated the lifting arm 112 will be in lowered position, this condition operating as the links 64b and 64c travel around the sprocket. Conversely when these links are closer together, i.e., when the chain is driven on a straight line the lifting arm 112 will be in its upright carton erecting position. This trailing carton lifting or erecting element 112 also carries a projection 116 for a purpose later described.

Referring to FIGURE 5, the initial carton erecting operation of the mechanism will be described, starting with a position marked "1" of the various parts, the successive operating positions illustrated in phantom lines being shown at 2, 3, 4, 5 and 6 respectively. It will be noted that the carton in its flat folded condition comprises an upper layer consisting of a top panel 11 and an end panel 14, and a bottom layer consisting of an end panel 13 and a bottom panel 12, the end panels being provided with finger apertures 15.

As the carton erecting assembly 112 and 116 starts

from the position 1 in FIGURE 5, the finger 116 penetrates an aperture 15 and engages the top panel 11 at the time the arm 112 engages the bottom panel 13, the flaps 16 of the bottom panel are held against rising by the stops 103 on the side wall portions 101 and 102 so that the carton breaks at its hinged joints. As the chain progresses, and as the lifting arm 112 is raised around its arcuate course in passing around the sprocket 66, operation proceeds through the positions 3, 4 and 5, the angle end 112a on the lifting arm 112 engaging the end of the carton and the carton finally being erected to the position shown in dotted lines in FIGURE 5, the other end of the carton being engaged with the stop 111.

The carton is conveyed along in this condition until it is picked up by the carton feed mechanism, which completes the erecting operation. During the latter portion of this travel it passes beneath but clears a pair of top rails 121 (FIGURES 1 and 4) suitably supported on the frame by a U-shaped bracket structure 122 at one end and at the other end by a crosspiece 184 (FIGURE 2). Also the bottom pair of side flaps 16 of the carton pass beneath a pair of opposite hold-down fingers or plates 123 (FIGURE 1) mounted on suitable side frame members 124 attached to the side plates 31 and 32. The flaps 16 being held down are relatively stationary with respect to the chain 64 and the erecting parts 112 and 111 which hold the carton and are travelling therewith, so that during subsequent carton erecting mechanism, a stationary part of the carton is used to hold it down and insure against its lifting out of place.

From the above description it will be seen that the conveyer or chain 64 includes a series of equally spaced apart carton receiving and erecting stations at each of which a stop 111 is provided and a lifting arm 112. These stations serve to partially erect the carton during its travel and to transfer a partially erected carton to a series of equally spaced apart carton erecting and holding stations on the conveyer or chains 49. Each chain 49 (FIGURE 5) at each carton erecting and holding station carries a block 131 secured to a link 49a upon which there is adjustably mounted an L-shaped stop 132 for engaging the leading end of the carton. Each chain 49 also carries on a link 49b a plate 136 which carries an upright carton-erecting and propelling portion 137, and respective side extensions 138, for a purpose later described.

As seen in FIGURE 9 the plate 136 is provided with respective side recesses 141, one of which engages a side guide plate 142 on the flange 31a of the side frame 31 and the other of which engages the center guide plate 36 previously referred to. The carton is supported and carried along by the stops 132 and the plate 136, and the upper center plate 37 (FIGURE 8) at a lower level forms a steady rest for engaging the bottom of the fully erected carton 10, whose top is engaged with the rails 121 so that the carton is carried along fully opened in rectangular fashion with its sides open, and the side flanges 16 and 17 are extended. This condition is illustrated at the extreme right of FIGURE 4 and in FIGURE 8.

As the carton thus held enters the can filling zone shown at the left of FIGURE 2, and also illustrated in FIGURE 8, the lower flanges 16 engaged beneath hold-down plates 151 suitably mounted on the side platforms or frames 124, and the upper flanges 17 are engaged by V-shaped hold-up guides 152 (FIGURE 8) secured to the top rails 121 which bend up and lift slightly the top edges of the carton.

Can Feed Mechanism

The can feed mechanism comprises generally a pair of opposite single file can conveyers 161 (FIGURES 1 and 2), which may be mounted and driven in any suitable manner, on which the cans 160 are progressed in two parallel files at opposite sides of the machine until

5

they are separated into groups and introduced as groups into the open sides of the carton 10.

At the end of each of the respective single file conveyers 161, a can segregating member or disc 162 is provided. Each disc or can segregator 161 is carried by a shaft 163 journaled in a housing 164 and is driven through suitable gear mechanism from the shafting 52. Each disc 162 has four can receiving pockets or sections 166 which are separated by respective can separating projections 167 having inclined outer surfaces. The pockets 166 and projections 167 serve to segregate the single file of cans 160 into sets of three each by the action of the leading high end of each projection 167 which enters between adjacent cans 160 and retards the cans following the group of three cans segregated. Because of the inclined can engaging edge of each projection 167 a slow progressing action of the following file of cans continues, so that no abrupt stopping and starting is involved. The similar can segregating discs 162 operate similarly on the two files of cans 160 so that two groups of three cans each are segregated and travel over a platform 171 in timed relation with respect to a container 10, on opposite sides thereof, and in timed relation to the progressing fingers 138 projecting out at either side of the respective blocks 136. The cans separated and conveyed by the discs 164 are carried out over the platforms 171, and past inclined guide rails 178 and 172, rail 172 having a section 173 hinged thereto at 174 and spring urged inwardly by a spring 176. This yieldable section 173 serves to introduce the upright cans side-wise into the open sides of the carton, and if a jam should occur, outward movement of the section 173 will open a limit switch 177 for motor 41.

As seen in FIGURE 2, the groups of cans are propelled by projection 167 and fingers 138 along a converging course leading to the cartons being guided by the inner rails 178 and outer rails 172, 173. Each can ultimately engages the outer edge of the hold-down plate 151 for the lower flaps 16, and this hold-down plate 151 has a terminal sharpened edge 151a off of which each can successively passes and into the carton 10. One set of cans 160 are shown approaching the terminal edge 151a and the other sets are shown partially entered into the carton.

Thus it is seen that inclined guide section 173 partially introduces the cans 160 into the carton as shown at the first segregated group in relation to the carton in FIGURE 2, and means is provided for subsequently completing the entry of the cans into the carton.

This means comprises a pair of opposite cam members 181 (FIGURE 2), each carried by a shaft 182 journaled in a gear box 183 through which the shafting 52 passes and provides a drive. The shafts 182 are also journaled in a crosspiece 184. Each of the cams 181 has two full sections 181a spaced 180 degrees apart, and one of these sections as shown in FIGURE 2 is just beginning to engage a group of cans partially entered in the carton 10, and it will complete the entry of the cans into the carton as shown at the next position to the right in FIGURE 2. The next operation is the flap folding.

Flap Folding Means

As previously explained, the flap folding is effected by first folding in the side flaps 17 attached to the end panels 13 and 14 of the carton through 90 degrees, then folding the side flaps 16 through 90 degrees, in subsequently a tuck-in folding of the side flaps 17 for another 90 degrees. In the preliminary folding of the flaps 17, the leading flaps 17 of a carton are folded by respective opposite stationary folding arms or guides 186 (FIGURES 2 and 9) found at either side of the carton. The rear flap folding means for flaps 17 comprises a pair of flap folding arms 187 arranged in pairs at either side of the machine, these arms being carried by a shaft 188 mounted in a gear box 189 and suitably driven from the shafting

6

52. These arms 187 are driven at a higher rate of speed than the linear travel of the carton and serve to engage the rear flaps 17 as shown in FIGURE 10 and fold these flaps inwardly for 90 degrees.

It will be recalled that the side flaps 17 attached to the end panels are connected to the side flaps 16 attached to the top and bottom panels by gusset folds, so that the folding of the side flaps 17 into place parallel to the container, will cause a partial downward folding of the upper side flaps 16 and partial upward folding of the lower side flaps 16. To complete the folding of the flaps 16 and thereby place the carton in rectangular condition, the carton 10 enters between respective upper and lower side rails 192 (FIGURES 2 and 9) having tapered entrance portions 192a which engage flaps 16 to complete their fold through 90 degrees to a vertical position. This conditions the carton and the containers therein for the flap tucking operation.

Flap Tucking

The conveyor 49 progresses each carton along in timed relation to the other cartons past four tucking mechanisms 226 and 227. It will be noted that there are two carton tucking units 226 for engaging the side flaps 17 at the leading or front edge of the carton, and two carton tucking mechanisms 227 for engaging the trailing or rear flaps 17 of the carton. The pairs of mechanisms 226 and 227 need not be timed with respect to each other, but only with respect to the conveyor feeding the cartons therepast.

Because the various tucking mechanisms 226 and 227 are essentially identical in construction, only one will be described in detail.

Referring to FIGURES 11 and 12, one of the tucking units 226 is illustrated and includes a pair of opposed discs 231 and 232 which are carried by an upright drive shaft 233 and secured in spaced relation thereon. The discs 231 and 232 carry two similar tucking means spaced 180 degrees apart, and for each tucking means have pivotally journaled therein an upright shaft 234 which carries a boss 236 having a pair of arms 237 secured thereto in vertically spaced relation and carrying a pivot pin 240 between their outer ends. The arms 237 form a part of the parallel linkage including a second pair of parallel arms 238 having a boss 239 journaled on a pin 241 secured between the plates 231 and 232. The arms 238 and 237 are parallel to each other and carry at their outer ends respective pins 242 and 243 on which a blade arm 244 is pivotally mounted by respective bosses 245. The blade arms 244 has a tucking blade 246 extending therefrom, this tucking blade including a pair of vertically spaced, round fingers 247 to perform the actual tucking operation. The upper end of shaft 234, carries a lever 251 having a cam follower roller 252 journaled therein and engaged with a cam track 253 formed in a cam member 258 which is journaled about the shaft 233 and has a hub 258a which rests on the upper disc 231. The four cam members 258 (FIGURE 3) are interconnected by a crosspiece 266 carrying respective end plates 267 adjustably secured by screws 268 to slotted extensions 258b of the cam members 258. Then each cam member 258 is mounted in stationary position above the related tucking assembly, and the cam track 253 thereof is circular in configuration except for a cam depression 256 opposite which a movable cam section 254 is mounted. The cam section 254 is pivotally secured by a pin 257 in a plate 258 mounted on the cam track 253 and has a cam portion 259 projecting into the cam track and spring urged into position by a spring 261 suitably engaged at its opposite end with an adjustable plate 255. The opposite end of the cam member 254 engages an adjustable stop 262 so that the extent of penetration of the cam surface 259 can be adjusted. The yieldable mounting of the cam section 254 provides against breakage in the

event of a jam in the operation of the tucking blade 246 so that no parts will be broken.

Referring to FIGURES 14, 15 and 16, three positions of the tucker blade 246 in various stages of the operation are shown including a position in FIGURE 14 which is the normal position of the tucker blade 246 with the roller 252 riding on the long dwell of the cam track 253. In this normal position of the tucker blade 246, it moves in to engage the aligned flap 17 and make an initial bend therein. The timing of the carton with respect to the tucker blade is such that this initial bend in the tuck-in flap is performed by the tucker blade along its normal path of travel and it will be noted that the cam follower roller 252 is just ahead of the depression 256 opposite the protuberance 259 of the outer cam section 254. During the continued movement of the carton from the position shown in FIGURE 14 to that shown in FIGURE 15, the tucker blade 246 moves inwardly, and accelerates relative to the carton to place the flap 17 behind the adjacent container 160 and flat against the end wall of the carton, this wall being slightly flexed during the operation. As the carton is moving, it progresses from the relative position shown in FIGURE 15 to that shown in FIGURE 16, the tucker blade 246 being withdrawn, and the flap 17 being securely held in place by the adjacent container 160.

It will be noted that the tucker blade 246 in its relation to the travel of the carton has three phases. During its normal rotating movement it is travelling at substantially the same speed as the carton (FIGURE 14) during its advance to the position shown in FIGURE 15, by virtue of the pivoting of the parallel linkage 237—238, etc., it is accelerated with respect to its regular rate of travel, and during its withdrawal, i.e., to the position shown in FIGURE 16, it decelerates back to its normal rotating speed.

The operation of unit 227 is shown in FIGURES 17 and 18 and it is noted that the operation is generally similar to that shown with respect to the tucker blade 246, except that the tucker blade 261 of unit 227 is oppositely angled with respect to the carton, being in trailing relation in its direction of rotation so that when it is projected, it is effectively decelerated with respect to its regular rate of travel, and when it is withdrawn it is effectively accelerated so as to leave the tucked-in flap in place and to clear the carton in leaving. Also the cam section 254 is bevelled at 254a. The opposite angle of the tucker blades is effected by inverting the tucking assemblies. It will be noted that as the tucking assemblies for the front and rear flaps are timed only with respect to the flaps, the machine is useful with cartons of varying length.

While I have shown a preferred form of the invention, it will be apparent that the invention is capable of variation and modification from the form shown, so that its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. In a carton closing machine for a rectangular carton of the type having side openings and a continuous series of panels forming the body of the carton and a continuous series of side flaps connected to the body of the carton by hinged connections around said opening, each of said side flaps lying in the plane of the adjacent panel in the open position thereof, said side flaps along the top and bottom panels of the carton being connected to the side flaps along the end panels of the cartons by gusset type connections, and the carton adapted to be closed by bending the side flaps attached to the top and bottom flanges through 90 degrees from their respective open positions, and by folding of the side flaps attached to the end panels of the carton through 180 degrees from their respective open positions and into parallel relation with the adjacent panels, comprising a conveyer having

a series of carton conveying stations thereon for conveying the cartons along a path, a first flap folding station adjacent said conveyer comprising means for effecting a preliminary fold of the side flaps attached to the end panels of the cartons on said conveyer, and thereby for effecting a partial closing or folding of the top and bottom parts, a second flap folding station adjacent said conveyer and spaced from said first folding station and including means for completing the fold of the side flaps attached to the top and bottom panels of the carton to positions substantially at right angles to the adjacent carton panel, and a third flap folding station adjacent said conveyer and spaced from said second folding station including means for effecting a second fold of the flaps attached to the end panels of the carton into substantially parallel relation with respect to said end panels.

2. In a carton closing machine as recited in claim 1, in which said first flap folding station comprises a stationary means for folding of one pair of side flaps attached to an end panel, and movable means for folding the other pair of side flaps attached to the other end panel of the carton.

3. A carton closing machine as recited in claim 1 in which the second flap closing station comprises stationary means including inclined elements for engaging the side flaps attached to the top and bottom panels of the carton, and for folding these flaps into substantially 90 degree relation with respect to said top and bottom panels.

4. A carton closing machine as recited in claim 1 in which the third flap folding station includes respective pairs of rotating elements for engaging the side flaps attached to the end panels of the carton and for folding these flaps into parallel relation with the end panels of the carton.

5. The method of packing articles in a display carton of the type having a pair of opposed end panels, opposed top and bottom panels, extending between said end panels, panel extensions integral with said top and bottom panels, and flap extensions integral with said end panels and having their ends respectively connected to the ends of said panel extensions, said method comprising: supporting said carton in a rectangular, fully open position for movement along a generally horizontal path of travel, inserting at least one row of said articles into said carton from an open side thereof, said row extending substantially from one end panel to the other of said carton, folding said flap extensions to a generally coplanar position extending toward each other thereby drawing said panel extensions to a generally coplanar position extending toward each other and overlying the sides of said row, and tucking said flap extensions into the space between said end panels and the ends of said row of articles for yieldably holding said panel extensions in enclosing relation with said row.

References Cited in the file of this patent

UNITED STATES PATENTS

1,118,424	Johnson	Nov. 24, 1914
1,873,059	Smith	Aug. 23, 1932
2,206,279	Ferguson	July 2, 1940
2,249,201	Ferguson	July 15, 1941
2,280,773	Ferguson	Apr. 28, 1942
2,485,235	Graf	Oct. 18, 1949
2,577,529	Kerr	Dec. 4, 1951
2,601,481	Williams	June 24, 1952
2,612,823	Woelfer	Oct. 7, 1952
2,612,832	Woelfer	Oct. 7, 1952
2,625,777	Malhiot	Jan. 20, 1953
2,625,778	Wood	Jan. 20, 1953
2,662,356	Swafford	Dec. 15, 1953
2,739,430	Griswold et al.	Mar. 27, 1956
2,765,603	Rose	Oct. 9, 1956
2,832,182	McGihon	Apr. 29, 1958