Feb. 19, 1952 J. D. CONTI 2,586,006

PACKAGING MACHINE

Filed June 29, 1949 4 Sheets-Sheet 1

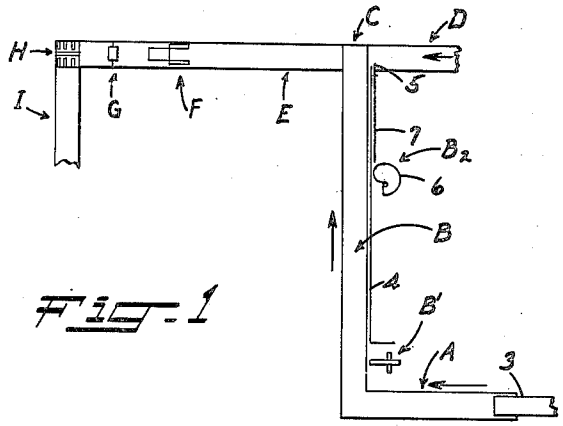


Fig. 1

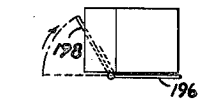


Fig. 13

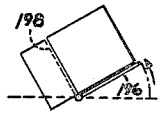


Fig. 13a

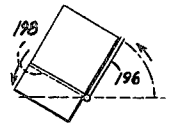


Fig. 13b

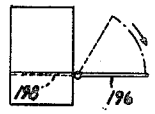


Fig. 13c

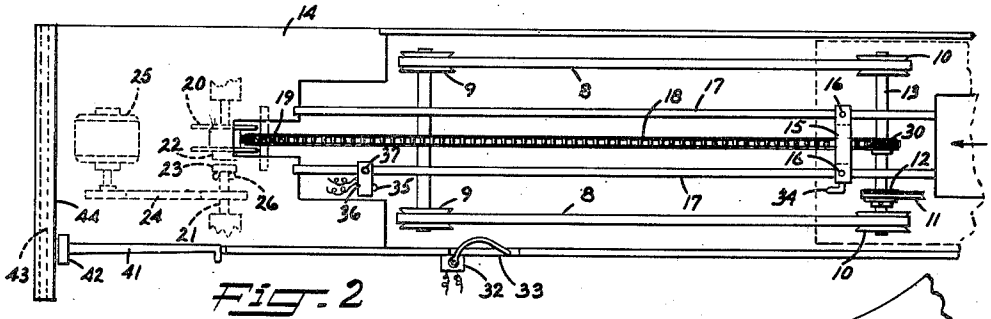


Fig. 2

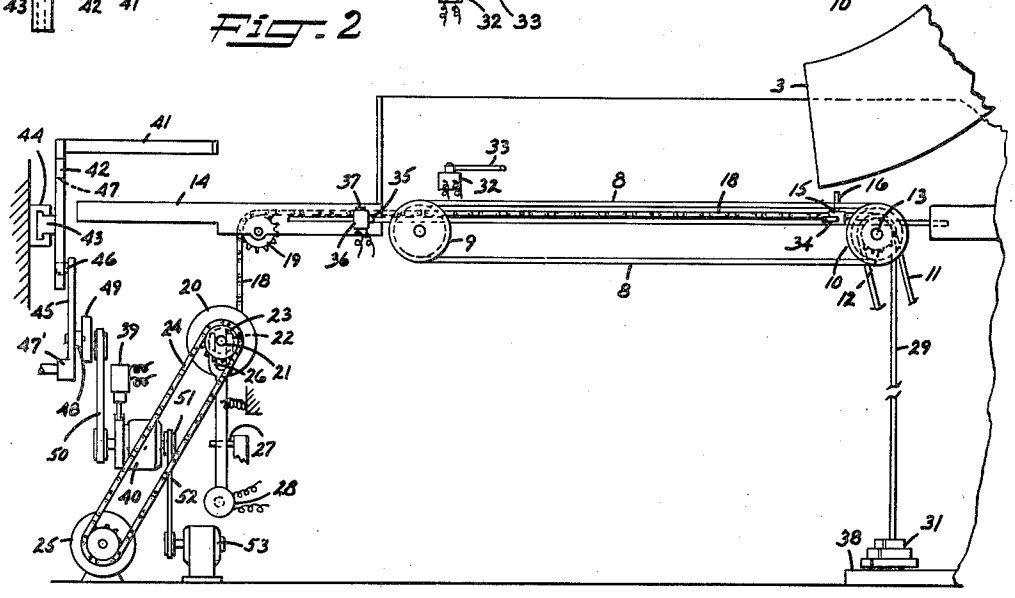


Fig. 3

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PACKAGING MACHINE

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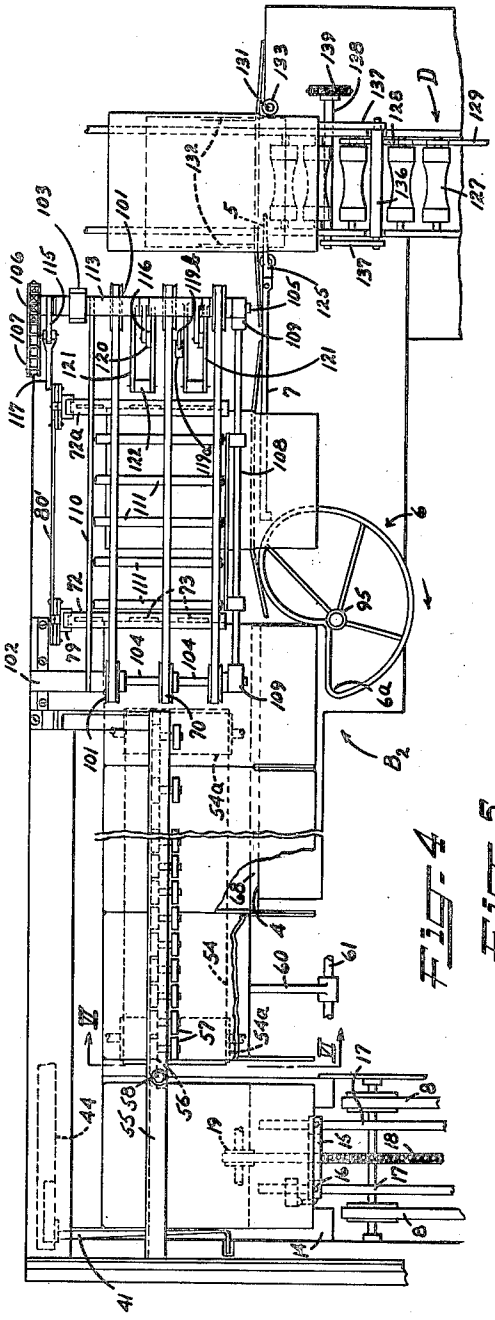


FIG. 4

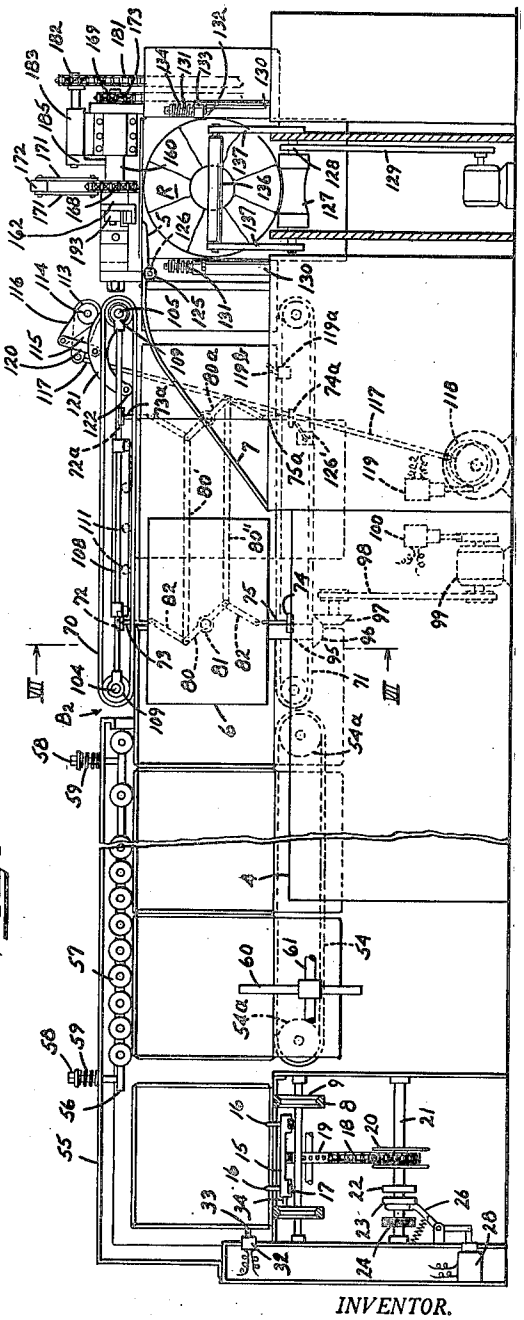


FIG. 5

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PACKAGING MACHINE

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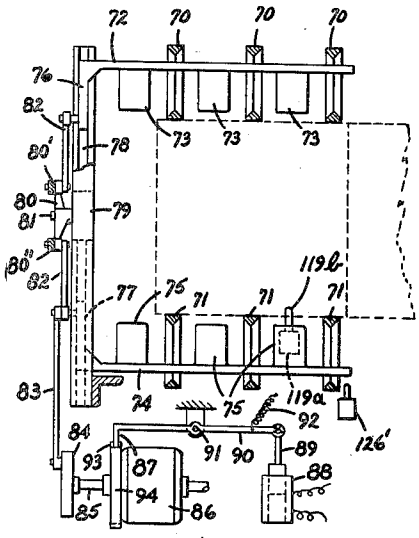


Fig. 7

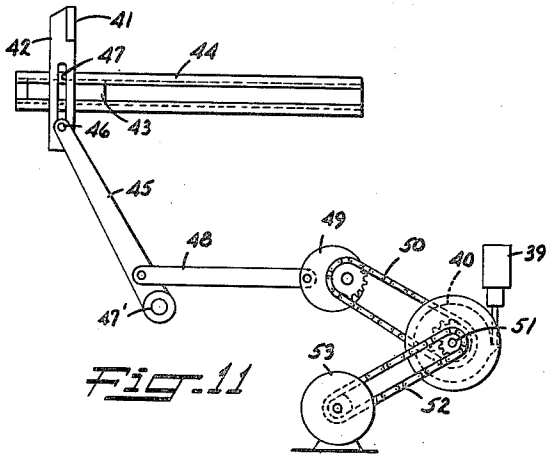


Fig. 11

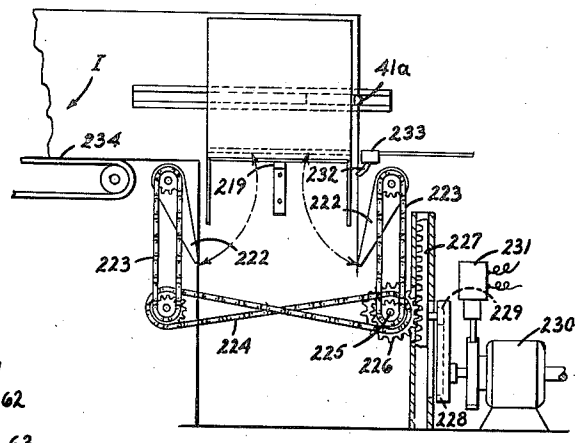


Fig. 10

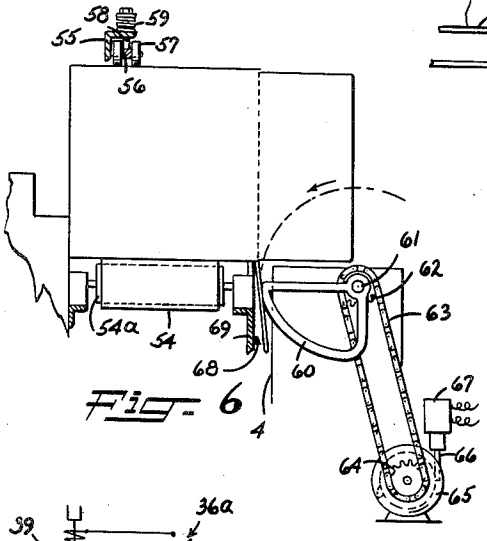


Fig. 6

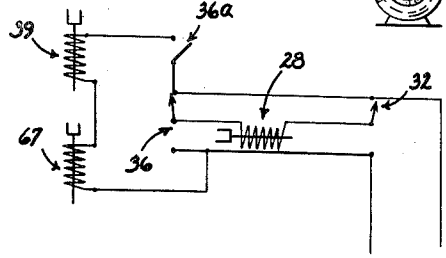


Fig. 12

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PACKAGING MACHINE

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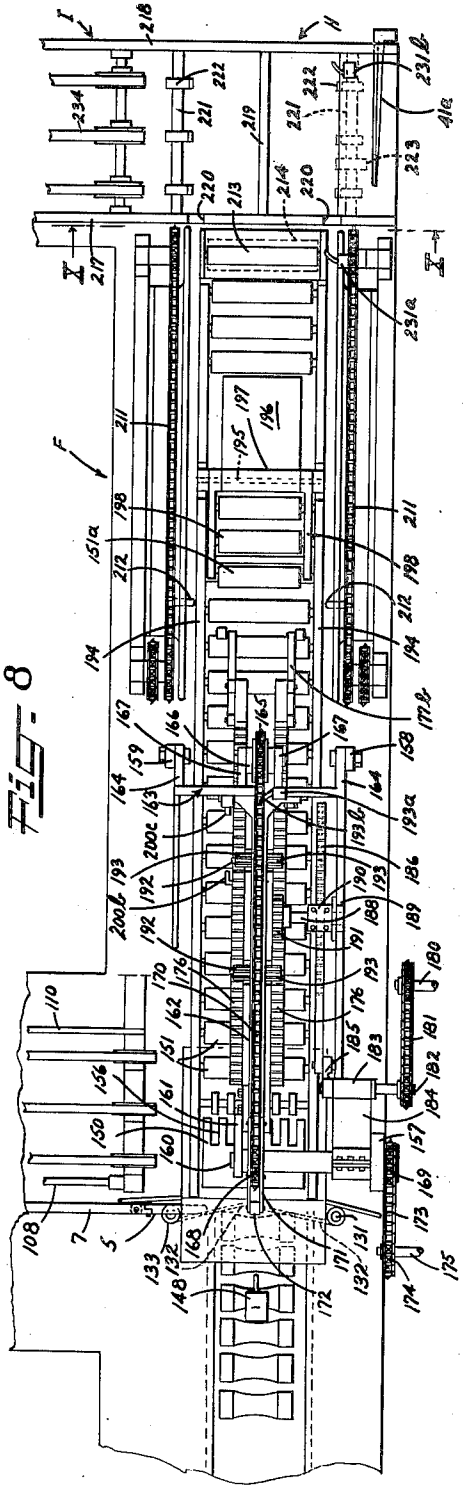


FIG. 8

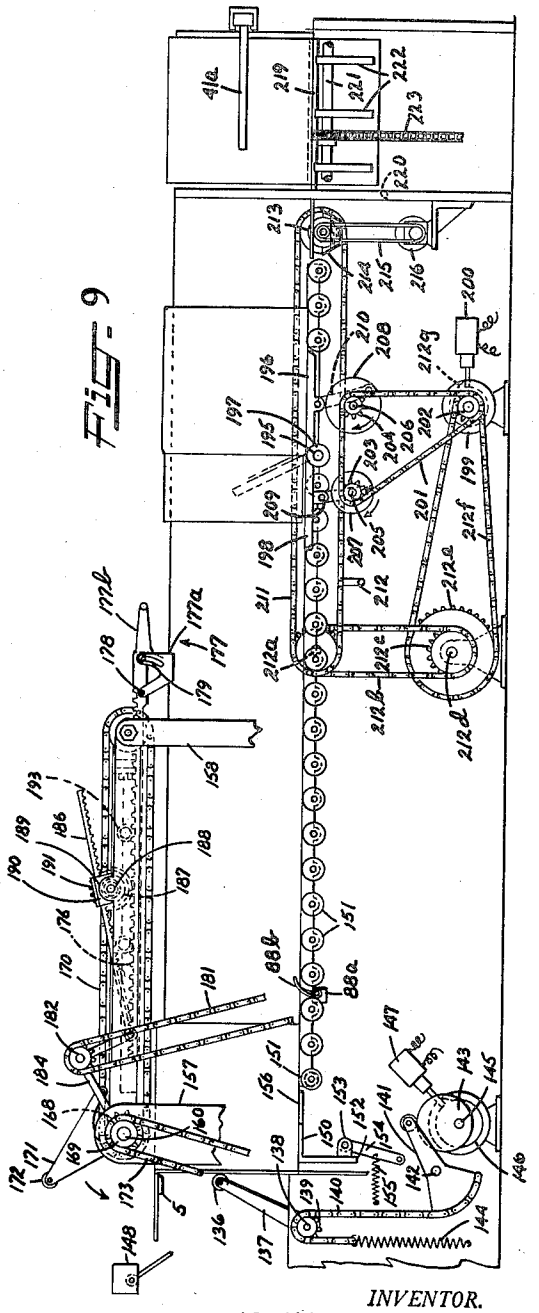


FIG. 9

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UNITED STATES PATENT OFFICE

2,586,006

PACKAGING MACHINE

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Application June 29, 1949, Serial No. 102,115

23 Claims. (Cl. 53—136)

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This invention relates to a machine for automatically conveying a carton and an article to be inserted into the carton along separate paths to a common carton filling or loading position, conveying the loaded carton to a flap gluing position, and then to a flap closing position from which it may be conveyed automatically to any other stage, such as weighing, labeling or the like.

It is the particular object of the invention to provide a machine which is adapted to effect the insertion of an article or aggregate of articles into a carton and subsequent sealing of the carton, which machine is adapted to handle cartons and articles of various sizes, though it is peculiarly adapted to rather large and heavy articles, such as wound rolls of cellophane, of paper, or of fabrics, yarn beams, and the like. Other objects and advantages of the invention will be apparent from the drawing and the description thereof hereinafter.

In the drawing, Fig. 1 is a diagrammatic chart showing in plan the general layout of the machine,

Fig. 2 is a plan view of the conveyer system which receives the open-ended carton,

Fig. 3 is an elevation view, with housings removed, of the conveyer shown in Fig. 2,

Fig. 4 is a plan view of the conveyer system for delivering the open-ended carton with flaps spread open into the loading position,

Fig. 5 is an elevation of the conveyer shown in plan in Fig. 4,

Fig. 6 is an elevation of a device for bending the lower flap into open position, as seen along section line V—V of Fig. 4,

Fig. 7 is a section on line VII—VII of Fig. 5,

Fig. 8 is a plan view of the loading position and the conveyer system for delivering the filled carton over a gluing means to a flap-closing position,

Fig. 9 is an elevation of the system shown in Fig. 8,

Fig. 10 is a sectional elevation taken on line X—X of Fig. 8,

Fig. 11 is an elevation view of a detail,

Fig. 12 is a diagrammatic electrical circuit, and

Figs. 13, 13*a*, 13*b*, and 13*c* show stages of operation of the inverting system at F.

In general, as shown in Fig. 1, an empty carton having the flaps at one end still open is delivered to the conveyer system A such as by a chute 3. From the end of system A, the carton is moved sidewise along conveyer system B to a carton filling position C. As the carton moves sidewise along conveyer B, it is disposed upon one side so that the open end lies in a vertical plane at the

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right side of B as viewed in Fig. 1. Near the first part of conveyer system B, at position B', a device is disposed for bending the lower flap so that it lies wide open substantially or approximately in the plane of the open end of the carton.

Whenever reference is made to bending flaps into the plane of the open end of the carton, it is to be understood that this includes any approximation of such plane and may include deviation of 5 to 30 degrees from such plane.

A stationary guideway or rail 4 extends along the conveyer B below its supporting surface so as to hold the bent flap in its downwardly opened position along the entire remaining portion of the conveyer B up to the carton filling position C. Farther along the conveyer system B, there is disposed at B_2 means for spreading the two side flaps into wide open position so that they lie approximately in the plane of the open end of the carton. This means comprises the rotatable cam drum or wheel 6. Another upwardly extending guide 7 for maintaining the side flaps in their wide open position terminates in a movable finger 5 which serves to hold the upper flap to prevent it from drooping or sagging into the path which the article must take as it is inserted into the open end of the carton.

The article is delivered into loading position by means of the conveyer system D. A conveyer system E is provided for transferring the filled carton to a package turning, inverting, or uprighting position at F in which two of the flaps are closed while the alternate two are left open. The turning at this position places the package so that it rests upon two opposite flaps folded in contact with the bed of the conveyer and the remaining two open flaps projecting downwardly on either side of the conveyer. From this position, the inverted package passes over an adhesive-applying station G and then to a flap closing position H in which the still open flaps are folded upwardly into contact with the previously closed, adhesive-coated flaps. From this position, a conveyer I serves to discharge the filled carton or to convey it to any desired station for additional operations, such as weighing, labeling, stamping or the like.

Figs. 2 and 3 show the conveyer system A to which the empty cartons are fed in any way desired, such as by hand, by chute 3 or by any other supply device. The system A comprises a belt means comprising a pair of belts 8 carried upon pulleys 9 and 10. The pulleys may be driven continuously in any suitable fashion, such as by a chain 11, sprocket 12 and shaft 13. The

belts 8 feed the carton onto a plate 14 with its open end facing the opening of the chute 3.

Means is provided for controlling the position of the flaps relative to the conveyer system B which takes off from a position next to the plate 14 at right angles to the direction of travel of conveyer system A. This position control means comprises a slide block 15 having one or more upwardly extending fingers 16 (two being shown) which are adapted to engage the trailing edge of the lowermost flap of the open-ended carton and to push the carton into the desired position. The slide block is mounted slidably upon one or more rods 17, two being shown. Forward motion of the slide 15 is obtained by means of a chain 18 attached thereto and extending over a sprocket 19 to a winch 20 which is adapted to be rotated by means of a shaft 21 provided with a clutch member 22. A driving clutch member 23 is freely rotatable on the shaft 21 and is continuously driven by chain 24 and a motor 25. The clutch member 23 is normally biased, such as by spring means (best shown in Fig. 5), out of engagement with member 22 by a yoke 26 pivotally mounted at 27 which is adapted to shift the clutch member 23 axially into engagement with 22. Swinging of the yoke 26 is effected by electromagnetic means, such as the solenoid 28. Return motion of the slide block 15 is effected by means of chain 29 (attached thereto) which passes about a sprocket 30 freely rotatable on shaft 13 and weighted at 31.

Forward motion of slide block 15 is initiated by the closing of a switch 32 which is in circuit with the solenoid 28. A finger 33, when engaged and swung by the leading edge of the carton, closes the circuit through the solenoid 28 and initiates forward motion of the slide block 15. The slide block 15 also carries a projecting lug 34 which engages the button or finger 35 of a switch 36, which is adjustably mounted on one of the rods 17 as by the set screw 37. The position of the switch 36 along the rod 17 controls the position to which the slide block pushes the carton. This is effected by virtue of the fact that actuation of switch 36 opens the circuit through the solenoid 28 so that it is de-energized. This releases the clutch and causes the weight 31 to return the slide block 15, the limit of return being controlled by a frame member 38.

With the exception of rotating switches 32 and 36, the contactor elements of the switches herein are returned to open position by springs (not shown) in conventional manner. In the case of all switches including 32 and 36, the lever that effects closing thereof is spring-returned to its normal position in readiness for the next actuation.

Button 35 when pressed also closes momentarily a switch 36*a* (Fig. 12) in circuit with solenoids 39 (see Figs. 3 and 11) and 67 (see Fig. 6). Solenoid 39, when energized, releases the latch of a single revolution clutch 40 for the purpose of operating the carton pusher 41. This pushing element 41 is disposed above the plate 14 and has a downwardly projecting arm 42 to which is secured a slide bar 43 adapted to slide in a horizontal guideway 44 secured to the frame. The horizontal reciprocating motion is imparted to the pusher 41 (see Fig. 11) by means of a crank arm 45, the outer end of which is provided with a pin 46 which operates in a slot 47 in the arm 42. The crank arm 45 is mounted rotatably on shaft 47' and is connected by a link 48 to an eccentric 49 which is driven by a chain 50 and a shaft 51 which is connected by the single revolution clutch 40, the constantly rotating input shaft of which is driven by chain 52 and motor 53. The shaft 51 is secured in conventional fashion to the shiftable clutch member of the single revolution clutch 40 and is driven when the latch releases the shiftable member and thereby allows it to engage the other clutch member secured to the clutch driving shaft driven constantly by motor 53. Hereinafter, this type of conventional system is meant whenever reference is made to a single revolution clutch.

Operation of the pusher 41 shifts the carton laterally or sidewise onto the conveyer system B which, in the first portion, comprises an endless belt 54 driven constantly by pulleys 54*a*. An overhead frame member 55 (which may take the form of an angle iron as shown) carries a rail 56 provided with a plurality of idler rollers 57. Upwardly extending cap screws 58 are secured to the rail 56 adjacent to each end. These cap screws extend through bores in the frame 55 and springs 59 serve to cushion the heads of the cap screws against the frame 55 in case of removal of all of the cartons. Normally, the springs do not interfere with the pressure exerted by the rollers 57 upon the upper surfaces of the cartons, such pressure depending upon the weight of the rail and roller system.

Alongside the conveyer system B near its receiving end, there is provided at B' means for bending the lower flap downwardly, which is particularly shown in side elevation in Fig. 6. This means comprises a sector member 60 which is secured to a shaft 61 for rotation therewith. Shaft 61 is rotated periodically through a single revolution by means of a sprocket 62, chain 63, sprocket 64 and a single revolution clutch 65, the latch 66 of which is retracted by means of a solenoid 67. Such retraction occurs when closing switch 36*a* by push button 35 energizes the solenoid 67. The normal rest position of the sector 60 is in the solid line position of Fig. 6 where it is out of the way of cartons being transferred by the pusher arm 41 onto the receiving end of conveyer system B and where it holds the lower flap of the box downwardly until such flap enters the space 68 between the guide 4 and the side wall 69 of the supporting frame for the system B. This space 68 extends the entire length of conveyer system B and serves as a guideway to maintain the lower flaps of the cartons in their downwardly bent position as they proceed along the conveyer into carton filling position.

At position B_2 of Figs. 1, 4, and 5, a carton is pushed into the space between upper belt means comprising one or more (three being shown) belts 70 and lower belt means comprising one or more belts 71. Each carton is brought and held in a definite position by means of upper and lower barricades. The upper barricade comprises a bar 72 with downwardly extending plates 73, such plates being spaced so that they do not interfere with the upper belts 70. The lower barricade comprises a similar bar 74 with upwardly projecting plates 75 also disposed so as not to interfere with the lower belt means 71. As shown more clearly in Fig. 7, the bars 72 and 74 have vertically extending lateral arms 76 and 77 respectively adapted to slide vertically in grooved guideways 78 provided in a vertical frame member or between two vertical channel-sectioned frame members 79. The opposed motions of the upper and lower barricades is imparted by

means of a lever system comprising a common interconnecting lever 80 pivoted about a fixed axis at 81 and links 82 connecting opposite ends of lever 80 to the vertical portions 76 and 77 of the barricades. A lever 83 connects the lower member 77 with an eccentric 84 carried by a shaft 85 which is rotated by means of a single revolution clutch 86, the latch 87 of which is retracted by means of a solenoid 88, the core 89 being linked to the latch through a lever 90 pivoted at 91. The solenoid 88 is energized when switch 88a is closed which is effected by each filled carton engaging finger 88b shortly after the carton leaves the loading position C. Energization of the solenoid retracts the latch, and spring 92 biases the latch so that it engages the tooth 93 of the ratchet 94 upon completion of a single revolution. The drive through the single revolution clutch in this instance is provided with a slip clutch so that slippage will occur when the barricades start to return but engage the upper and lower walls of the carton that they have just released. After this carton has passed beyond the barricades, they move into barricading position.

Once a carton is released by this barricade, the upper and lower belts 70 and 71 proceed to feed the carton to the next definite position which is controlled by a similar set of barricades 72a and 74a, having barricading plates 73a and 75a respectively. These barricades are operated in synchronism with the barricades 72 and 74 and by a similar linkage connected to the common link 80 by a parallelogram linkage comprising links 80' and 80'' and levers 80 and 80a, and the belts 70 and 71 feed the carton at a higher rate of speed than the belt 54 employed in the first part of conveyer system B.

Means is provided for spreading the vertical flaps into opened position as the carton proceeds from the first set of barricades 72 and 74 to the second set thereof. This means comprises the cam 6 which may consist of a spoked wheel or drum, the circumference of which is of the desired cam shape shown particularly in Fig. 4. As shown in Fig. 5, it is preferred that this cam wheel 6 have a height of considerable extent. In the actual showing, the height is almost the same as the length of the flaps to be turned. Such a height is unnecessary, however, as a relatively thin cam would also serve this purpose when the flaps are of a stiff cardboard composition. As the barricades 72 and 74 are lifted and the box leaves the position controlled by such barricade, the cam wheel 6 rotates in the direction of the arrow (Fig. 4) at a speed such as to cause the pronounced protuberance 6a to overtake the leading flap of the carton as it proceeds between the belts 70 and 71 and thereby to bend such flap into the plane of the open end of the carton. The flap in this position passes behind the inclined guide rod 7 which serves to maintain the flap in the bent position as it proceeds into loading position. The cam 6 not only flattens out the leading flap of the carton but the trailing bulge of the cam is in the way of the trailing flap of the carton and causes such flap to be bent back into the plane of the open end of the carton. At the completion of a single revolution of the cam, it comes to rest in the position shown in Fig. 4 wherein it is shown holding the trailing flap of the carton which is in the second barricaded position controlled by barricades 72a and 74a. The cam is secured to a shaft 95 driven through bevel gears 96 and 97 and a chain 98 deriving power from the output shaft of a single revolution clutch 99 controlled by a solenoid 100. This solenoid is energized by switch 88a as each filled carton passes over finger 88b.

The structure for supporting the pulleys 101 which carry the belts 70 comprises two standards having bearings 102 and 103 at their top. Rotatably mounted in these bearings are the shafts 104 and 105 respectively and shaft 105 carries a sprocket 106 which is driven by a chain 107. The two shafts carry a tie rod 108 connected thereto by the end bearing members 109. Also a bar 110 extends between the shafts near their supporting standards. The tie rod 108 and the bar 110 carry a plurality of transverse rods 111 which may be provided with roller sleeves to reduce friction as the carton passes thereunder. The standard 103 also carries a bearing sleeve 113 above that through which shaft 105 extends. A shaft 114 is rotatable within this sleeve and has secured to one of its ends an arm 115 and to the other end a plurality of arms 116. Arm 115 is connected by a link 117 to an eccentric groove 118 in a disk driven by a single revolution clutch under the control of a solenoid 119 controlled by a switch 119a having its actuating member 119b projecting partially above the belts 71 into the path of a carton leaving the second set of barricades 72a and 74a (Figs. 4, 5, and 7). The arms 116 are connected by links 120 to levers 121 and these levers carry at their ends rollers 122. This leverage system serves to give a final push to the carton to be sure that it is in proper filling or loading position. A carton is shown in loading position with its side flaps spread wide open and its lower flap down at the right end of Figs. 4 and 5. The upper flap is held out of the way of an article such as the roll R shown by means of a finger 5 pivoted at 125 and biased in a counterclockwise direction into the position shown in Fig. 5 by a helical spring 126.

While belt means 70 and 71 may be continuously driven so that the belts slip relative to the cartons when the latter are held up by the barricades, it is also contemplated that 70 and 71 be driven intermittently through a single revolution clutch or equivalent means under the control of switch 88a. In such arrangement, the belts 70 and 71 start to move when the barricades start to open. However, a switch 126', closed by engagement of one of the barricades (as 74 in Fig. 7) may be used to control a single revolution clutch connected in the drive for belts 70 and 71.

Any suitable means may be provided for delivering the article to the carton-filling position and as shown in Figs. 4 and 5, the conveyer system D comprises a plurality of rolls 127 disposed in the upper surface of a table leading to the filling position. These rolls are driven such as by being provided at their ends with sprockets 128 which are driven by a common chain 129. In front of the loading position and disposed on each side of the opening of the carton are disposed two upright posts 130. Pivotally mounted upon stationary rods 131 secured in concentric relation to the posts 130 are a pair of strips 132 having hub portions 133. The coil springs 134 bias the member 132 at the left in a clockwise direction and the right member 132 in a counterclockwise direction, when viewed from above, into the position shown in Fig. 8. In this position, they serve to keep the side flaps of the open-ended carton from returning from their bent positions as the carton passes the loading position. Also, as an article is inserted into the carton, these strips 132 pivot about the rods 131 and are swung into the carton along with the article so that

they take a position approximately parallel to the wall of the carton. During the insertion, this swinging action serves to prevent the leading end of the article from becoming caught against one or the other side of the open-ended carton. Instead, strips 132 smoothly guide the article into the carton.

At a point a short distance in front of the loading position, the conveyer D is provided with a short gap which receives a transverse roller 136 rotatably supported at its ends in two arms 137 which are secured to a shaft 138 carrying a sprocket 139. A chain 140 is connected to a sector lever 141 (Fig. 9) pivotally mounted at 142. A cam or eccentric 143 actuates one end of lever 141 and a spring 144 serves to return the system as the cam permits. The cam is driven by a shaft 145 through a single revolution clutch 146 under the control of a solenoid 147. Solenoid 147 is energized to cause operation of the pusher when the switch member 148 is swung by the carton as it proceeds to the loading position.

In the loading position, the carton is supported upon a front plate 150 (which normally occupies the position shown in Figs. 8 and 9) and also one or more rolls 151. The plate 150 has a depending skirt 152 provided with one or more lugs 153. A link 154 pivotally connects each lug to the frame and a spring 155 serves to bias the system into the position shown in Fig. 9. The roll 151 which is nearest plate 150 may be provided with annular grooves and the plate 150 may be complementarily notched as at 156 so that when a loaded carton is pushed to the right in Figs. 8 and 9, the plate 150 can move to the right to allow the lower flap to swing upwardly into the plane of the bed of the conveyer. After this movement of the flap, the spring 155 returns the plate 150 to the position in which it is shown.

The following means is provided for transferring the loaded package from loading position to a turning or inverting position. The conveyer bed comprises a plurality of idler rolls 151 over which the package is pushed by an overhead system which is supported from standards 157 and 158 at one side of the conveyer bed and the standard 159 on the other side thereof. A cantilever shaft 160 extends through a suitable bearing provided in the standard 157 and an offset frame member 161 extends from the outer end of the shaft 160 and is fixedly secured to an intermediate supporting bar 162. The other end of the bar 162 is secured to a transverse bar 163 which in turn is secured to horizontal members 164 supported by the standards 158 and 159. A sprocket 165 is mounted on a short shaft 166 rotatably supported in a pair of brackets 167. The shaft 160 has secured thereto a sprocket 168 in alignment with sprocket 165 and another sprocket 169 at the end of the shaft adjacent of the standard 157. A chain 170 extends in driving relationship about sprockets 165 and 168 and carries a pair of projecting plates 171 between the ends of which a roll 172 is supported. The plates 171 and roll 172 together constitute an element or device for pushing the carton forward. When this chain 170 is driven, and this is accomplished by means of the sprocket 169, a chain 173, a sprocket 174, and a drive shaft 175, which is also under the control of a single revolution clutch operated by a solenoid energized when a carton actuates switch 148, the pusher element comprising the roll 172 travels (in the direction of the arrow in Fig. 9) downwardly against the upper flap of the open-ended carton in the loading position, thereby closing this flap (this being permitted by the spring 126 associated with the supporting finger 5) and then pushing the loaded carton to the right in Figs. 8 and 9. The normal position of rest of the pusher device 171, 172 is that shown in Figs. 8 and 9.

This overhead supporting structure carries a guideway for a pair of toothed racks 176 which are reciprocable in the direction of travel of the carton along the conveyer system. At the foremost end of each rack 176, there is mounted a pusher element 177 pivotally mounted at 178 and having a pin and slot connection at 179 to allow the element 177 to be lifted upwardly about the pivot 178 within the limits permitted by the slot 179 by a carton passing thereunder. The element 177 has a downwardly extending shoulder or edge 177*a* which is adapted to engage the rear panel of the carton and push the latter forward. The element 177 may also have a projecting arm 177*b* extending at about right angles to the shoulder 177*a*. This arm tends to prevent lifting of the carton and consequent overturning when the shoulder 177*a* pushes it ahead. The outer end of the arm 177*b* may carry a roll 178'.

The drive means for these racks comprises a shaft 180, a chain and sprocket drive 181 from that shaft to a shaft 182 which is mounted in a bearing 183 provided in an extension 184 from the bearing carried by the standard 157. An arm 185, fixedly secured to a shaft 182, is pivotally connected to a toothed rack 186 which is held in engagement with a pinion 187 fixedly mounted on a shaft 188 rotatably mounted in a frame member 189. A yoke 190 pivotally mounted on the shaft holds the rack 186 in engagement with the pinion 187. A gear 191 is fixedly secured to the shaft 188 and engages one of the racks 176. Motion of the rack engaged by gear 191 is transmitted to the other rack by means of transverse shafts 192 extending through the intermediate supporting member 162 and carrying fixedly mounted thereon a pair of pinions 193 which engage the respective racks. The shaft 180 is operated through a single revolution clutch controlled by a solenoid which in turn is energized by closing of a switch 193*a* actuated by one of the plates 171 when the latter passes the switch lever 193*b* mounted in its path above the transverse bar 163.

It should be noted that at least near the carton-inverting position F the side frame members 194 within which the idler rollers 151 are journaled are spaced a distance from each other such that the overall width of the conveyor in the neighborhood of the inverting position is less than the width of the carton. The purpose of this is to permit the side flaps to hang down at each side of the frame members 194 when the carton is inverted to a position in which its open or unsealed end is down.

At the inverting position F, the rails or side frame members 194 are provided with a transverse shaft 195. A lifting plate 196 is carried by a bearing sleeve 197 journaled upon the shaft, and a pair of lifting arms 198 are similarly pivotally mounted on the shaft 195 on either side of the lifting plate 196. The rolls 151*a* are narrowed to accommodate the arms 198 in the bed of the conveyor. In the solid-line position, shown in the Fig. 9, the lifting plate 196 and the lifting arms 198 have their upper surfaces substantially flush with a tangent to the upper peripheries of the rollers 151 and 151*a*.

After the pushing member 171 has advanced

the loaded carton into a position just ahead of the pusher members 177, the latter members push the carton into the position shown in solid lines in Fig. 9 so that it rests upon the plate 196. Means is provided for swinging the arms 198 into the dotted angular position shown in Fig. 9 and then upwardly tilting plate 196 so as to swing the carton resting on plate 196 back against the arms 198, after which arms 198 lower the carton down to the bed of the conveyor while plate 196 at first continues to transfer the full weight of the carton onto the arms 198 and then recedes into the bed of the conveyor.

These motions are shown in Figs. 13, 13*a*, 13*b* and 13*c* and are imparted by the following means under the control of a single revolution clutch 199 which in turn is under the control of the solenoid 200 which is energized by closing of a switch 200*a* effected when lug 200*b* on one of the racks 176 engaged the push button 200*c* of the switch. This engagement occurs at the end of the forward stroke of racks 176. A chain 201, driven by a sprocket 202 on the output shaft of the single revolution clutch, drives sprockets 203 and 204 on shafts 205 and 206 respectively, which shafts carry the crank discs 207 and 208 respectively. Links 209 and 210 connect the discs 207 and 208 to the arms 198 and the plate 196 respectively. It will be noted that the relative positions of the connections between links 209 and 210 and the discs 207 and 208 respectively are such as to cause arms 198 to lift first into the dotted line position shown in Fig. 9. Then the plate 196 lifts the carton and transfers its weight to the arms 198 as such arms are again lowering into the conveyor bed and thereafter plate 196 itself returns to the bed. The solid-line position shown in Fig. 9 shows the normal position of rest of these elements.

Means is provided for conveying the inverted carton to a glue-applying stage G and then to a flap-closing stage H. This means comprises a pair of chains 211 disposed at each side of the conveyer path with the upper course of the chains just above the bed formed by the rolls 151 and 151*a*. These chains are entirely outside the path of the carton but have lateral projecting lugs 212 which serve to come up behind the inverted carton and engage it at each side to push it forward past the gluing position into the flap-closing stage H. These chains are driven by a sprocketed shaft 212*a* which in turn is driven by a chain 212*b*, a sprocket 212*c*, shaft 212*d*, sprocket 212*e*, chain 212*f*, and sprocket 212*g* on the output shaft of the single revolution clutch 199. Lugs 212 are shown in their normal position of rest.

The glue-applying means comprises a roll 213 having its upper surface in the bed of the conveyor and dipping into a tank 214 containing glue or any other adhesive. This roll may be driven as by a belt 215 and a continuously operating motor 216. At the flap-folding position H, the framework comprises a pair of parallel side members 217 and 218 extending across the path taken by the carton as it is pushed into the flap-folding position. A fixed narrow strip 219 extends between members 217 and 218 in approximate alignment with the center line of the package as that package approaches and is finally placed upon the strip. Frame member 217 is provided with notches 220 through which the downwardly extending flaps at each side of the carton may pass as the carton moves into flap-folding position.

A pair of parallel shafts 221 are disposed below the carton and have a number of arms 222 fixedly secured thereto and extending downwardly in the solid-line position shown in Fig. 10 when the carton is transferred into the folding station. Means is provided for rotating these shafts in order to swing the arms 222 upwardly against the flaps to press them against the other two flaps to which glue has already been applied. This means comprises chain and sprocket systems 223 and the interlinking chain and sprocket system 224, and a shaft 225 for carrying a gear 226 which engages the reciprocating rack 227. The rack 227 is moved up and down by means of a groove in a cam 228 within which the follower 229 projecting from the rack bar runs. The cam is driven by a single revolution clutch 230 which is under the control of a solenoid 231. The solenoid 231 is in series with two switches 231*a* and 231*b* and both must be closed by the carton before the solenoid is energized. This condition occurs when the carton is almost completely in the flap-closing position H. The flap-closing means starts to operate and then switch 231*a* opens so that the solenoid 231 is de-energized before the clutch 230 can complete a single revolution.

In the upper position of arms 222, a switch lever 232 is actuated by one of such arms, thereby closing switch 233 which energizes a solenoid controlling a single revolution clutch which drives a pusher arm 41*a*, driven by the same or equivalent means as that described above for the driving of pusher 41. This transfers the package from the flap-folding position to a conveyer system I which may comprise a plurality of driven belts 234 by which the sealed package may be transferred to any other stage of operation, such as weighing, labeling, printing or the like.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A carton handling system comprising means for conveying an open-ended carton sidewise to a temporary position of rest, means for loading an article into the carton in said temporary position of rest, means for turning the carton into inverted position with the inner flaps folded under the carton and the outside flaps projecting downwardly therefrom, means for conveying the filled carton endwise from the loading position to the turning means, a conveyor comprising a bed of rollers adapted to support the carton for conveying the inverted carton to a carton-closing station, means for applying adhesive to the inside flaps folded under the inverted carton comprising a roll mounted in the roller bed of the conveyor in advance of the carton-closing station and means for supplying adhesive to the roll, and means disposed at the carton-closing station beneath the level of the conveyor bed for folding the flaps with the adhesive therebetween to close the carton.

2. A system in accordance with claim 1 comprising means disposed along the first-mentioned conveying means for spreading or bending the flaps wide at the open end of the carton.

3. A system in accordance with claim 1 comprising means along the first-mentioned conveying means for folding the lower flap downwardly and a guideway adjacent the first-mentioned conveying means extending from the last-named folding means to the temporary position of rest

for maintaining the flap in downwardly extending position.

4. A system in accordance with claim 3 comprising means for spreading the side flaps wide open as the carton advances to the temporary position of rest.

5. A system in accordance with claim 4 in which the side flap spreading means comprises a member rotatable on a vertical axis and having a cam-shaped periphery as viewed along the direction of the axis, and means for intermittently rotating the cam-shaped member.

6. A system in accordance with claim 5 comprising barricade means for stopping the carton in a predetermined position in relationship to the cam-shaped member.

7. A system in accordance with claim 6 comprising additional barricade means between the first-mentioned barricade means and the filling position, swinging means for pushing the carton into filling position, and swinging means for pushing the article into the carton.

8. A system in accordance with claim 1 comprising a conveyer for delivering an empty carton with its open end trailing in a direction at right angles to the first-mentioned carton conveying means, means for moving the open end of the carton to a predetermined position with respect to the side of the said first-mentioned conveying means, and means for transferring the so-positioned carton sidewise onto the first-mentioned conveying means.

9. A system in accordance with claim 1 in which the means for turning the carton into inverted position comprises oppositely extending members pivotally mounted on a common axis transverse of the filled carton conveying means, said members having their upper surfaces normally disposed in or beneath the bed of said conveying means, and means for swinging said members upwardly and then back to normal position in timed relationship.

10. A system in accordance with claim 9 in which the width of the bed of the filled carton conveying means near the turning means is less than the width of the carton and unobstructed flap-receiving channels or spaces are provided on each side of said conveying means beneath the level of the bed thereof.

11. A system in accordance with claim 10 in which the filled carton conveying means comprises a pair of chains disposed along the outer sides of the flap-receiving channels, and having their upper courses above the level of the conveyer bed, inwardly projecting lugs extending from the chains and arranged to engage the trailing face of the inverted carton for pushing it forward over the adhesive-applying means to the flap-closing station.

12. A system in accordance with claim 11 in which the flap-closing means comprises a strip for supporting the carton, said strip extending approximately in alignment with the center line of the filled carton path as it is received in the flap-closing station, oppositely disposed upwardly swingable means normally positioned beneath the strip and pivotally mounted on axes parallel to the strip but spaced outside the paths of the flaps discharged from the flap-receiving channels, and means for swinging the swingable means upwardly to press the flaps up against the adhesive bearing flaps.

13. A system in accordance with claim 12 comprising means for moving the carton out of the flap-closing station at an angle to its direction of entry therein.

14. A system in accordance with claim 1 comprising a plate for supporting the open end of the carton in filling position, said plate being mounted for reciprocating movement in a direction endwise of the carton, and spring means urging the plate into its normal position of rest.

15. A system in accordance with claim 14 in which the filled carton conveying means comprises a plurality of supporting idler rollers in the bed of the conveyer, a chain above the carton path, a lug extending outwardly from the chain to engage the carton and move it forward, and means for driving the chain.

16. A system in accordance with claim 15 in which the filled carton conveying means comprises auxiliary means for moving the carton ahead beyond the position to which the lug advances it into the carton-inverting position.

17. A carton handling system comprising means for turning a carton through a 90° angle from a position on its side into inverted position, means for conveying a carton to the turning means, said turning means comprising oppositely extending members pivotally mounted on a common axis transverse of the carton conveying means, said members having their upper surfaces normally disposed in or beneath the bed of said conveying means, and means for swinging said members upwardly and then back to normal position in timed relationship.

18. A system in accordance with claim 17 in which the width of the bed of the filled carton conveying means near the turning means is less than the width of the carton and unobstructed flap-receiving channels or spaces are provided on eacn side of said conveying means beneath the level of the bed thereof.

19. A system in accordance with claim 18 in which adhesive-applying means is disposed in the conveyor bed and the filled carton conveying means comprises a pair of chains disposed along the outer sides of the flap-receiving channels, and having their upper courses above the level of the conveyer bed, inwardly projecting lugs extending from the chains and arranged to engage the trailing face of the inverted carton for pushing it forward over the adhesive-applying means to the flap-closing station.

20. A carton handling system comprising means for turning a carton through a 90° angle, a bed of rollers for supporting a carton and extending to the turning means, said turning means comprising oppositely extending members pivotally mounted on a common axis transverse of the roller bed, said members having their upper surfaces normally disposed in the roller bed, means for pushing a carton over the rollers to the forwardly extending member of the turning means, means operated in timed relation with said pushing means for swinging the members of the turning means upwardly and then back to normal position, the forwardly extending member being swung through a greater angle than the backwardly extending member sufficient to transfer the weight of the carton from the forwardly extending member to the backwardly extending member whereby the carton is turned through a 90° angle when it again comes to rest on the roller bed.

21. A system as defined in claim 20 comprising means operated in timed relation with the swinging means for conveying the carton ahead of the turning means.

22. A system as defined in claim 21 in which the width of the roller bed is less than the width of the carton and unobstructed flap-receiving channels are provided on each side of the roller bed beneath the level of the bed from the turning means to a flap-closing station beyond.

23. A system as defined in claim 22 comprising an adhesive-applying roll in the roller bed at a position between the turning means and the flap-closing station, and means beneath the roll to supply adhesive thereto.

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